

CALIFORNIA HORSE RACING BOARD

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In response to the extraordinary number of racehorse fatalities that occurred during the race meet at Santa Anita that began on December 26, 2018, the California Horse Racing Board (CHRB) initiated an investigation into each of the deaths.

Concurrently, the Los Angeles County District Attorney's Office began its own investigation. That report focused on violations of the penal code and "did not find evidence of criminal animal cruelty or unlawful conduct relating to the equine fatalities at Santa Anita Park."

This CHRB report on the 23 fatalities that occurred at Santa Anita between December 30, 2018, and March 31, 2019, looks back at the circumstances and causes of each fatality. It also looks forward, using its findings to make recommendations that can change current practices that may have contributed to the tragic loss of horses. The CHRB set a simple goal: 1) to find out what happened; 2) to recommend ways to prevent it from happening again, and 3) to offer a framework for a comprehensive culture of safety in horse racing in California.

Because each case involved veterinary medical research and analysis, interpretation of necropsy results, and interviews with attending veterinarians, the Board relied primarily on the expertise of three scientists: Rick Arthur, DVM; Tim Grande, DVM; and Alina Vale, DVM, MS. Dr. Arthur is the Board's Equine Medical Director. Dr. Grande is the CHRB Official Veterinarian assigned to Santa Anita. Dr. Vale, who holds a Master of Veterinary Forensics degree, is an Official Veterinarian assigned specifically to coordinate this project.

Those three individuals were the main contributors to the report. They were joined by six CHRB Investigators, three Safety Stewards and several members of the CHRB staff. Susan Stover, DVM, PhD, was a special contributor to the report. The Racing portion of the report, which encompassed the entire race meet, was compiled by CHRB staff. The Board has recorded details and circumstances of every fatality that has occurred within a CHRB licensed enclosure since 2007. Those statistics, along with rainfall and track maintenance data, are the basis for the related charts and graphs.

The CHRB views the issuance of this report not as the completion of a project but rather a component of its ongoing and continual commitment to improve racing for the good of the horse and rider.

A handwritten signature in blue ink, appearing to read "Rick Baedeker".

Rick Baedeker
Executive Director

California Horse Racing Board

Business, Consumer Services and Housing Agency

Report on Fatalities at Santa Anita Park from 12/30/18 through 3/31/19

The CHRB general office is located at 1010 Hurley Way, Suite 300, Sacramento, CA 95825.
Field offices are located at all operating racetracks. Additional reports are available at:
www.chrb.ca.gov

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Introduction

Twenty-three thoroughbred racehorses died during racing or training at Santa Anita Racetrack between December 30, 2018, and March 31, 2019. Twenty-two of those horses incurred a fatal musculoskeletal injury; one horse died suddenly during training. The California Horse Racing Board (CHRB) routinely reviews all fatalities but opened an in-depth investigation of these 23 deaths. The goals of this CHRB investigation were to uncover any potential CHRB violations related to these fatalities and, more importantly, to analyze the information in order to improve racehorse welfare and safety in California. The purpose of this investigation was fourfold: 1) To prevent more horses from suffering catastrophic injuries as part of the cluster or outbreak; 2) To prevent future clusters or outbreaks of catastrophic injuries; 3) To further understand the etiology (causes) of catastrophic injuries; and 4) To develop injury prevention strategies.

Ten fatal incidents occurred during a high-speed workouts (“breeze”) in morning training, and 13 horses suffered injuries during afternoon racing. Seventeen incidents occurring on the dirt track, and six on the turf (grass). Most horses had permanent stabling at Santa Anita, while one horse shipped to race from Los Alamitos; one horse had recently relocated from Golden Gate Fields and was breezing at Santa Anita for the first time. Affected horses ranged from 3 to 7 years old with an average age of 4 years. There were eight females (fillies or mares), 11 geldings, and four intact males (colts or stallions). Orthopedic injuries included: 19 fetlock failures, two metatarsal bone fractures (5 and 7-year-old stakes mares injured on the turf one day apart), and one carpal bone fracture (3-year-old gelding). The catastrophically injured limb was the left front in seven horses, right front in nine horses, left hind in three horses, right hind in two horses, and both front limbs in one horse.

There were four additional non-exercise related fatalities during this time period that were not part of the special investigation. Those were three colics, two in ponies and one in a racehorse, and a laminitis in a racehorse. After March 31 through the end of the Santa Anita race meet June 23, there were seven additional racing and training fatalities and two non-exercise fatalities. Except for one racing and one training fatality, both involving the fetlock joint, those cases are pathologically distinct and are not included in this report.

Fatality Investigation Summary

On March 13, 2019, CHRB Investigators opened individual law enforcement investigations on each racing and training-related horse fatality that occurred at Santa Anita Park during the race meet that began on December 26, 2018. The scope of these investigations was to determine if any CHRB rules or criminal laws had been violated. Six in-

vestigators (sworn peace officers) were assigned to coordinate the investigations. They were teamed up with CHRB Official Veterinarian Dr. Tim Grande and a CHRB Safety Steward to assist with the investigations.

All 23 horses underwent necropsy performed by pathologists within the CHRB/University of California, Davis, Post-Mortem Program.

On March 15, 2019, the Los Angeles District Attorney’s Office opened a criminal investigation into the horse fatalities at Santa Anita. The CHRB Investigators worked collaboratively with the District Attorney’s Office through this investigation. The District Attorney’s Office was provided with copies of all documents, reports, and interviews.

CHRB staff in Sacramento assisted with researching each horse and provided CHRB investigators and those with the District Attorney’s Office with internal CHRB information and with public information, such as past performances, workouts, and other background information. The required Veterinary Confidential reports (Form CHRB-24) submitted to the CHRB Official Veterinarian detailing treatments and medications prescribed and/or administered by practicing veterinarians were carefully reviewed for each horse. These covered at least the 30 days preceding each fatality and in some cases longer, as determined by investigators in consultation with CHRB veterinary staff. The CHRB issued over 70 subpoenas to trainers and veterinarians requiring them to provide various documents to the CHRB. The necropsy examination and toxicology reports were reviewed by investigators and CHRB veterinary staff. Video footage was reviewed for racing incidents.

After the review of all the collected documents, investigators and CHRB veterinary staff interviewed trainers, jockeys/riders, and attending veterinarians. Over 100 detailed interviews were conducted. For each horse fatality, the investigator wrote an investigative report covering the entirety of the law enforcement investigation, concluding with whether any CHRB rules or criminal laws appeared to have been violated. Seven complaints will be filed alleging violations of Rule 1842, Veterinarian Report, for failing to turn in daily reports, and three complaints will be filed alleging violations of Rule 1894, Duties of a Trainer, and/or Rule 1489(a)(4) Grounds for Denial or Refusal of License, for training without the proper license. None of the investigations found evidence of an animal welfare violation (CHRB Rule 1902.5).

Investigative reports, veterinary confidential reports, and necropsy reports are considered confidential by California statutes and the courts. Therefore, the names of horses, trainers, owners, jockeys, and veterinarians have been withheld to comply with those legal considerations.

Official Veterinarian's Role

The CHRB veterinary staff has been reviewing necropsy reports with trainers and other licensees since 2016. This fatality review program is designed to be an educational tool for trainers and attending veterinarians, as well as a fact-finding tool, providing information relevant for developing strategies to prevent injuries in the future.

The Official Veterinarian conducts the fatality review program as the representative of the CHRB. The Official Veterinarian is tasked with reviewing Veterinary Confidential reports, the health and racing soundness record (Form CHRB 1846) for the subject horse, and the final necropsy report. Additional information is collected from Equibase, including racing (past performances, result chart) and training (workout history) records. Prior to interviewing licensees, the Official Veterinarian identifies key training, veterinary care, and horse health information relevant to the injury event.

After producing a summary of the incident, the Official Veterinarian schedules an interview with the trainer to discuss the case findings. The trainer is asked to bring training records and any additional veterinary medical history

pertaining to the horse. The trainer also has the option of inviting the attending veterinarian to the interview.

The protocol for this review program was augmented to suit the mandated investigation for the cluster of fatalities that occurred between December 30, 2018, and March 31, 2019, at Santa Anita Park. In addition to the aforementioned records, full exercise history reports were developed by Dr. Susan Stover's Veterinary Orthopedic Research Laboratory (VORL) at UC Davis. Trainers and attending veterinarians were subpoenaed to submit training and veterinary medical records dating back for longer time periods (months v. weeks) than previously utilized. Trainers and attending veterinarians were also required to appear for interviews as part of the fact-finding process. In some cases, owners, racing managers, additional veterinarians, and previous trainers were asked to appear. These interviews were conducted in conjunction with a CHRB investigator assigned to each case.

Following data collection, the Official Veterinarian produced a written summary of the incident highlighting all relevant information, including potential CHRB rule violations. The following Key Findings and Recommendations will be more fully detailed in the body of the report.

Key Findings

- No illegal medications or procedures were uncovered.
- 21 horses had evidence of pre-existing pathology at the site of their fatal injury based on gross pathology.
- 19 of the 22 catastrophic musculoskeletal injuries (CMI) had proximal sesamoid bone fractures. Proximal sesamoid bone fractures have been related to racing and training intensity.
- 21 of the 22 CMI cases had evidence of pre-existing pathology that is presumed to be associated with high exercise intensity, which predisposed CMI horses to catastrophic injury.
- Eleven horses had received intra-articular (joint) corticosteroid injections. Five of those intra-articular corticosteroid injections were within 60 days of fatal injury, and two of those were within 14 days of injury.
- The overwhelming majority of the CMI (21 of 22 cases) in this cluster involved the fetlock joint (metacarpophalangeal/metatarsophalangeal).
- The majority of CMI cases (14 of 22) exhibited a high-intensity exercise profile followed by a decline in activity in the month prior to CMI.
- Nearly a third of the CMI cases (7 of 22) had a history of at least six months between race starts at some point in their respective careers.
- The data suggests that 39% of the fatalities occurred on surfaces affected by wet weather.
- Although several trainers expressed concern over the condition of the track due to the weather, none blamed the track itself for any fatality.
- Prior to the fatality review, the majority of horsemen had not previously reviewed the necropsy reports on their horses; furthermore, many did not display good working knowledge of anatomy or grasp the significance of major pre-existing lesions (e.g., Palmar/Plantar Osteochondral Disease (POD) lesions).
- Record-keeping by the horsemen involved in the investigation overall was poor save in a couple of instances. Large gaps in historical information were noted in case histories for the affected horses.
- Organizationally the Track Veterinarian and Examining Veterinarians being supervised by the racing association's Racing Office poses an inherent conflict.
- In several cases it is suspected that program training was taking place. Program training entails someone controlling (overseeing) the horse other than the listed CHRB-licensed trainer.
- 16 horses were under the care of trainers with at least one other fatality within a 12-month period.
- While several trainers said during investigative interviews that they felt pressured to run their horses, only one gave a specific example.

Summary of Recommendations

In furtherance of promoting a comprehensive culture of safety in horse racing in California, CHRB presents the following recommendations, which are detailed in this report.

Track Maintenance, Condition, And Safety

- Make track-related data and maintenance protocols accessible to horsemen via digital record-keeping system – page 8.
- Implement protocols for real-time adjustment based on track performance – page 9.
- Monitor speed of surface race-by-race, adjusting for class level – page 9.
- Explore utilizing weather-based algorithm(s) for track maintenance and closures – page 18.

Track Management: Racing Office, Entries, Race Conditions, Training

- Write condition books (proposed races) based on existing horse populations – page 7.
- Communicate with the association's veterinary department during entry process – page 7.
- Standardize protocols for moving races from the turf course – page 18.
- Establish strict criteria for canceling racing based on weather and surface conditions – page 18.
- Require additional veterinary examinations and/or diagnostics for horses racing or working on 'off' tracks – page 18.
- Regulatory veterinarians at their discretion should have the capability of conducting expanded lameness evaluations incorporating current technology, including photography and/or video for documentation purposes utilizing facilities provided by management, including areas of hard (concrete) surfaces and round pens – page 24.
- Establish video surveillance systems at all CHRB facilities – page 30.
- Restructure claiming rules and policies – page 30.

Trainers and Training Practices

- As a contingency of stall applications/horseman's agreements, trainers should be required to maintain basic health records on individual horses in their care – page 24.ⁱ
- Require continuing education for trainers and attending veterinarians – pages 27, 29.ⁱⁱ
- Provide greater detail on recent exercise history for CHRB review panel to evaluate horses – page 27.

- Workout requirement criteria should be re-evaluated – page 27.
- Criteria for official workouts should be established for unraced 4-year-olds, horses returning from layoffs greater than one year, and at the discretion of regulatory veterinarians for horses returning from layoffs greater than 120 days – page 28.
- Require compulsory diagnostic imaging based on exercise history criteria – page 28.
- Require compulsory official examinations and/or workouts for horses returning from layoffs or making belated racing debuts – page 28.
- Require compulsory rest for horses based on rate of accumulation of high-speed furlongs time in training or number of recorded high-speed event – page 28
- Require review of necropsy reports by trainers and others specified on their horses – page 29.ⁱⁱⁱ

Private Practitioners and Veterinary Practice

- Efforts should be made to transition to digital veterinary medical records – pages 22, 23.^{iv}
- Private practitioners should seek to increase physical examinations prior to high-speed workouts, race entries, and intra-articular (IA) therapy – page 23.
- Private practitioners should seek to increase diagnostic procedures prior to IA therapy; the CHRB should consider specific regulations requiring diagnostic imaging prior to repeated IA treatments in the same horse – page 23.
- Clear policies on physical therapy treatments should be established identifying allowable times for physical therapy relative to racing or training, and determining which treatments require a veterinary prescription – page 23.
- Require that medical records follow the horse – page 31.^v

Horse Safety and Welfare

- Industry support is needed for research to better understand proximal sesamoid bone (PSB) and Fetlock Injuries – page 27.
- Industry support of research is needed to better understand the relationship between dorsal metacarpal/metatarsal disease (DMD) and CMI – page 27.
- Industry support of research is needed to better understand the etiology of medial PSB osteopenic lesions – page 28.
- Maintain a database of injuries, veterinary procedures for safety, and research – page 30.
- Provide facilities for turn-out – page 30.

Regulatory Veterinary Procedures and Practices

- Examinations closer to the completion of high-speed events (i.e., post-workout and post-race) would improve identifying horses at risk of major injury with continued training and racing – page 25.
- Additional regulatory veterinary positions are necessary to improve efficiency and handle the overall increase in official veterinary examinations, including review of previous examination records for all horses undergoing fitness examinations – page 25.^{vi}
- Track Veterinarians and Examining Veterinarians should be under the direct supervision of the Official Veterinarian or Equine Medical Director – page 25.^{vi}
- Require compulsory diagnostic imaging based on known risk factors for PSB fractures – page 27.
- Regulatory veterinarians should be empowered with the authority to order diagnostic procedures and imaging as a condition of continued racing and training – page 28.

California Horse Racing Board

- Refine CHRB entry review panel and expand to all CHRB racetracks – pages 8, 25, 27.
- Create a Veterinary Investigator position focused on necropsy review program – page 29.
- The CHRB should implement its proposed measures for expanding the list of prohibited medications and practices, including but not limited to the use of bisphosphonates, extracorporeal shockwave therapy, thyroxine, and furosemide (Lasix) – page 23.^{viii, ix, x}

- Restrictions on medications that can be administered for workouts must be expanded and enforced – page 24.
- Track Veterinarian emergency procedures should be formalized, including requiring filing CHRB Form 24 reports and obtaining post-injury samples from all horses treated in on track emergency incidents – page 25.
- Increase research on catastrophic injuries including efficacy of special diagnostic modalities (PET Scan, MRI) – page 27.
- Restrictions and controls must be in place to ensure that horses are suited for high-speed workouts and racing and training records must be examined before horses are permitted to work – page 27.
- Continuing education should be required as a condition of licensing with a focus on the etiology of common veterinary syndromes of the thoroughbred racehorse – page 29.^{xi}
- Licensing requirement for both trainers and assistant trainers should be expanded and potentially standardized on a national level and include requiring a specific length of apprenticeship or animal experience hours before eligibility to apply – page 29.
- Program training should be expressly prohibited in the CHRB rules and regulations, and strictly enforced – page 29.^{xii}
- The potential association between crop use and serious musculoskeletal injury should also be systematically examined – page 29.

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- i Proposed language was approved by the Board and the public hearing will be on March 19, 2020. See Rule 1842.5
 - ii Proposed language was approved by the Board at the November 2019 meeting and is in regulatory adoption process. See Rule 1503.5
 - iii Proposed language was approved by the Board at the January 2020 meeting and final package was submitted to Office of Administrative Law. See Rule 1846.6
 - iv Proposed language was approved by the Board and the public hearing will be on March 19, 2020. See Rule 1842
 - v Proposed language pertaining to horses claimed in a claiming race was approved by the Board at the December 2019 meeting and final package was submitted to Office of Administrative Law. See Rule 1660.1
 - vi A budgetary change proposal has been drafted by the CHRB to accomplish additional hiring.

- vii Proposed language was approved by the Board and the public hearing will be on March 19, 2020. See Rule 1842
- viii Proposed language prohibiting Bisphosphonate use was approved by the Board at the February 2020 meeting and is in regulatory adoption process. See Rule 1867.1
- ix Proposed language restricting Shockwave Therapy was approved by the Board at the February 2020 meeting and is in regulatory adoption process. See Rule 1866.2
- x Proposed language limiting Furosemide was approved by the Board and the public hearing will be on March 19, 2020
- xi Proposed language was approved by the Board at the November 2019 meeting and is in regulatory adoption process. See Rule 1503.5
- xii Proposed language was approved by the Board at the February 2020 meeting and is in regulatory adoption process. See Rule 1502

Racing

The Racing Office

Prior to the 2018-19 meet, on November 30, 2018, Santa Anita terminated Rick Hammerle, who was hired as Racing Secretary in 1999 and became Vice President of Racing in 2011. He was replaced on an interim basis by Racing Director Daniel Eidsen, who became responsible for the day-to-day operations of the Racing Office, along with P.J. Campo, Executive Vice President, Racing Division, for The Stronach Group (TSG). Then, on December 22, 2019, Santa Anita Park announced that Steve Lym, a longtime racing official in Canada, would become the track's Vice President and Racing Secretary, relocating to the track the following month. Several months later, in May, Eidsen was terminated; Campo was dismissed shortly thereafter.

Pressure To Run

Tim Ritvo, who oversaw increases in horsemen's participation and field sizes at TSG tracks in Maryland and Florida, repeatedly and openly expressed his intention to do the same at Santa Anita when he arrived in 2017. There is a known and accepted correlation between field size and increased handle (wagering). Shortly after arriving in California and becoming chief operating officer at Santa Anita, Ritvo told the Los Angeles Times that "we need to correct the guys who are here and not running and just using the place as a training track." Ritvo said. "We need to replace them."

Some trainers who were interviewed expressed that the need to run more races with more starters may have contributed to a feeling on the part of trainers that if they didn't run their horses, they could lose their allocation of stalls. While several trainers said during investigative interviews that they felt pressured to run their horses, only one gave a specific example, stating that on one occasion he had been scolded by the Racing Secretary for entering a horse as "turf only," meaning the horse would be automatically scratched if the race scheduled for the turf was to be switched to the main track due to poor weather after entries had been drawn.

This perception that horsemen were compelled to enter horses or hustled into races is a safety concern because: (1) horses are not necessarily ready for said races; (2) horses may be entered on quick turnarounds; (3) horses may not be placed competitively, so may overexert or struggle in the race, exposing them to fatigue injury; and (4) a horse may have significant veterinary history. A better knowledge of available horse inventories and writing race conditions accordingly would help alleviate this concern.

Recommendations:

- **Write condition books (proposed races) based on existing horse populations**
- **Communicate with association veterinary department during entry process**

Intervention by CHRBR

CHRBR staff keeps data related to every fatality occurring within a CHRBR enclosure. Eleven fatalities had occurred from December 26, 2018, the first day of the 2018-19 Santa Anita winter/spring meet, through the end of January. There had been five losses over the same period in 2017-18 and two losses in 2016-17. The CHRBR had learned from Commissioner Alex Solis, a former jockey who still exercised horses during training, that the racetrack was "wavy" and "inconsistent" and therefore difficult for horses to handle. After six horses died during a seven-day period (February 17-23), CHRBR Chairman Chuck Winner asked for a conference call with Santa Anita management. The call took place on Sunday, February 24, with Ritvo and Campo representing Santa Anita. Chairman Winner urged them to immediately close the track for at least five days to allow for repair and renovation. After a lengthy discussion, Ritvo and Campo agreed to close the track on Monday and Tuesday only. A few hours later, Campo called back to say they would close the track the next day (Monday) but only after 9 a.m. to allow certain horses to train for upcoming races. Unfortunately, a horse suffered a catastrophic injury during training before the track was closed, which was the 19th loss of the meeting to that point. Santa Anita resumed training two days later, on February 27, and resumed racing the following day. After the 21st breakdown occurred March 5, management canceled racing indefinitely. Dennis Moore returned as track consultant and supervised extensive renovation of the main track, which reopened on March 11 for training only.

At the same time, management announced new protocols for workouts (high-speed exercises), requiring trainers to apply for permission to work a horse at least 24 hours in advance to allow Track Veterinarians to assist in identifying "at risk" horses. Additional veterinarians were hired to observe all horses entering and exiting the tracks each morning during training hours.

Racing resumed March 29. There was no rain and there were no fatalities for the next six weeks. But beginning on May 16, it rained on eight of the next 12 days, and six fatalities occurred over a three-week period. On May 28, Chairman Winner, Vice Chair Auerbach, and the Executive Director met with TSG Chief Executive Officer Belinda Stronach and Aiden Butler, chief strategic officer for TSG, to urge management to close Santa Anita for the remainder

of the meet. They countered that to be effective, any shut-down would need to include morning training, and doing so would keep more than 1,600 horses confined to their stalls for more than a month until Del Mar opened its stable area in July.

In response to the continued losses in May, Governor Gavin Newsom directed the CHRB to establish a safety panel to review the fitness of every horse entered to race. The five-member panel was headed by the CHRB's Equine Medical Director and Chief Steward. Subsequent to formation of the review panel on June 14, no horses were lost during racing through the end of the meet on June 23, but one horse suffered a catastrophic injury during training, the 30th loss of the meet.

Track Superintendent

Dennis Moore served as Santa Anita Track Consultant from late 2013 until leaving the position in December 2018. He was replaced by Andy LaRocco, who had been a part of Santa Anita's track maintenance crew for 37 years and Moore's chief assistant for the previous five.

Moore reported to Ritvo for any track maintenance costs. Moore said he has never been turned down by Ritvo or anyone at Santa Anita for any track maintenance that he requested, adding "I wish every track was as free with their money when it comes to track maintenance costs as Santa Anita is."

A dirt racetrack sits atop a base of decomposed granite, the "bottom," topped by a 12-inch mixture of dirt, sand, silt, and clay. Using heavy equipment, the top part of the dirt track at Santa Anita is "cut" daily to a depth of 5 ½ inches and then compacted to a depth of 3 ½ inches. The 3 ½ inches is the top of the track, commonly called the "cushion." Depth measurements are taken at several areas of the track to ensure that the top level is a consistent 3 ½ inches. Under normal circumstances, daily duties of a dirt racetrack superintendent include overseeing the watering, grading, harrowing and cutting of the track, plus measuring the depth and moisture content of the soil. The California climate causes the sand components to degrade, or break down, and sand is added — usually weekly — as a result.

Surface Ratings

A dry dirt surface is rated "fast" and a dry turf course "firm." Wet dirt surfaces are called "off-tracks" and rated "wet/fast" for a track that is wet on the top but dry underneath, "sloppy" for surfaces covered with standing water but still fairly firm underneath, "muddy" (self-explanatory), or "good" for a track that is drying out. Turf surfaces with moisture are usually rated "soft" for wet, yielding conditions and "good" for those that are drying out.

Surface Testing

Santa Anita maintains a track database for each calendar day of the meet, recording the equipment used on the track, cushion depth, watering amounts and related data. On race days the data is collected and reported hourly.

Multiple horsemen complained about a lack of communication concerning track-maintenance procedures. Data on track maintenance submitted for the investigation and summary was cumbersome, disorganized, and often incoherent. Improved transparency in track maintenance will allow horsemen to adjust their training schedules in real-time to better protect horses. This could require a digital record-keeping system that should be prominently posted to show up-to-the-minute track-maintenance procedures, surface conditions, and any other information to help horsemen make informed decisions.

Some horsemen also expressed concern about areas of the main track possibly being compromised by track maintenance practices. The concerns included excessive wear near the ¼ pole due to tractor routes, development of an uneven base due to harrowing methods, and surfaces drying out inconsistently. Such concerns or suspicions must be closely examined to determine their validity. The standard must be consistent racing surfaces at all California racetracks and training facilities.

Recommendation:

- **Make track-related data and maintenance protocols accessible to horsemen**

The CHRB also collects data on race days, measuring soil compaction, cushion depth, moisture content and, less frequently, soil composition. The information is collected by Safety Stewards and entered into the CHRB Track Safety database. The database, which contains only a fraction of the data gathered by the track superintendent, is correlated with fatality statistics to arrive at a baseline for safety. The Board relies on its independent information to detect significant variations from the baseline and works with track superintendents to determine safety risks.

The racing surfaces must be monitored and adjusted whenever necessary. Abrupt changes in the speed of the course should not be allowed to develop. As an example, on January 19, 2019, at Santa Anita, the reigning Eclipse champion sprinter (for two consecutive seasons) won the Grade 2 Palos Verdes Stakes in a time of 1:08.89 for 6 furlongs on a track rated 'good'. A week later on January 26, California-bred stakes horses completed the California Cup Sprint Stakes in a time of 1:09.88 for 6 furlongs on a track rated 'fast'. Just five days later, on January 31, a second-level allowance race was won in a time of 1:07.41 for 6 furlongs on a track rated as 'sloppy (sealed)' (i.e., the cushion is compacted with rollers to promote runoff, rather than penetration of the surface). Adjusted for class level, this represents

a multi-second increase in the speed of the main track at Santa Anita in less than a week.

In addition, some of the injuries in this cluster occurred when the racing surface was conducive to horses running faster than what might be considered normal for a particular field of horses. A system of fine adjustments in track maintenance between races may maintain a consistent surface before abrupt changes in track speed can occur. A safety protocol that would compel specific maintenance procedures, arbitrarily reschedule subsequent turf races to the main track, or lead to a cancellation altogether might be of value in the rare instance of abrupt change in track speed.

Recommendations:

- **Implement protocols for real-time adjustment based on track performance**
- **Monitor speed of surface race-by-race, adjusting the surface for class level**

After Moore returned to work for Santa Anita, he said that he maintained the track the same way he did prior to his departure in December 2018. Moore stated that he did not notice any difference in the track at the time of his return and still believes that no changes need to be made to make the track safer.

In response to the fatality crisis, Santa Anita contracted with Mick Petersen, the co-founder of the Racing Surfaces Testing Laboratory, to conduct specialized testing of the main track during the first week of March 2019. Dr. Petersen told investigators that the track was not consistent due to the complex maintenance decisions made by track

management during the time period when Santa Anita had an unusually high amount of rain.

Petersen and Moore had worked together for many years. The racetrack was closed for five days for extensive renovation. Petersen conducted biomechanical tests by a machine that mimics a galloping horse and collects data on deceleration, sliding, surface elasticity, and energy absorption. He used ground-penetrating radar to measure depths along the track and used chemical and x-ray diffraction studies on track samples to test for density, moisture content, and mineralogical qualities.

Rainfall

Wet weather changes the daily maintenance of the surface. The track is usually “sealed” when rain is anticipated. The seal is broken, however, when horses race across it, allowing the water to break the seal in scattered patterns according to the impacts of the hooves. According to Moore, heavy rains or multiple days of rain can create problems. The “fines” (i.e., tiny silt and sand particles) can be washed towards the bottom. “The most important thing is that we closely monitor compaction levels,” said Moore. “With all the rain — and this is the case in any wet winter — the fines can change very quickly, and that affects the clays as well. Compaction as well as dilution of silt and sand are all factors in the overall composition of the soil.”

When Moore was asked if running on a sealed track was any more dangerous than a non-sealed track, he responded, “A sealed track is consistent, therefore it is safe.” Moore further stated, “A sloppy track is an inconsistent surface, thus is less safe for horses to run on than a sealed track.”

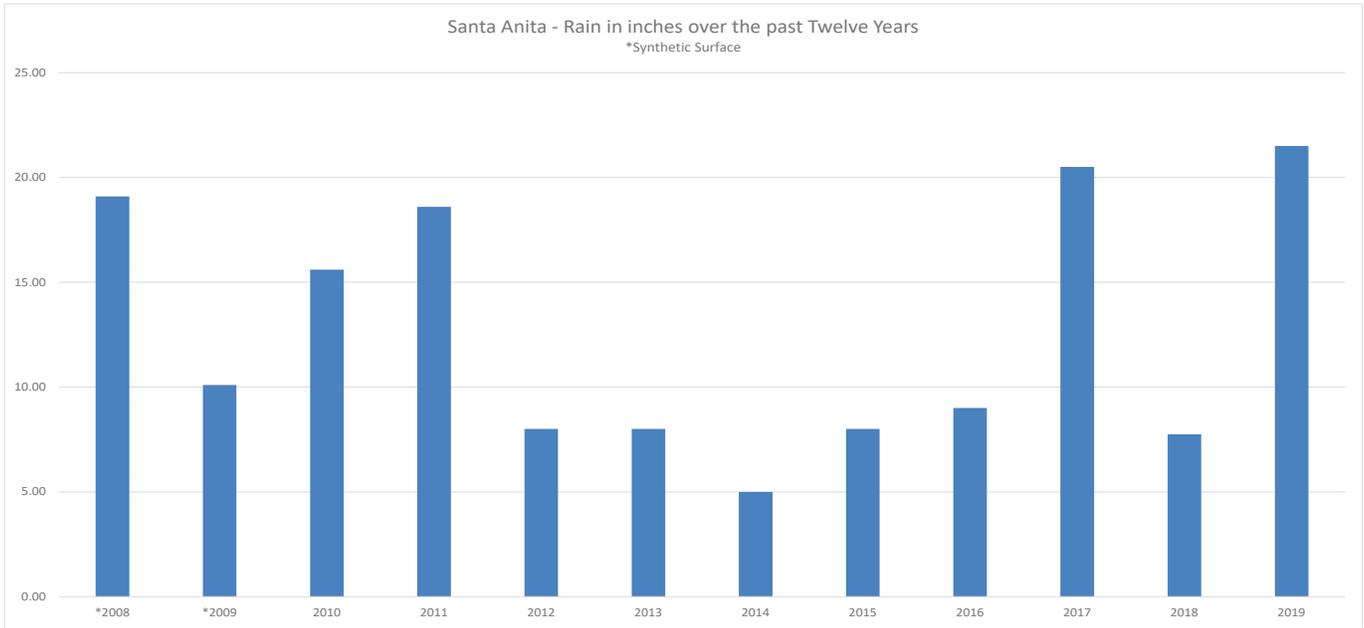


The track is sealed.

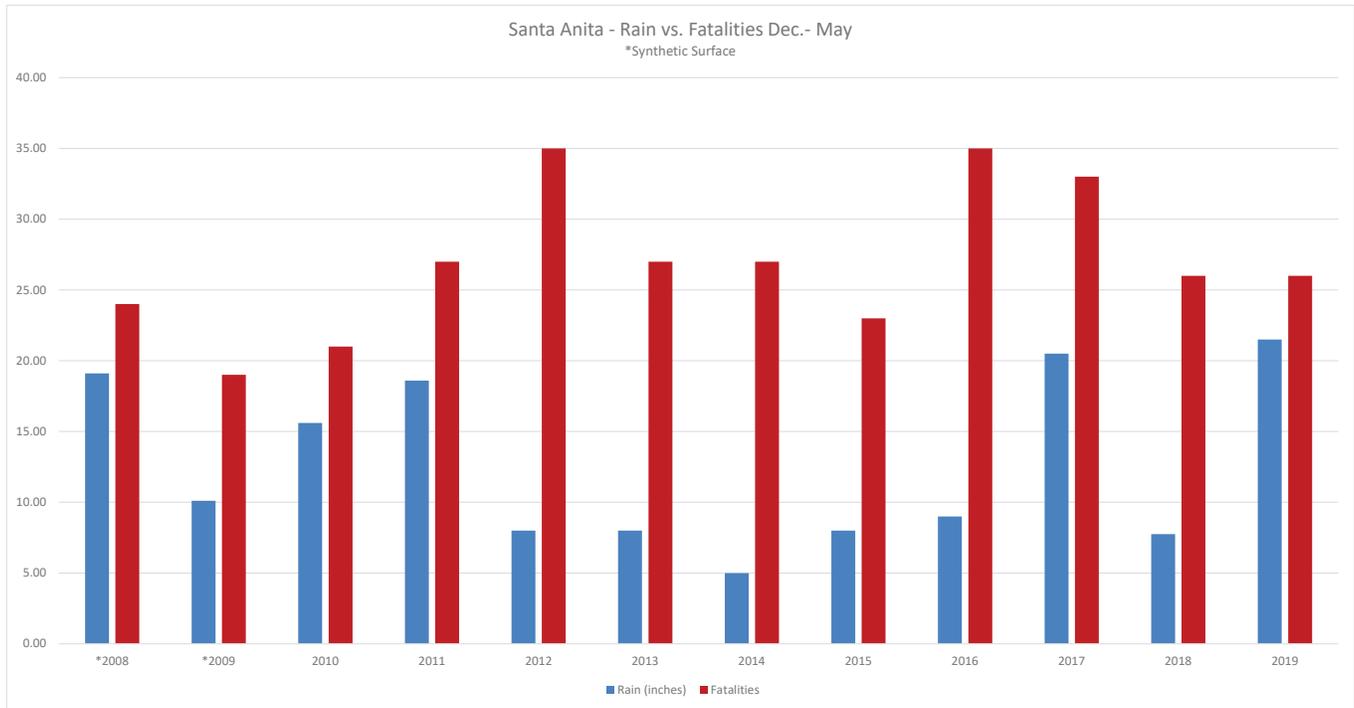


After sealing, the track is floated.

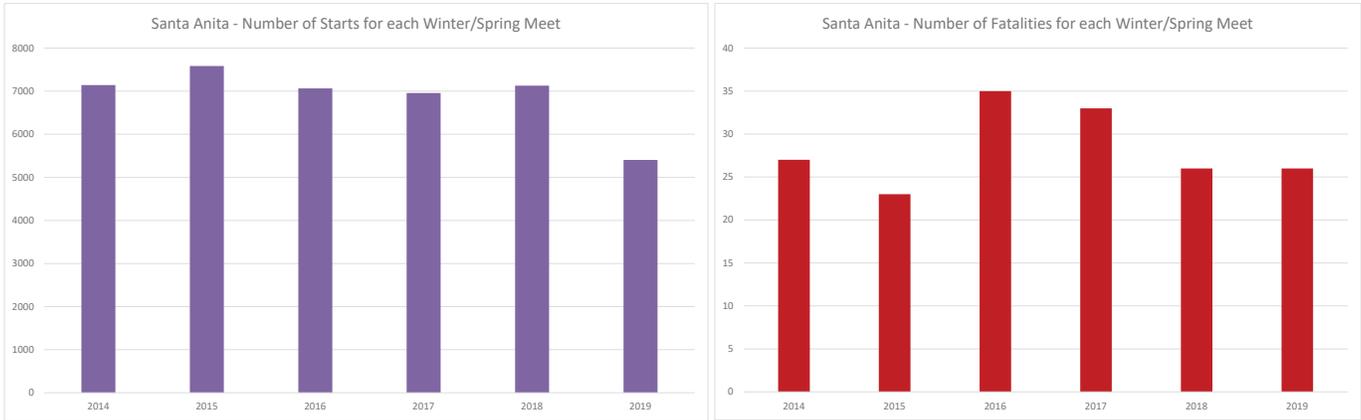
The 2019 winter/spring meet at Santa Anita had the highest rainfall totals for the period since 2008:



The following graph shows rainfall total vs. fatalities over the same 12-year period.



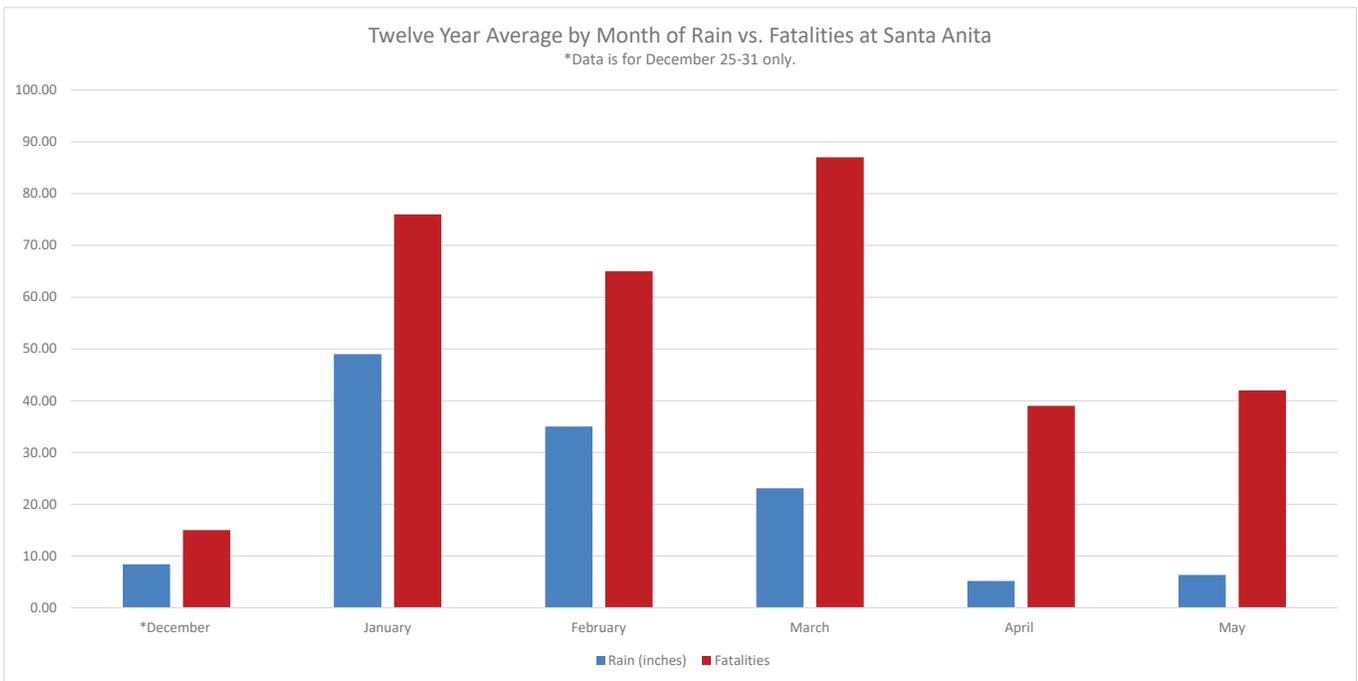
Even though the number of fatalities was equal to the previous year, there were far fewer starts in 2019 vs. 2018:



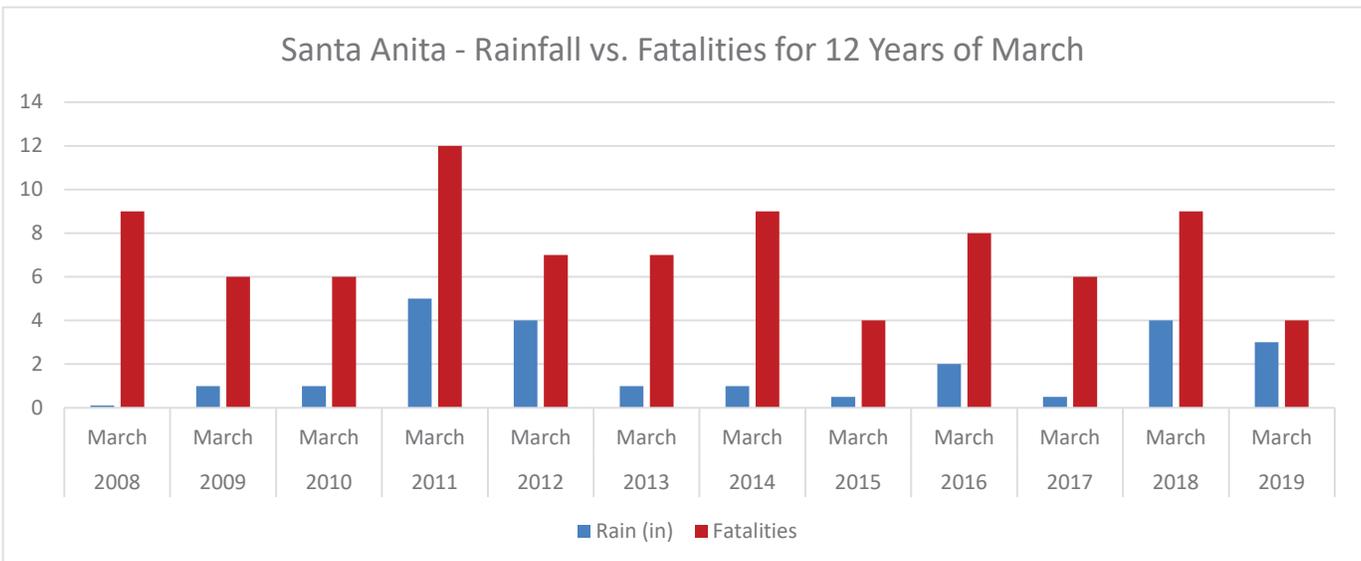
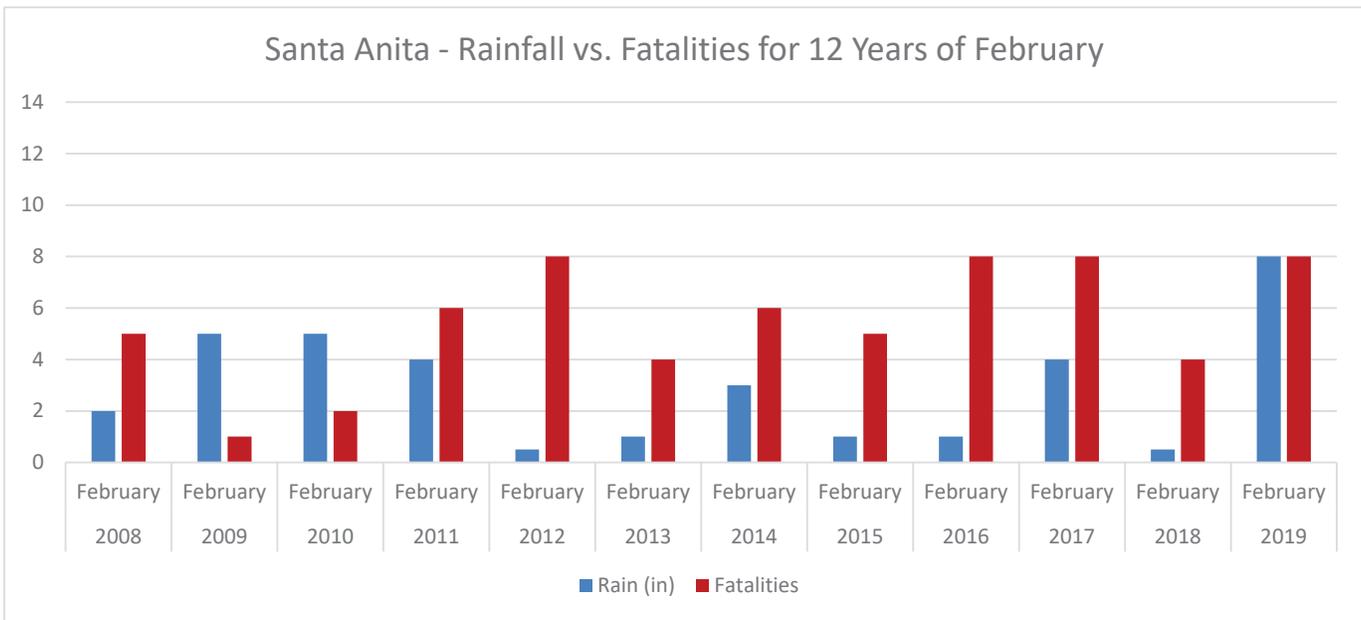
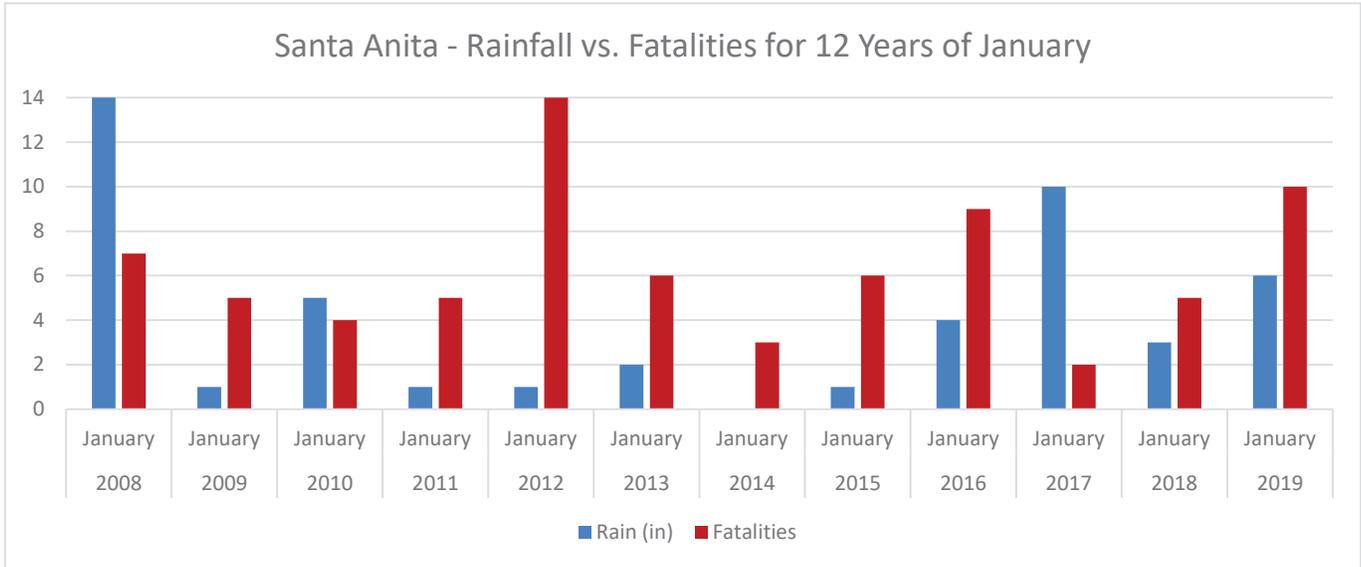
Fatalities

As shown below, the months of January; February and March have recorded the most fatalities over the last 12 years during the same time periods. March, however, which shows the lowest rain amounts of that time-frame, has more fatalities than the surrounding months. This suggests

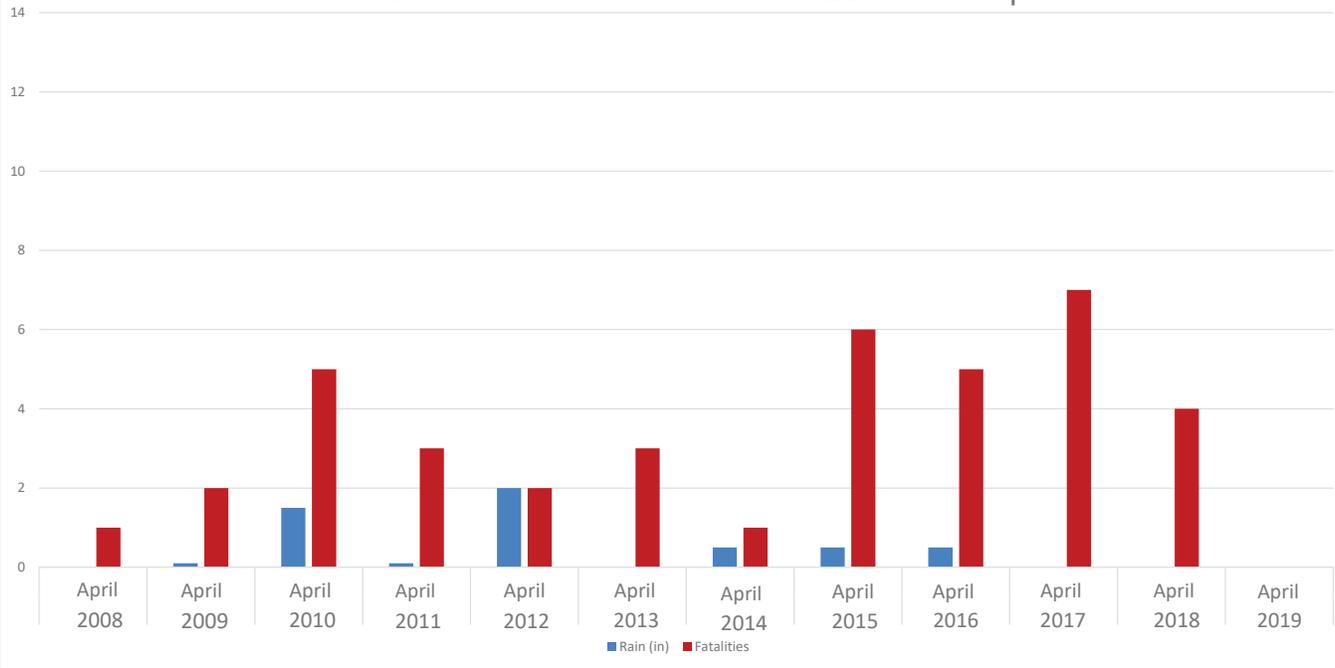
that horses starting during that month may have been compromised by racing or training on off-tracks earlier in the meet, a conclusion consistent with the prevalent veterinary medical view that catastrophic breakdowns are due to repetitive stress injuries.



The same data is shown for each month during the same 12-year period:

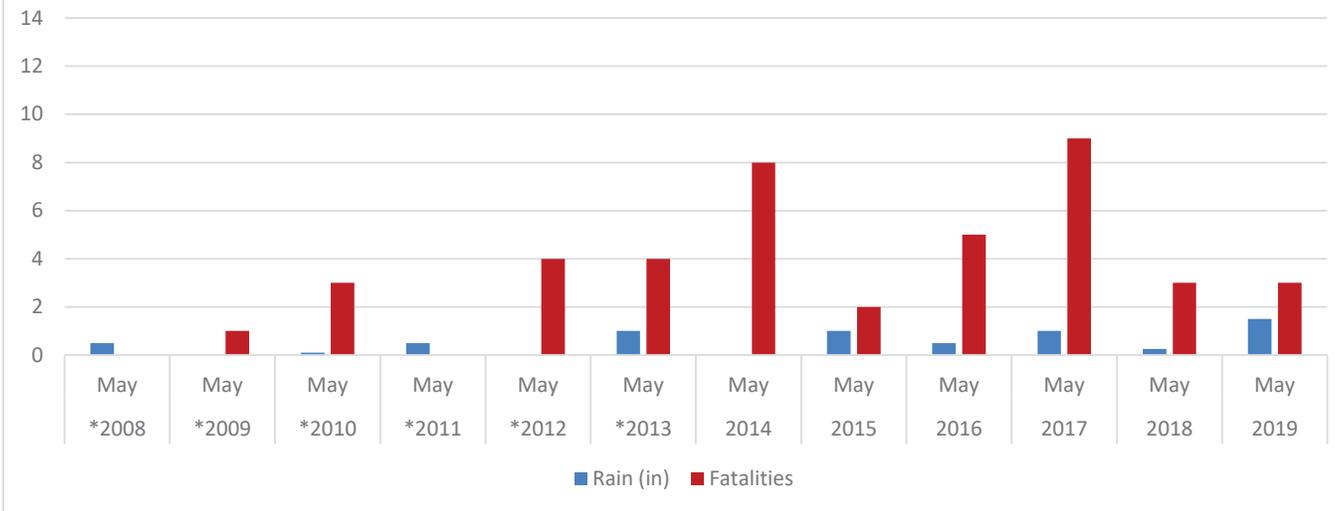


Santa Anita - Rainfall vs. Fatalities for 12 Years of April

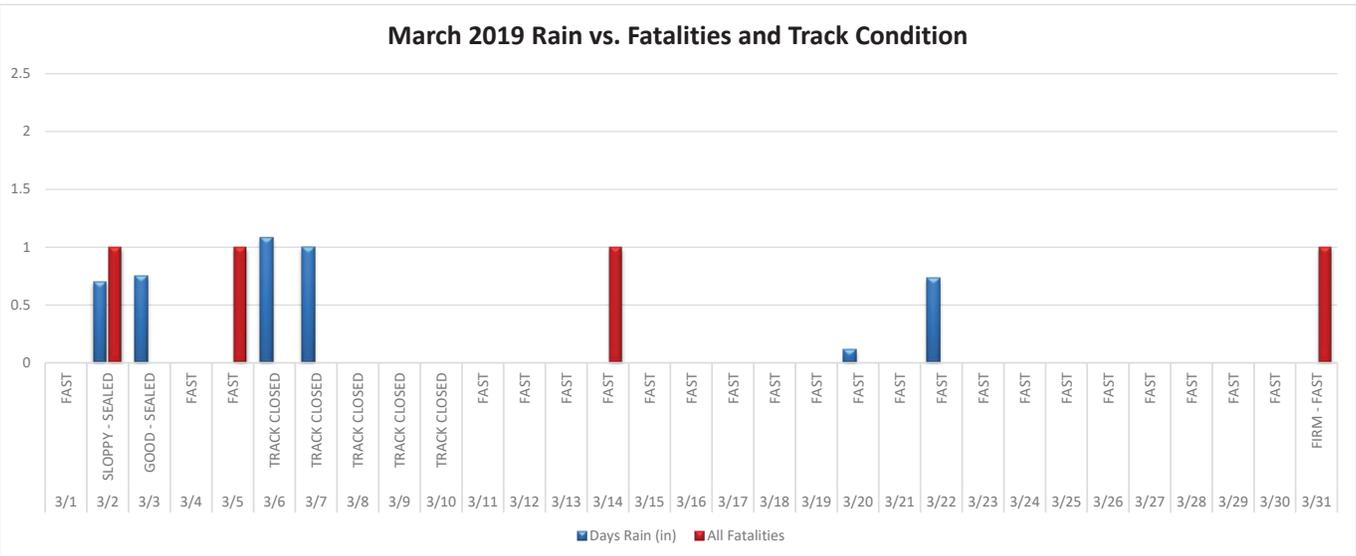
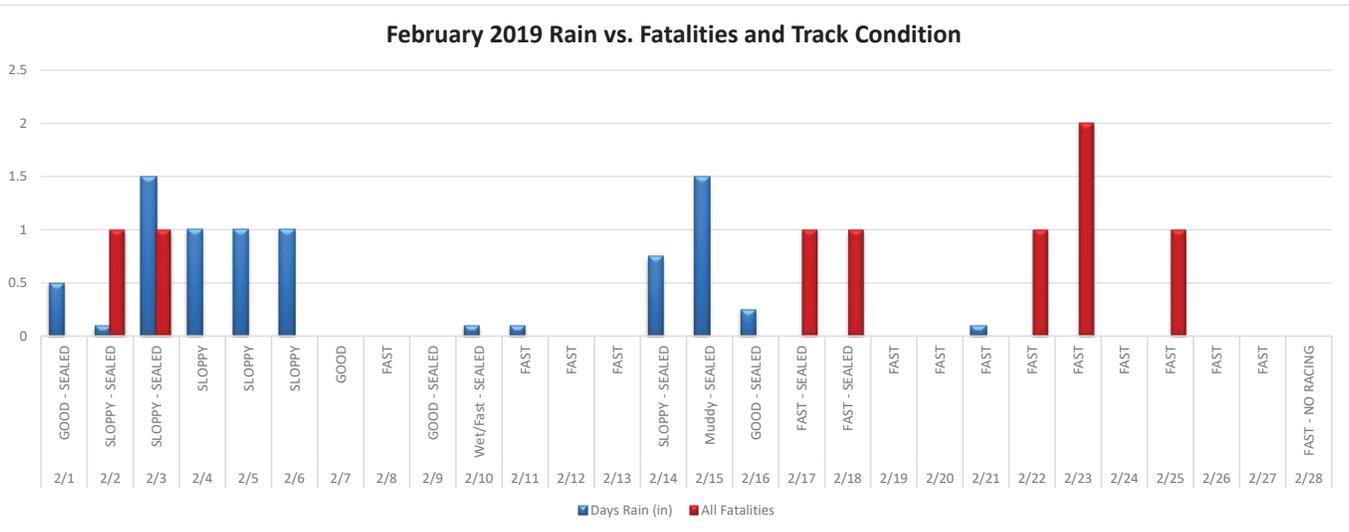
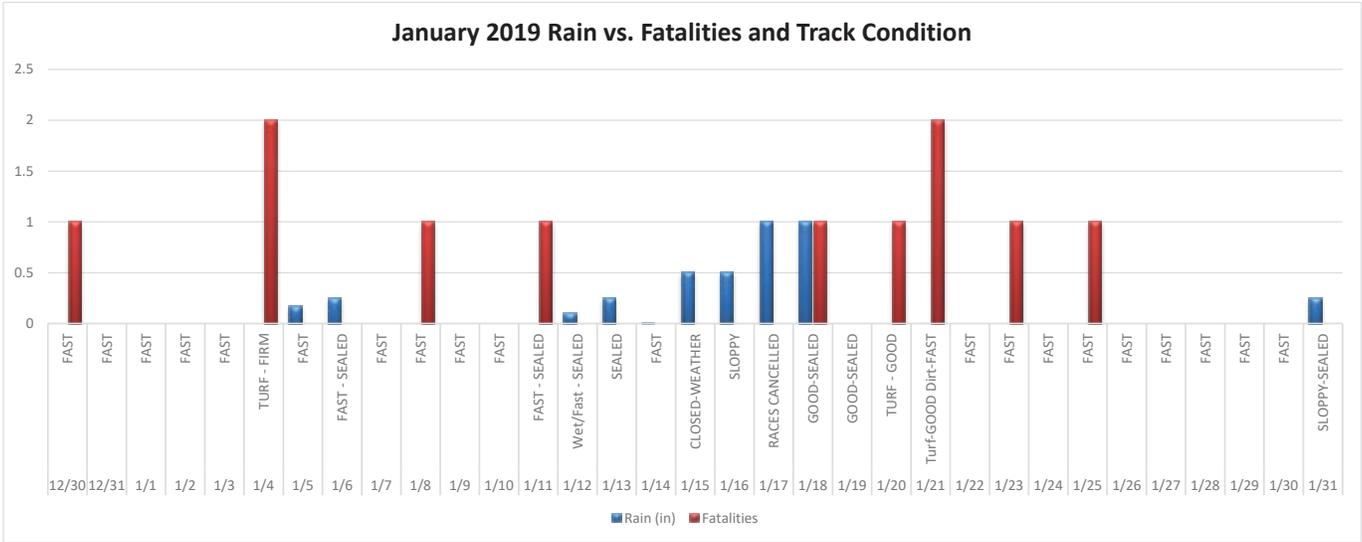


Santa Anita - Rainfall vs. Fatalities for 12 Years of May

*2008-2013 are Training Fatalities only - the meet ended in April.



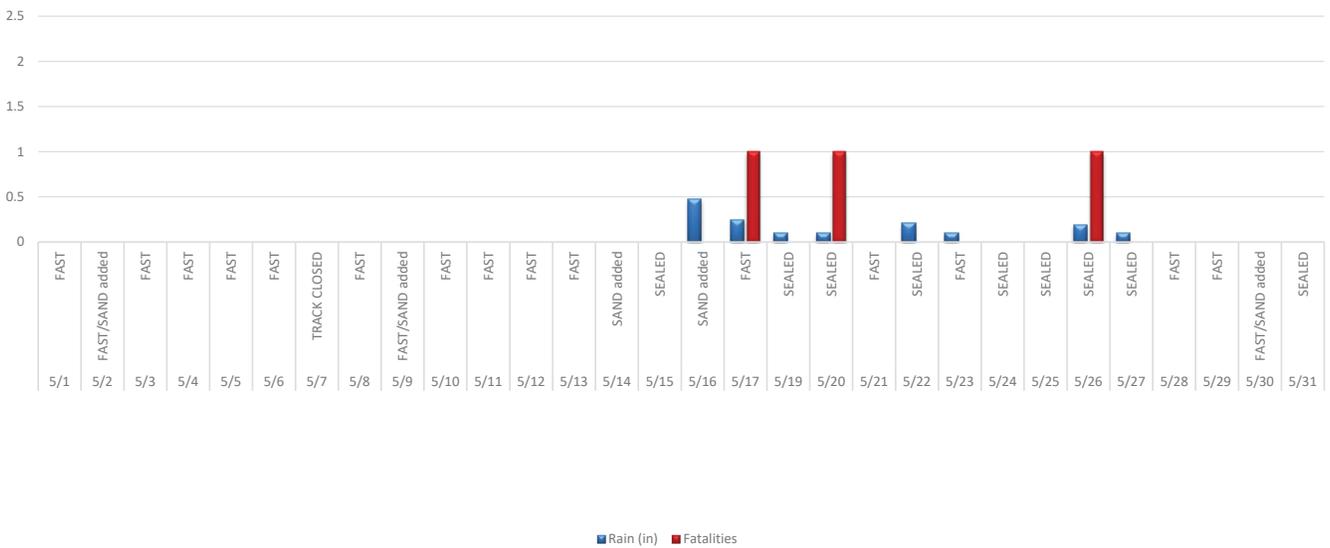
The following graphs show the track ratings for each month of the 2018-19 winter/spring meet at Santa Anita:



April 2019 Rain vs. Fatalities and Track Condition



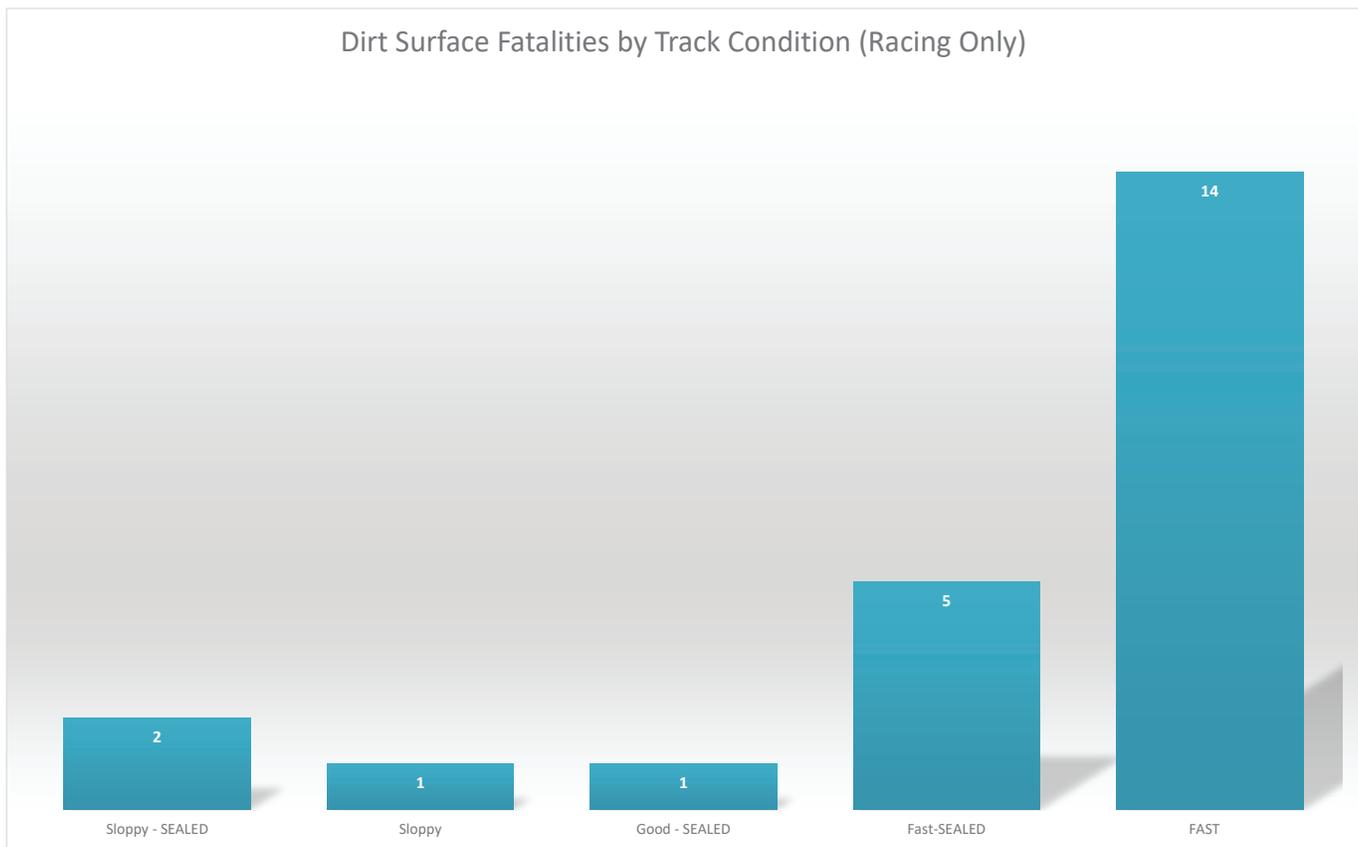
May 2019 Rain vs. Fatalities and Track Condition



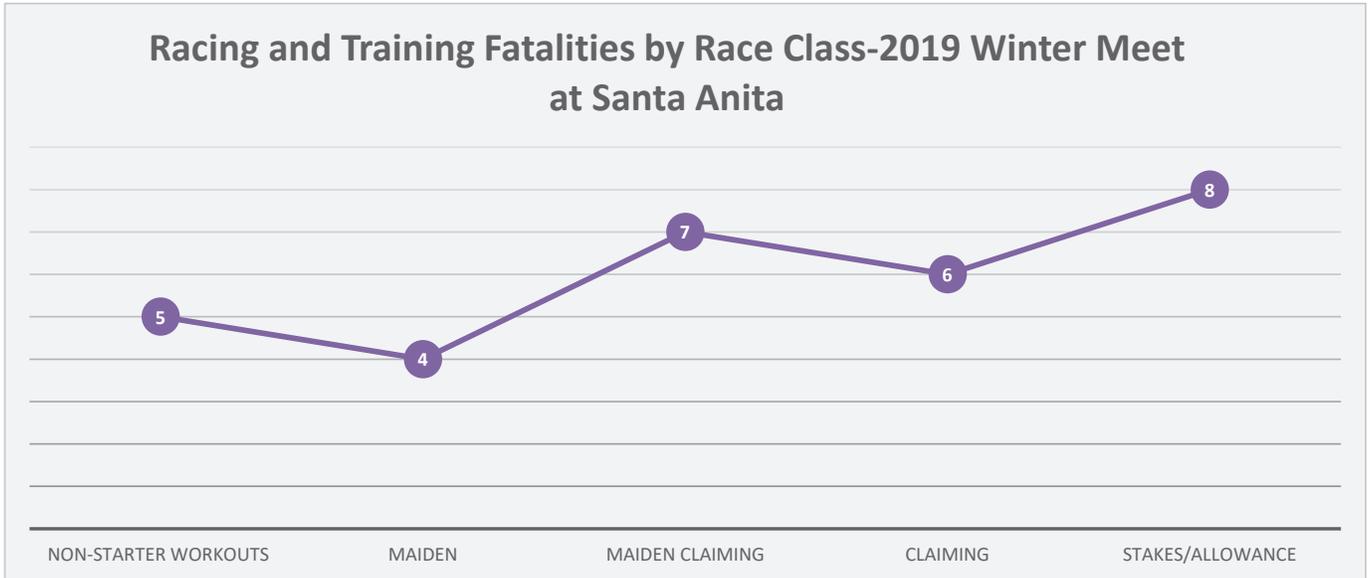
Six of the 23 fatalities occurred on the turf course. Since 2011, after the synthetic track was replaced with a dirt surface, turf vs. dirt fatality ratios are as indicated in the chart to the right.

Santa Anita Fatality Ratios			
Turf vs. Dirt per 1,000 starts			
Totals for 2011 - 2019 Racing Only			
Course	Fatalities	Starts	Per 1,000 Starts
Dirt	107	44,838	2.39
Turf (Oval)	38	13,966	2.72
Turf (Downhill)	30	10,666	2.81
TOTAL	175	69,470	<u>2.52</u>

Nine of the 23 fatalities occurred on tracks listed as “sloppy” or “sealed”:



Eleven of the fatalities occurred during maiden races:



As shown below, 10 of the fatalities that occurred during racing were on the main track, seven on the turf course, eight at a mile or over, and nine at less than a mile:

SANTA ANITA - RACING FATALITIES by DISTANCE								
#	Activity	Date	Distance	Final Time	Class	Rating	Surface	Notes
1	Racing	1/20/2019	1 1/2 Miles	2:27.83	Stakes	Good	Turf	
2	Racing	6/9/2019	1 1/4 Miles	2:02.70	AOC	Firm	Turf	
3	Racing	2/22/2019	1 1/8 Miles	1:48.82	Clm25,000	Firm	Turf	
4	Racing	2/2/2019	1 1/16 Miles	1:41.81	Stakes	Sloppy	Dirt	SEALED
5	Racing	12/30/2018	1 Mile	1:37.67	Clm16,000	Fast	Dirt	
6	Racing	1/21/2019	1 Mile	1:34.82	Stakes	Good	Turf	
7	Racing	3/2/2019	1 Mile	1:38.38	Clm16,000	Sloppy	Dirt	SEALED
8	Racing	6/8/2019	1 Mile	1:40.65	Mcl30,000	Fast	Dirt	
9	Racing	1/4/2019	6 1/2 F	1:13.70	MSW	Firm	Turf	
10	Racing	1/4/2019	6 1/2 F	1:13.70	MSW	Firm	Turf	
11	Racing	1/21/2019	6 1/2 F	1:19.70	Mcl50,000	Fast	Dirt	
12	Racing	3/31/2019	6 1/2 F	1:11.21	Stakes	Firm	Turf	
13	Racing	1/11/2019	6 F	1:13.16	Mcl30,000	Fast	Dirt	
14	Racing	5/20/2019	6 F	1:10.99	Mcl50,000	Fast	Dirt	
15	Racing	1/18/2019	5 1/2 F	1:05.01	Mcl20,000	Good	Dirt	SEALED
16	Racing	5/26/2019	5 1/2 F	1:05.23	Clm10,000	Fast	Dirt	
17	Racing	2/6/2019	5 1/2 F	1:04.16	Mcl50,000	Sloppy	Dirt	

The final chart includes all fatalities that occurred during racing or training:

SANTA ANITA - WINTER/SPRING MEET FATALITIES													
Activity	Date	RACE CLASS	DISTANCE	FINAL TIME	Age	Surface	TRACK RATING	Track Notes	RAIN	Clegg Hammer	Previous "Off-Track" Starts during this Meet	Lifetime STARTS	1ST
Racing	12/30/2018	Claim	1 MILE	1:37.67	4	Dirt	FAST		0	7.6		18	2
Racing	1/4/2019	Maiden	6 1/2	1:13.70	3	TURF	FIRM		0	5.4		3	0
Racing	1/4/2019	Maiden	6 1/2	1:13.70	3	TURF	FIRM		0	5.9		4	0
Training	1/8/2019	Non-Starter	5 F	1:02.20	3	Dirt	FAST	Sealed on 1/6	0			0	0
Racing	1/11/2019	Maiden Claim	6 f	1:13.16	4	Dirt	FAST		0	6.1		8	0
Racing	1/18/2019	Maiden Claim	5 1/2	1:05.01	3	Dirt	GOOD	SEALED	1 INCH	6.8		1	0
Racing	1/20/2019	Stakes	1 1/2 M	2:27.83	7	TURF	GOOD	SEALED	0	4.9		26	2
Racing	1/21/2019	Maiden Claim	6 1/2	1:19.70	3	Dirt	FAST	Sealed 1/18-1/20	0	5.1		2	0
Racing	1/21/2019	Stakes	1 MILE	1:34.82	5	TURF	GOOD		0	3.6		12	3
Training	1/23/2019	Allowance		0.00	4	Dirt	FAST	Sealed on 1/20	0	6.5	12/31/2018 SA GOOD Turf	8	1
Training	1/25/2019	Claim	4 F	47.80	7	Dirt	FAST		0	7.1	1/13/2019 SA GOOD Turf	13	3
Racing	2/2/2019	Stakes	1 1/16 M	1:41.81	3	Dirt	SLOPPY	SEALED	.01 INCH	6.8		5	1
Racing	2/6/2019	Maiden Claim	5 1/2	1:04.16	3	Dirt	SLOPPY	Sealed 1/31-2/3	1 INCH	6.8	2/3/2019 SA SLOPPY Dirt 1/19/2019 SA GOOD Dirt	5	0
Training	2/17/2019	Non-Starter	4 F	47.00	4	Dirt	FAST	SEALED	0	13.79		0	0
Training	2/18/2019	Maiden	4 F	DNF	3	Dirt	FAST	SEALED	.01 INCH	13.79		4	0
Racing	2/22/2019	Claim	1 1/8 M	1:48.82	4	TURF	FIRM		0	6.9	1/31/2019 SA SLOPPY Dirt	10	1
Training	2/23/2019	Non-Starter		0.00	4	Dirt	FAST		0	24.62		0	0
Training	2/23/2019	Stakes		0.00	5	Dirt	FAST		0	24.62	2/2/2019 SA SLOPPY Dirt	16	8
Training	2/25/2019	Maiden		0.00	3	Dirt	FAST		0	24.62	2/14/2019 SA SLOPPY Dirt	1	0
Racing	3/2/2019	Claim	1 MILE	1:38.38	4	Dirt	SLOPPY	SEALED	1 INCH	6.9	2/9/2019 SA GOOD Turf	12	2
Training	3/5/2019	Allowance		0.00	4	Dirt	FAST	Sealed 3/2 -3/3	0	8.7	2/2/2019 SA SLOPPY Dirt	4	1
Training	3/14/2019	Maiden Claim	4 F	53.00	3	Dirt	FAST		0	11.6		2	0
Racing	3/31/2019	Stakes	6 1/2	1:11.21	5	TURF	FIRM		0	7.3		13	3
Training	5/17/2019	Non-Starter		0.00	3	Dirt	FAST	Sealed on 5/15	.25 INCH	11.8		0	0
Racing	5/20/2019	Maiden Claim	6F	1:10.99	3	Dirt	FAST	SEALED	.10 INCH	11.6		1	0
Racing	5/26/2019	Claim	5 1/2	1:05.23	9	Dirt	FAST	SEALED	.20 INCH	12.2	2/2/2019 SA SLOPPY Dirt	49	11
Training	6/5/2019	Non-Starter		0.00	2	Dirt	FAST	Sealed on 5/31	0			0	0
Racing	6/8/2019	Maiden Claim	1 MILE	1:40.65	4	Dirt	FAST		0	13.5		6	0
Racing	6/9/2019	Allowance	1 1/4 M	2:02.70	3	TURF	FIRM		0	13.5	2/1/2019 SA GOOD Turf	6	1
Training	6/22/2019	Claim		0.00	4	Dirt	FAST	Sealed on 6/21	0	13.7		13	3

Recommendations:

- Management should establish strict criteria for canceling racing based on weather and surface conditions. This should be done in consultation with horsemen, jockeys, and the CHRB. The resulting criteria should be strictly adhered to and known to all. The process should include standardizing protocols for moving races from turf to the main track due to surface conditions. In addition, personnel should explore utilizing weather-based algorithms for track maintenance and closures.

- Standardize protocols for moving races from the turf course
- Explore utilizing weather-based algorithm(s) for track maintenance and closures
- Require additional veterinary examination and/or diagnostics for horses racing or working on 'off' tracks

Racing Summary

Santa Anita management had made it known that both the number of races and the number of runners per race needed to increase in order to improve business. Several trainers said they felt pressured to race. However, only one gave a specific example.

Extended and repeated rainy periods often required the sealing of the main track multiple times before dry weather allowed the surface to return to normal. The continuing rainfall events caused the fine sand particles to leach to the base, which caused an imbalance in the blend of sand, silt and clay. The track was closed for five days when renovated in March, when sand was added and the composition repaired. Several trainers expressed serious concerns with the condition of the racetrack due to the rainy weather, but none expressed opinions that the racetrack had caused their horses to break down.

The data suggests that 39% of the fatalities occurred on surfaces affected by wet weather.

The study indicates a correlation between fatalities and surfaces that have been affected both by heavy rains and the extraordinary procedures needed to maintain them for racing and training. The presence of pre-existing pathology, coupled with aggressive veterinary treatments described herein, may have resulted in horses that were physically compromised running on compromised surfaces, resulting in an extraordinary number of fatalities.

Finally, given the apparent correlation between wet weather, sealed tracks and fatalities, Santa Anita management should continue to consider replacing the dirt track with a synthetic surface, which does not need to be sealed.

Necropsy Reports and Pre-Existing Pathology

The CHRB/California Animal Health & Food Safety Laboratory (CAHFSL) at the UC Davis School of Veterinary Medicine postmortem (necropsy) program began in 1990. Very early in the program the relationship between Catastrophic Musculoskeletal Injury (CMI) and pre-existing pathology at the site of the fatal injury became evident. The first new pre-existing injury/CMI relationship was recognized with humeral fractures by Dr. Sue Stover.ⁱ (See appendix to this section.) These “shoulder” fractures had been perplexing. They were often low-speed events, more common in training than racing. Imaging all upper extremities in the horse is challenging. Identifying these pre-existing injuries with radiography, even with the large hospital x-ray machines at Santa Anita and Hollywood Park, proved difficult and inconsistent. The veterinary and racing industry responded with the installation of the Dolly Green Nuclear Imaging Facility at Santa Anita in 1994. Since installation, over 13,000 nuclear scintigraphic examinations have been performed at Santa Anita.

Considerable knowledge of the pathology of CMIs has been gained over the 30-year history of the necropsy program. Most of what has been learned has been from research on necropsy bone specimens sent to Dr. Stover’s Veterinary Orthopedic Research Laboratory (VORL) at UC Davis, usually with outside funding. Those research efforts progressed with focused research on specific anatomical structures. That changed for FY 11-12 & FY 12-13 with the CHRB-funded Racing Safety Program that included an enhanced necropsy program, whereby all CMI bone specimens were sent to VORL for that two-year period.

Dr. Stover’s VORL is a research laboratory with access to sophisticated and high-resolution laboratory techniques on dissected bone specimens. Using those laboratory procedures, Dr. Stover’s research team determined that 85-90% of all CMIs had some degree of pre-existing pathology associated with the injury.ⁱⁱ There is a misperception from these findings that horses are being raced or trained with trainers and their veterinarians knowing the horse was injured. That is simply not the reality. What is clear, and especially so with the Santa Anita fatality cluster, is that trainers and attending veterinarians, and for that matter the regulatory Examining Veterinarians, were completely unaware of the pre-existing lesions in most of those horses. There are two reasons for this. In the first instance, many of the pre-existing lesions are clinically silent, by which is meant they do not have recognizable clinical signs; in the second place, many of the pre-existing lesions were not amenable to current and available diagnostic imaging techniques. As has been the case throughout the program’s history, pre-existing lesions associated with CMIs are best considered an opportunity to

improve recognition of the relevant clinical signs and to improve diagnostics procedures and imaging to identify those horses before they sustain a serious injury.

Twenty-two of the 23 fatalities at Santa Anita between December 30, 2018, and March 31, 2019, were due to catastrophic injuries. The 23rd was a sudden death. Based on gross pathology, of the 22 CMIs, 21 horses had evidence of pre-existing pathology at the site of their fatal injury based on gross pathology. The one horse without demonstrable pre-existing lesions had a history of multiple intra-articular injections at the site of fatal bone failure. The fetlock has always been the most common site of CMIs in horses racing and training, primarily due to proximal sesamoid bone fractures. In this series of horses, 19 of the 22 CMIs had proximal sesamoid bone fractures. Proximal sesamoid bone fractures have been related to racing and training intensity. The significance of this will be addressed later in this report. Relative to pre-existing lesions, Dr. Stover had previously identified a pre-existing lesion in proximal sesamoid bone fracturesⁱⁱⁱ during the aforementioned enhanced necropsy program that we believe is a key finding in this group.

The lesion is primarily seen on the abaxial surface of the medial proximal sesamoid bone.^{iv} This lesion was not amenable to diagnostic imaging then available at Santa Anita. The standing PET scan that was installed at Santa Anita in December 2019 was developed for Santa Anita specifically to image these proximal sesamoid bones and related lesions in the fetlock joint. The early PET images at Santa Anita so far are exciting and show this proximal sesamoid bone lesion can be successfully imaged.

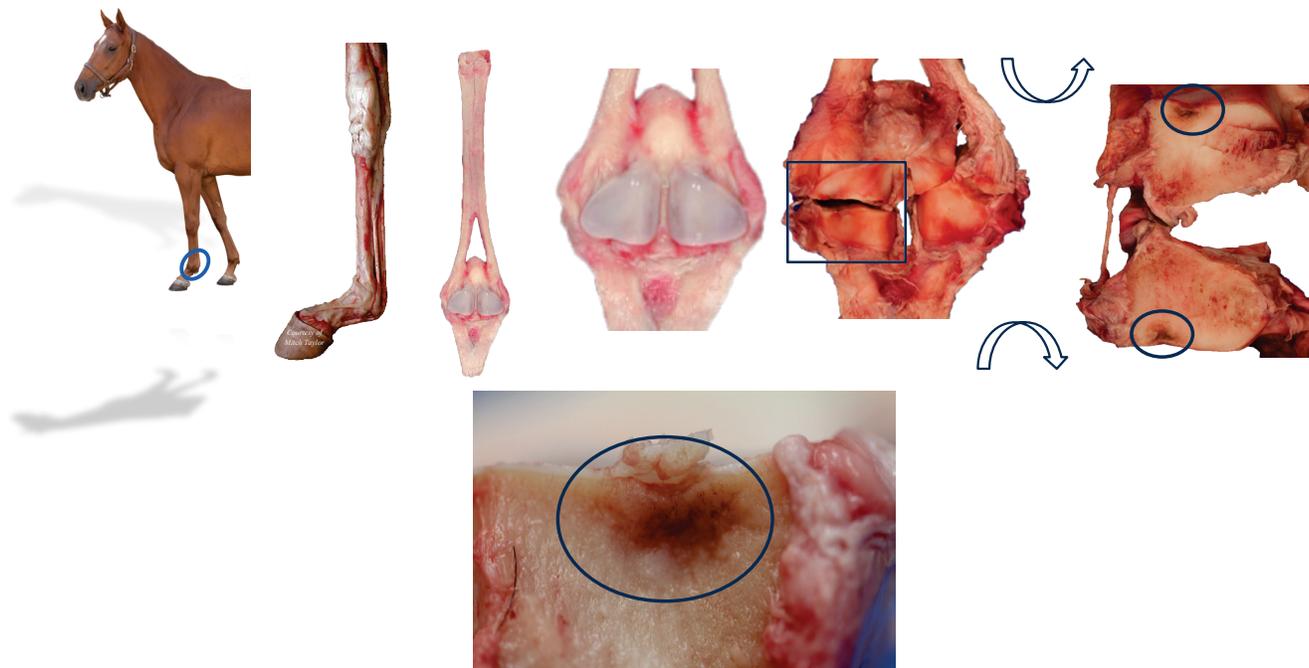
Two other pre-existing lesion groupings were also identified. As expected, most horses with condylar fractures of the cannon bone, either the 3rd metacarpal or 3rd metatarsal, medial or lateral, had either palmar or plantar osteochondral lesions of varying degrees. Surprisingly, two hind cannon bone fractures had evidence of dorsal metatarsal disease. One was clearly associated with the fracture; in the other case, the relationship was not as clear. Nevertheless, dorsal metatarsal disease, essentially inflamed or “bucked shins,” in the hind limbs of older horses was a surprise finding.

The one non-musculoskeletal fatality was a sudden death while training. Sudden deaths while racing and training are an internationally recognized phenomenon.^v Pathologically, sudden deaths are very frustrating, as the definitive cause of death is found in only about 50% of all cases in spite of considerable pathological and toxicological effort. The general assumption is that sudden deaths without clear pathological signs are cardiac conduction events, but that is speculation

at this time. Sudden deaths are more common in racing and training than generally appreciated. In a review of CHRB cases from July 1, 2007 to June 30, 2017, sudden deaths constituted 8.2% of all racing and training fatalities. In an

earlier analysis, the incidence of sudden deaths was estimated to be 1/ 8,800 race starts and 1/158,000 training days for thoroughbreds.^{vi}

Proximal Sesamoid Bone Fracture



Case 19

McKerney, et al. Am Assoc Equine Pract 2013

Exercise Intensity and Risk of Catastrophic Musculoskeletal Injury

Exercise intensity has been related to Catastrophic Musculoskeletal Injury (CMI) for nearly 25 years.^{vii} High speed exercise intensity was specifically shown to be a risk factor with proximal sesamoid bone (PSB) fractures.^{viii} This series of CMIs is no exception. The high incidence of PSB fractures is consistent with published research. What is striking is the similarity between Santa Anita's 2018-19 winter-spring and Del Mar's 2006 meet in terms of the distribution of injuries. In both instances, there was a disproportionate number of proximal sesamoid bone fractures and a perception by horseman that the track surface was problematic.

Biomechanically, this makes sense. The accumulation of high-speed furlongs is an objective indication of the biomechanical stress placed on the horse's limbs. But not all high-speed furlongs are the same. Faster speeds and/or unforgiving surfaces can both be associated with higher biomechanical stress. Racing injuries at their simplest are the accumulation of repetitive biomechanical stresses at rates too high for the bone to adequately repair. The exceptions are relatively unusual racing accidents, such as falls from clipping heels or tripping over fallen horses. But even in those cases, pre-existing injury can be a contributing factor.

Dr. Stover analyzed the exercise history of the 22 CMIs with case selected cohorts. Exercise history is monitored by the accumulation of high-speed exercise based on official timed works and races. While total exercise and variation in intensity of the high-speed furlongs would be ideal, the accumulation of high-speed exercise based on official timed works and races is the data available that can be readily analyzed. The exercise histories of affected horses (n=22) were compared to three cohort horses matched by age, sex, and same event. The same event is either the race in which the CMI occurred or, for training, another horse working that same day as the training CMI being studied.

The important finding is that affected horses performed less high-speed activity in the last month before injury compared to matched control horses (p=0.070). Affected horses had on average 14.8 furlongs in the second month before death and 16.5 furlongs the month before death. During the same period of time, control horses had on average 13.7 furlongs the second previous month and 18.9 furlongs the last month. This decrease in training intensity immediately prior to CMI related to proximal sesamoid fractures is consistent with recent analysis in New York.^{ix} Weather would not be a factor, as both affected and control horses were training and racing at Santa Anita.

When the 22 CMI horses were compared to case racehorses in an ongoing research study at Dr. Stover's Veterinary Or-

thopedic Research Laboratory^x, she found that both the 22 CMI horses and control (non-injured) horses from Santa Anita were acquiring high-intensity exercise at a relatively higher rate. That rate of acquiring high-intensity exercise was similar to the case horses in the research project (fatally injured), but not to the research control (non-injured) horses. More simply, this suggests that the population of racehorses training and racing at Santa Anita last winter had an exercise intensity profile that put the population of horses at Santa Anita at higher risk for injury.

When the 22 CMI horses were compared to a set of control horses (n=1,668) from the CHRB Racing Injury Prevention Program conducted from 2011-2013 at UC Davis, the number of furlongs performed in six months was a statistically significant factor (p=0.002).

The majority of the 22 CMI cases at Santa Anita Racetrack had evidence of pre-existing pathology that is presumed to be associated with high exercise intensity, which predisposed CMI horses to catastrophic injury. Furthermore, the training intensity among the unaffected matched control horses at Santa Anita is greater than the exercise analysis in thoroughbred racehorses in the period 2011-2013. This suggests that, without taking into consideration safety initiatives undertaken since 2011-2013, the general population of racehorses at Santa Anita is at higher risk for injury than thoroughbred racehorses in the period 2011-2013.

Veterinary, Medication and Medical Records

Reviews of veterinary confidential records and subpoenaed medical/billing records, along with interviews with trainers and veterinarians, uncovered several areas of concern. Once the subpoenaed veterinary and medication records were being reviewed, it became clear that in some cases the subpoena dates did not go back far enough to capture the horse's entire relevant veterinary medical history, and in other cases, did not include all veterinary practices involved in the horse's care.

There were also several cases of simply poor veterinary medical record keeping.

Recommendation:

- **Efforts should be made to transition to digital veterinary medical records. Records on horses beyond billing invoices did not appear to be kept in most instances; furthermore, Veterinary Confidential reports (Form CHRB-24) were for the most part**

hand-written with a variety of shorthand, abbreviations, and code that made analysis difficult and time-consuming. (The CHRB is in the process of adopting a new rule requiring veterinarians to file records electronically.)

Physical examination and diagnostic workup

In several cases there was a lack of veterinary involvement and examination of horses. The attending veterinarians only checked horses that the trainer had requested they examine. However, the veterinary practice may have dispensed anti-inflammatories and other medications without having examined, palpated, or flexed the horse, or watched the horse trot.

Recommendation:

- **Private practitioners should seek to increase physical examinations prior to high-speed workouts, race entries, and intra-articular (IA) therapy. This policy should be considered a best practice.**

Several horses had a history of Exertional Rhabdomyolysis (ER), or “tying up.” ER, or Recurrent Exertional Rhabdomyolysis (RER) in chronic cases, is muscle cramping associated with exercise. This is a common problem more often seen in fillies than colts. Several medications are prescribed for the condition, but only a few of these horses had blood-work performed in an attempt to confirm the diagnosis and monitor the muscle enzymes. These suspected RER cases could have been secondary to another primary musculoskeletal issue or a sign the horse was not traveling well, and assumed to be RER when it was another musculoskeletal issue. Horses with unsoundness issues can develop ER secondary to the primary unsoundness.

Intra-articular Therapy

Eleven horses had received intra-articular (joint) cortico-steroid injections. Five of those intra-articular cortico-steroid injections were within 60 days of fatal injury, and two of those were within 14 days of injury. The injected joint was not necessarily the fatally injured joint. Multiple horses were thought to be traveling ‘hocky’ and received tarsal (hock) injections without diagnostic analgesia (nerve/joint blocks) nor imaging. Hocky is a somewhat nebulous, poorly defined way of traveling behind that is thought to indicate soreness from the hocks. It is possible the hocks were a source of discomfort for these horses; it is also possible these horses were traveling differently because of another primary musculoskeletal issue.

There were cases of what appears to be overuse of intra-articular therapy even though the treatments did not violate then-existing CHRB medication regulations. There were instances of repeated intra-articular injections without diag-

nostic imaging. One horse was being treated by two veterinarians without communication or even an awareness that the other was similarly treating the horse. In one case two veterinarians injected the same joint within five days of each other. In that case, it was the major weight-bearing bone in the joint that ultimately failed in the race. Surprisingly, there were instances of poor communication between veterinarians in the same practice treating the same horse.

Recommendations:

- **Private practitioners should seek to increase diagnostic procedures prior to intra-articular therapy; the CHRB should consider specific regulations requiring diagnostic imaging prior to repeated IA treatments in the same horse.**

Questionable Medications and Veterinary Treatments

In multiple cases, horses were undergoing routine or regular physical therapy treatments. Currently horsemen licensed as physical therapists under the CHRB are required to work under the direction of private veterinarians.

Recommendations:

- **Clear policies on physical therapy treatments should be established. This will include specifying those allowed to do physical therapy, establishing allowable times for physical therapy relative to racing or training, and determining which treatments require a veterinary prescription.**
- **The CHRB should consider expanding prohibited medications and practices. These could include but are not limited to the use of bisphosphonates, extracorporeal shockwave therapy, thyroxine, and furosemide (Lasix). (The CHRB is in the process of amending and adopting rules to further restrict or prohibit certain medications and procedures.)**

No illegal medications or procedures were uncovered. Four horses received extracorporeal shock wave therapy (ESWT) as currently allowed within CHRB regulations. The treated structures were not the structures that were fatally injured. One horse received the medication Osphos® (clodronate, a bisphosphonate) on two occasions. Bisphosphonates are labeled in horses to control the clinical signs associated with navicular syndrome in horses 4 years and older. The horse was a 3 year-old when treated and did not have a diagnosis of navicular disease. Bisphosphonates act by disrupting the normal cascade of bone remodeling in order to treat osteoporosis. There is strong evidence these drugs have an analgesic effect on bone and may delay natural remodeling process in young athletic horses. The bisphosphonates approved for use in horses also have significant analgesic activity relative to bone pain. These properties, especially the

potential to impact the normal bone injury repair and remodeling processes, are contraindicated in actively training racehorses, which is why the CHRB has moved to prohibit their use at CHRB racetracks.^{xi}

Trainer-Administered Medications and Pre-Race Medication Regimens

Most trainers have standard medication routines for all horses in their barn receive prior to workouts or races. For example, some horses received oral phenylbutazone (“Bute”, a non-steroidal anti-inflammatory drug, or NSAID) the night before a workout or after a workout. Many horses received several medications in the days leading up to a race. Common pre-race treatments included: the corticosteroid dexamethasone as an oral powder, the muscle relaxant methocarbamol (aka “Robaxin), DMSO (a free-radical scavenger), the NSAID flunixin (aka “Banamine”), and the most commonly used NSAID in horses, phenylbutazone. All horses received furosemide (Lasix, a diuretic to decrease exercise induced pulmonary hemorrhage) four hours prior to racing, and many regularly received furosemide for high-speed exercise. With one exception, all these treatments were administered within CHRB regulations.

Record keeping by the horsemen involved in the investigation overall was poor save in a couple of instances. Large gaps in historical information were noted in case histories for the affected horses.

Currently CHRB rules require intra-articular treatments and thyroxine and clenbuterol administration to be documented.

Recommendation:

- **As a contingency of stall applications/horseman’s agreements, trainers should be required to maintain simple health records on individual horses in their care, including but not limited to: origin; ship-in/ship-out dates; vaccination/de-worming records; surgical procedures; lameness; diagnostic procedures; non-steroidal anti-inflammatory drug (NSAID) administration; and Veterinarian’s List appearances. (The CHRB is in the process of adopting a new rule to require trainers to record all treatments given to a horse, including veterinary procedures performed and all medications administered.)**

Examining Veterinarians have been concerned for years that medication could be hindering their pre-race examinations. In recent years, racing regulations have been amended to restrict commonly used and heretofore authorized anti-inflammatory medications prior to racing. California has gone further yet by removing authorization for previously authorized anti-inflammatory medications and mandating stand-down period for intra-articular treatments.

Recommendation:

- **Restrictions on medications that can be administered for workouts must be expanded and enforced. (The CHRB is in the process of adopting a new rule that establishes threshold limits for the presence of certain drug substances and medications in official test samples taken from horses after they complete a timed workout.)**

Official Veterinary Examinations

There are two classifications of regulatory veterinarians in racing in California, the Official Veterinarian^{xiii} and the racing or Track Veterinarian.^{xiii} The Official Veterinarian is responsible for examining all horses for determining a horse’s “fitness to start.”^{xiv} The Official Veterinarians and Track Veterinarians conduct the pre-race Racing Soundness Examination.^{xv} These are the Examining Veterinarians. At the time of the morning pre-race examinations, the Examining Veterinarians are compensated by the association. Organizationally, their supervisor is the Racing Secretary at the time they are performing the pre-race examinations. The Examining Veterinarians have been tasked with determining whether a horse is fit to race by watching it jog a few steps in a straight line in the barn area and palpating/flexing limbs the morning of a race. The Racing Soundness Examination regulation specifically states, “...examinations shall be conducted in or near the stall to which the animal is assigned...” This system is limited in determining whether a horse is fit to race, primarily because many horses have bilateral pre-existing lesions, which may not be readily discernible when the horse jogs in a straight line in a confined space inside the stable shedrow. Several affected horses had notes in the pre-race examination related to signs of osteoarthritis; none were deemed unfit to race. Additionally, there are ‘blind spots’ that regulatory veterinarians must contend with because they often do not have information about what is occurring with horses between their races.

Pre-race examinations of horses currently involve having the horse jog in a straight line in the shedrow. However, some lesions can be better detected under special circumstances to highlight mild or bilateral lameness.

Recommendation:

- **Regulatory veterinarians at their discretion should have the capability of conducting expanded lameness evaluations including (1) trotting/circling on hard surfaces, (2) lunging, and (3) watching horses exercise under saddle. Management should provide facilities for these expanded lameness examinations, including areas of hard (concrete) surfaces and round pens. In addition, examination procedures should incorporate current technology, including photography and/or video for documentation purposes.**

Current CHRB regulations require horses to be examined the morning of the race by Examining Veterinarians. However, this is not necessarily the only time a horse should be examined to determine fitness to race. Examinations closer to the completion of high-speed events (i.e., post-workout and post-race) would improve identifying horses at risk of major injury with continued training and racing.

Recommendation:

- **Ideally, all or at least a subgroup (panel review) of horses entered to race should be examined prior to race day. Furthermore, post-race examinations of specific horses based on performance should be expanded.**

An emergency measure implementing veterinary coverage and monitoring during morning training hours has been of significant value. Greater scrutiny of horses in suspect physical condition that would not otherwise be identified during routine barn examinations appears to be an important benefit. It also allows for more efficient response to on-track emergencies.

Recommendation:

- **The morning program of veterinary coverage and monitoring of training should be evaluated, refined, and standardized across all CHRB-facilities.**

Additional regulatory veterinary positions would increase the amount of time allowed for individual examinations of horses and allow for expanded evaluation if necessary. This would also provide Examining Veterinarians with additional time to review previous examination records for all horses undergoing fitness examinations. The caveat to this is that Examining Veterinarians need to achieve consistency with their examination procedures and scoring.

Recommendation:

- **To improve efficiency and handle the overall increase in official veterinary examinations, additional regulatory veterinary positions are necessary. (Governor Newsom's proposed budget includes \$1.4 million for additional Official Veterinarians and other oversight personnel.)**

Organizationally the Track Veterinarian and Examining Veterinarians being supervised by the racing association's Racing Office poses an inherent conflict.

Recommendation:

- **Track Veterinarians and Examining Veterinarians should be under the direct supervision of the Official Veterinarian or Equine Medical Director (EMD).**

Drug Testing and Toxicology

Drug testing and toxicology samples on deceased horses come from several sources. The first consideration for track or attending veterinarians is caring for the horse. Sampling for drug testing is a secondary concern. For racing fatalities there are CHRB veterinary personnel and testing materials readily available. In addition, on the Southern California thoroughbred circuit, all horses have blood samples drawn for total carbon dioxide (TCO₂) testing to prevent the prohibited administration of bicarbonate. Those samples are sent for drug testing after TCO₂ testing or re-directed to drug testing prior to TCO₂ testing to ensure adequate samples. On-track sampling is rarely done before the horses are sedated. Samples are occasionally obtained ante-mortem, but the samples are more commonly obtained after euthanasia. The circumstances associated with the individual condition of the horse drives the sampling process. Under all circumstances, humane treatment of the horse comes first. That said, it was not always clear or officially documented which veterinarians performed euthanasia. Furthermore, errors were noted in some necropsy submission forms, or information was missing on post-injury medication administration.

Recommendation:

- **Track Veterinarian emergency procedures should be formalized, including requiring filing CHRB Form 24 reports and obtaining post-injury samples from all horses treated in on track emergency incidents.**

Additional post-mortem samples are obtained by pathologists at the time of necropsy. Urine is the preferred matrix for drug testing but is seldom available. Clotted blood from a heart chamber or aqueous humor from the eye are the alternative options for drug testing analysis at the Kenneth L. Maddy Equine Analytical Chemistry Laboratory (EACL Maddy) at UC Davis. Clotted blood can be highly hemolyzed, which complicates high-sensitivity testing, so aqueous humor often provides the best sample option for EACL Maddy drug testing analysis. Tissue samples are collected for toxicology testing; liver is the primary tissue of choice. Liver tissue analysis is done in the CAHFSL toxicology section rather than EACL Maddy. The target compounds for tissue are primarily diagnostic toxicology, which would include heavy metal analysis for non-CMI cases, such as sudden deaths.

Different sample matrices retain drugs differently. Blood and urine give the most contemporaneous picture of drugs at the time of death. Other matrices provide a more historical picture. For example, we often see metabolites of acepromazine, a commonly used tranquilizer, in aqueous humor samples even though the drug may not have been administered to the horse for a week or more before death.

There were no major concerns in the drug testing or toxicology reports. The drugs found were consistent with what

one would be expected related to care of an acutely injured horse. There were some discrepancies between what was reported and what was found, but multiple veterinarians are often treating the same horse in a high-stress situation. Any anomalies are addressed in the individual horse reports. Heavy metal screening is part of the sudden death necropsy protocol. Low levels of arsenic were found in the liver on the heavy metal screen performed on the sudden death case. This was considered an incidental finding by the pathologist, unrelated to the sudden death. Additional heavy metal analysis of the same horse's kidney tissue was negative for arsenic, which is consistent with the previous comment about the arsenic detected in liver being an incidental finding. There was no evidence of arsenic intoxication.

Conformation and Pedigree

The strategic plan^{xvi} developed at the very first Welfare and Safety of the Racehorse Summit identified selecting matings for “Brilliance”, essentially speed and precocity, while ignoring durability and longevity, despite the risk of weakening the breed by perpetuating unsoundness traits. Since then, The Jockey Club and Grayson-Jockey Club Research Foundation have published the annual Stallion Durability and Soundness report for the previous year.^{xvii}

While in-depth evaluation of the pedigree of each case was not a component of this investigation, brief reviews were conducted. This included evaluation of race records, veterinary histories, pre-race examination records, Veterinarian's List histories, published reports, and anecdotal information concerning the parentage, siblings, and close relatives of each case. Data was collected from InCompass and Equibase, among other sources.

Of the cases involving musculoskeletal injuries between December 30, 2018, and March 31, 2019, familial information was subjectively considered significant in 13 of 22 cases. This information was considered potentially relevant in regards to the development of pre-disposing lesions.

Especially with the change starting half-a-century ago that transitioned from breeding to race to commercial breeding

for sale at auction, thoroughbred breeding has focused on “Brilliance”. Many industry observers believe this has been to the detriment of durability and longevity. Furthermore, selection for commercially desirable phenotypes can inadvertently select for deleterious traits. It has long been observed that both positive and negative traits are passed on from generation to generation.

Specific conformation faults are passed on through specific sire lines and female families. While bone, tendon, and ligament strength are undoubtedly inheritable as well, poor conformation is the easiest to appreciate. Poor conformation can expose the joints of a horse to undergo uneven loading during high-speed exercise, resulting in more stress on bone, tendon, and ligaments. Over time poor conformation increases wear of joint surfaces, and inflammation of soft tissue structures can result in arthritic conditions, in some cases leading to the development of lesions pre-disposing the horse to catastrophic injury. The incidence and rate of development of these lesions can be expected to be greater in poorly conformed horses, as compared to horses with balanced, ideal conformations.

The horse genome was fully sequenced in 2007, opening up the possibility for future veterinary medical advancements in both diagnostics and therapeutics. The genetic makeup (genotype) of an animal is influenced by environmental factors (e.g., climate, diet, exercise) that stimulate or inhibit gene expression, ultimately resulting in the animal's observable phenotype (morphology, behavior). By having the ability to manipulate a horse's environment through good husbandry practices, horsemen to some extent can influence the outward expression of a horse's genotype.

On a more practical level, horsemen can keep themselves apprised of sire statistics representative of soundness and durability (i.e., starters-to-foals, number of starts, and average winning distance). At minimum, it would be advisable for breeders, trainers, and horsemen in general to be aware of the tendency of specific lines and families to pass on undesirable conformation faults.

Discussion of Veterinary Medical, Training, and Horse Related Findings

Anatomical Structure Injured

The overwhelming majority of the CMI (21 of 22 cases) in this cluster involved the fetlock joint (metacarpophalangeal/metatarsophalangeal). Pre-existing lesions noted at necropsy included: (1) palmar or plantar osteochondral lesions (POD), (2) focal osteopenic lesion on the abaxial articular surface of the medial proximal sesamoid bone (PSB); and (3) dorsal metacarpal/metatarsal disease (DMD, 'bucked shin'), and transverse ridge arthrosis. The POD and PSB lesions are considered pre-disposing lesions for catastrophic failure. These lesions were seen in eleven cases each, and in some cases were seen bilaterally. Both lesions (POD, PSB) were seen in four cases. Six cases noted dorsal metacarpal/metatarsal disease syndrome. It is unclear whether this syndrome is associated with catastrophic failure of the fetlock joint.

Palmar or plantar osteochondral disease is a recognized syndrome in thoroughbred racehorses. However, the syndrome may be under-diagnosed due to affected horses being asymptomatic for a prolonged period during the pathogenesis and the low correlation of radiographic findings to actual disease severity. Special imaging techniques (i.e., nuclear scintigraphy, MRI, and PET scan) are much more sensitive to POD lesions than radiography.

Recommendations:

- **The industry should develop stratagems that increase and facilitate the use of special imaging techniques.**

The lesions noted on the abaxial articular surface of the medial PSB were associated with the fracture line through the bone in eleven cases. To this point, the PSB lesions have not been amenable to diagnostic imaging techniques. However, the PET scan has shown promise in identifying this lesion. Further research to elucidate the pathogenesis and the prevalence (background rate) of the lesion is warranted based on the large number of cases noted in this cluster.

Recommendations:

- **Compulsory diagnostic imaging based on known risk factors for PSB fractures**
- **Required trainer and attending veterinarian continuing education**
- **Industry support of research to better understand PSB & Fetlock Injuries**

The finding of DMD in six of the cases was surprising. However, not all lesions were seen in the same leg that failed. Nevertheless, in one case (Case #9) it was considered a pre-disposing lesion and in another (Case #7) the condylar fracture in the distal third metatarsus coalesced with the area of the bone affected by DMD. Further research may be warranted to calculate the prevalence and validate the association of this syndrome with catastrophic failure of the distal third metacarpal/metatarsal bones.

Recommendation:

- **Industry support of research to better understand the relationship between dorsal metacarpal/metatarsal disease (DMD) and CMI.**

Recent Exercise History

The majority of CMI cases (14 of 22) exhibited a high intensity exercise profile followed by a decline in activity in the month prior to CMI (see Exercise History Reports). Categorization into this subgroup was confounded by several factors including training adjustments due to the inclement weather, trainer changes, and unrecorded workouts. Hypothetically, this exercise profile suggests a diminished capacity for continued high-intensity exercise due to the development of musculoskeletal pathology. Considering that 21 of the 22 CMI cases had confirmed or suspected pre-existing pathology in the failed anatomical structure, the fact that a majority of cases also exhibited this declining activity pattern suggests that such an exercise profile is a significant risk factor for CMI. Furthermore, understanding why the exercise was decreased may be an important consideration. Was the decrease trainer driven or horse driven?

Recommendations:

- **CHRB review panel evaluate horses based on recent exercise history**
- **Workout requirement criteria be re-evaluated**

A smaller group of CMI cases (3 of 22) exhibited a high intensity exercise profile without a decline in activity in the month prior to CMI. However, one of these cases did have a decline in activity two months prior to CMI when exhibiting lameness in the limb that ultimately failed. Another of the three cases had two transient episodes of lameness in the near term but no concomitant easing off in activity. The third case was an unraced 3-year-old that was being trained for his racing debut.

Two CMI cases exhibited a low-intensity exercise profile in terms of high-speed activity. Significantly, these were both unraced 4-year-olds

Recommendations:

- **Criteria for official workouts should be established for unraced 4-year-olds, horses returning from layoffs greater than one year, and at the discretion of regulatory veterinarians for horses returning from layoffs greater than 120 days.**
- **The fact that 10 of the 23 fatalities listed in this report occurred during training calls for the introduction and strict enforcement of workout criteria at all racetracks. Restrictions and controls must be in place to ensure that horses are suited for high-speed workouts. Racing and training records must be examined before horses are permitted to work.**

Layoff History

Nearly a third of the CMI cases (7 of 22) had a history of at least six months between race starts at some point in their respective careers. Four of these had recently returned from a layoff and had made five return starts or fewer at the time of CMI. In addition, two other cases had made their racing debuts late in their sophomore (3-year-old) years. Combined with the aforementioned two unraced four-year-olds, half of the CMI cases (11 of 22) were horses that had prolonged gaps in activity at some point in their careers. Contrarily, one CMI case had been in training for 17 consecutive months.

Recommendations:

- **Compulsory official examinations and/or workouts for horses returning from layoffs or making belated racing debuts. (This has been implemented under CHRB Rule 1588(a)(14) as of October, 1, 2019.)**
- **Compulsory rest for horses based on rate of accumulation of high-speed furlongs time in training or number of recorded high-speed events.**

Career Status

Over a third of the CMI cases (8 of 22) were 3-year-old maidens. All eight had made five starts or fewer, one being unraced. Five of these had at least one month of high intensity activity (defined as greater than one standard deviation from the mean value of controls) in the previous four months. Two of the three cases that did not demonstrate high intensity activity as compared to controls did have multiple gate workouts in the near term. One of those two had also recorded faster workout times than previous ahead of his racing debut. The third of these cases was the only one of the entire subgroup that had a POD lesion (labeled as 'severe') identified at necropsy and was the only horse

to sustain CMI in both front fetlocks. This subgroup may be significant in that seven of the eight had an osteopenic lesion on the abaxial margin of the medial PSB of the affected limb(s). Furthermore, none of these cases sustained a condylar fracture. This could suggest that the PSB lesion develops early in a horse's racing/training career perhaps in response to the stress of high intensity exercise on a skeletal apparatus not fully adapted to race training. In this respect the lesion may not necessarily be associated solely with the accumulation of high-speed furlongs.

Recommendations:

- **Industry support of research to better understand the etiology of medial PSB osteopenic lesions**
- **Compulsory diagnostic imaging based on exercise history criteria**

Cumulative High-Speed Furlongs

Eight of the 22 CMI cases were horses that had accumulated more high-speed furlongs (via races and timed workouts) than control horses in the past 12 months. Significantly four of these horses also had significant periods of inactivity in the same time frame, suggesting that exercise intensity was at very high levels during the intervals when the horses were in full training. Furthermore, all eight cases were aged 4 years or older and all but one had POD lesions in the affected third metacarpal or metatarsal at necropsy. All but two cases sustained a condylar fracture. Only one of the eight horses underwent a diagnostic imaging procedure in the 90 days prior to injury.

Horses out of training for more than 90 days, horses entered with multiple level class drops, horses suspected of fetlock pathology, and horses that have accumulated a large number of high-speed furlongs may require additional diagnostics. The latter profile was seen in several cases in this cluster. Horses that have accumulated a large number of high-speed furlongs in a specific time frame may benefit from mandatory periods of rest to interrupt the cycle of chronic repetitive loading that leads to pre-existing lesions (e.g., POD lesions).

Recommendation:

- **Regulatory veterinarians should be empowered to order diagnostic procedures and imaging as a condition of continued racing and training.**

From the 23 cases, 16 horses were under the care of trainers with at least one other fatality within a 12-month period. Furthermore, two trainers had multiple fatalities within this cluster, and a third had a second fatality later in the same race meeting.

The majority of horsemen did not review the necropsy reports on their horses; furthermore, many did not display good working knowledge of anatomy or grasp the signifi-

cance of major pre-existing lesions (e.g., POD lesions). The CHRB is nearing implementation of a new rule requiring such a review by trainers and others.)

Recommendations:

- **Continuing education should also be required on a regular basis as a condition of licensing. This program should focus on the etiology of common veterinary syndromes of the thoroughbred racehorse, such as osteochondral disease, lameness evaluation and diagnostic imaging, common airway disease, and soft tissue injuries. (The CHRB is in the process of establishing a program for continuing education.)**
- **Require review of necropsy reports by trainers and others specified on their horses. (A rule requiring this review is nearing implementation.)**
- **Create a veterinary investigator position focused on necropsy review. (Governor Newsom's proposed budget includes \$1.4 million for additional Official Veterinarians and other oversight personnel)**
- **Licensing requirement for both trainers and assistant trainers should be expanded and potentially standardized on a national level. This would include but not be limited to requiring a specific length of apprenticeship or animal experience hours before eligibility to apply.**

Program Training

In several cases it was suspected that program training was taking place. Program training entails someone controlling (having oversight of) the horse other than the listed CHRB-licensed trainer.

Recommendation:

- **Program training should be expressly prohibited in the CHRB rules and regulations, and strictly enforced. (The CHRB has adopted rules to prohibit program training and is considering additional steps to ensure that horses are under the care of appropriate licensees.)**

Use of the Riding Crop

In two cases video footage and interview statements point to the possibility of crop use being an immediate factor in precipitating the catastrophic event. In one case, the stewards fined the rider for misuse of the crop.

Recommendation:

- **The potential association between crop use and serious musculoskeletal injury should also be systematically examined.**

General Recommendations

This investigative report on the first 23 equine fatalities during the 2018-19 winter/spring meet at Santa Anita Park makes it clear that horse racing must develop a culture of safety first. This culture change must occur with everyone. A small number of participants refusing to change will harm the entire industry. It is the responsibility of all involved, including the California Horse Racing Board, to provide the regulation, oversight, and guidance to achieve this goal. The following recommendations are part of that process.

The following are additional recommendations proposed in response to the cluster of fatalities:

Horse Welfare and Safety

Recommendations:

- **A database of documented injuries and veterinary procedures should be maintained to identify emerging trends in injury rates, distribution patterns, and types of injuries. This information would be used to make short-term recommendations to horsemen, veterinarians, and track management. Also, this information can be used for statistical analysis and research purposes. Sources of information would include: Southern California Equine Foundation (SCEF) hospital records, Veterinary Confidential reports (Form CHRB-24), attending veterinarian medical records, trainer-logged individual health records, association veterinary records (monitoring veterinarian observations), and the CHRB Veterinarian's List.**
- **Facilities at the racetrack should be explored for a small, paddock turn-out where horses can be outdoors and with more space.**

Entry Process

Prolonged intervals between the time horses are entered and their races can result in horses performing high-speed exercise (workouts) after entry that could negate any physical exam findings documented by attending veterinarians ahead of entry; additionally, prolonged intervals allow trainers to enter compromised horses in the hope that the problem will resolve by race day. The aforementioned culture change would alleviate these problems.

Recommendation:

- **Horses that work out after entry, before they race, should be re-examined by attending veterinarians. Compromised horses should not be entered at all. Certainly, the Racing Office should not encourage such an entry.**

Claiming System

The CHRB should consider restructuring the current claiming system, which involves offering horses for sale at the given price level for the race. Within this system, which allows trainers/owners to arbitrarily determine the “price” of their horses, the potential exists for a physically compromised horse to be entered to race for the purpose of losing said horse via a claim. Precipitous drops in class are obvious concerns in terms of equine safety. Such horses are red-flagged by the panel reviewing entries (i.e., placed on the “watch list”), but the issue should be resolved before the horses are entered, not identified afterwards.

Alternatives exist to the claiming system, such as merit racing, which stratifies the relevant horse population by current class. A panel of racing officials handicaps the horse population into class levels and adjusts based on subsequent performances. Auction races are another alternative. Auction races differ from current claiming races in that a prospective buyer commits to buying the horse after said race rather than several minutes prior to the start.

Recommendations:

- **Purse-to-claiming-price ratios should be established to further ensure that horses are being run when appropriate.**
- **Alternatives to the current claiming system should be considered.**
- **Multiple-level class drops should be discouraged if not outright prohibited.**

Ship-in policy

Some horses came onto the grounds from non-CHRB facilities, yet were allowed to train or breeze with no prior examination. The CHRB is adopting rules to ensure that horses have been in the proper care of licensed individuals before they race.

Recommendation:

- **Additional steps should be taken to ensure that horses entering the grounds from non-CHRB facilities are suitable for training.**

Video Surveillance

Santa Anita installed an elaborate video surveillance system in 2016 that monitors the stable area. More than 1,000 HD video cameras closely monitor human and equine traffic in and out of individual stalls and barns. The control center utilizes the best technology available with the capability to zoom in each of the HD cameras by a power of 25 in order to display and record in complete detail. The video footage

from each camera is stored and available for detailed subsequent review to ensure full transparency in the barn area.

Recommendations:

- **Other tracks should consider installing similar systems.**
- **Consideration should be given to expanding video surveillance at all locations, including the racing ovals to monitor morning training.**

Transfer of medical records

Currently medical records are not transferred when horses transfer between connections. The CHRB is in the process of adopting a new rule to require that the trainer of a horse

that has not been stabled at a facility under the jurisdiction of the CHRB for 14 days prior to a race submit to the Official Veterinarian the previous 14-day veterinary treatment record. The CHRB also is in the process of adopting a new rule to require pertinent medical information from a horse claimed in a claiming race be transferred from the horse's former attending veterinarian to the horse's new attending veterinarian.

Recommendation:

- **Additional steps should be considered to make veterinary records available to CHRB regulatory veterinary personnel and to the new owners and trainers of horses that are transferred.**

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- xiv Racing Injury Prevention Report July, 2011 to June, 2013; (There will be a link here; it is not working not)
- xv Stover, SM (2013). Diagnostic workup of upper-limb stress fractures and proximal sesamoid bone stress remodeling. In *Proceedings of the 59th Annual Convention of the American Association of Equine Practitioners* 59:427-435
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- xxiii Bramlage, LR; Bisphosphonates in Racehorses. <https://www.youtube.com/watch?v=UQh1U4c65pM>
- xxiv CHRB Rule 1560
- xxv CHRB Rule 1561
- xxvi CHRB Rule 1853
- xxvii CHRB Rule 1846
- xxviii Recommendations of The Welfare and Safety of the Racehorse Summit (2006); <https://www.grayson-jockeyclub.org/resources/WelfareSummit.pdf>
- xxix Stallion Durability and Soundness(2019); <https://www.grayson-jockeyclub.org/resources/eletter19.1dur.pdf>

Case #1

Incident Summary:

On December 30, 2018, this horse ran his 18th race, the 5th race at one mile on the main dirt track. The weather was clear, and the track was listed as fast. The horses all broke well from the starting gate at 2:08 p.m. Racing in third position at the $\frac{3}{4}$ pole, the jockey pulled his mount up from between horses entering the backstretch. This horse appeared game to continue running despite being injured, but the jockey was able to stop the horse near the $\frac{1}{2}$ -mile pole. The Track Veterinarian sedated the horse with detomidine and applied a Kimzey splint to the left-front lower limb before the horse was walked into the ambulance and removed from the track. The trainer witnessed the injury to the horse during the running of race. The attending veterinarian performed a clinical examination of the horse in the ambulance and recommended euthanasia. Based on this recommendation, the horse was humanely euthanized with intravenous pentobarbital at 2:30 p.m.

Necropsy Summary:

A necropsy examination revealed biaxial (both medial and lateral) proximal sesamoid bone fractures of the left front fetlock joint with associated extensive soft-tissue injury. A pre-existing area of focal discoloration and bone porosity (“osteopenic focus”) was associated with the fracture surfaces in the medial proximal sesamoid bone. The injury was closed.

Track Summary:

The horse was injured racing on the main dirt track and it was listed as fast. The track was last sealed six days earlier on Dec. 24, 2018, due to weather.

Veterinary History Summary:

After entry and prior to his final race, the horse received ketoprofen (a non-steroidal anti-inflammatory drug, or NSAID), Polyglycan, and electrolytes on December 28, and throat flush was dispensed the same day. On December 29, the horse received phenylbutazone (an NSAID), and on the day of the race he received furosemide (Lasix, a diuretic to decrease EIPH-exercise induced pulmonary hemorrhage), administered by third-party Lasix veterinary staff.

Previously, the horse was diagnosed with osteoarthritis of both front fetlock joints. A lameness examination, including intra-articular anesthesia and radiographic imaging for a left front lameness, was performed by the attending veterinarian on February 4, 2018. The attending veterinarian recommended time off and IRAP (Interleukin-1 Receptor Antagonist Protein) treatment for the horse, but also proposed retirement as a possible option. IRAP is a form of biological therapy that is frequently employed to treat os-

teoarthritis (OA). The horse was making his fifth start since a layoff after that examination. The horse received dexamethasone oral powder July 10, 2018. The last recorded breeze was on December 16, 2018. The following day, the assistant trainer requested a blood sample be obtained for IRAP processing. However, after collection there was no subsequent IRAP intra-articular (IA) treatment performed. The trainer decided that the horse did not need the treatment prior to the race, as he considers IRAP a “long term treatment”. The only time the horse had been on the Veterinarian’s List was July 13-18, 2018, for being sick (febrile).

Pre-race Examination History:

Pre-race examination records show chronic joint effusion of the left front fetlock since June 2017. This was episodic in the horse’s early exam history, but was noted for the first time in four months for his January 6, 2018, race, his last race prior to the seven-month layoff starting on February 4, 2018. Upon returning to racing in August 2018, the fetlock effusion was consistently noted. Exostosis (“osselets”) was prominent on both fore fetlocks but to a greater extent on the left front. The morning of the fatal race was the first time the fetlock exostosis was graded as high as 3/5.¹

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. This is a chronic, repetitive, overuse injury.

From the history of the horse, the possible source(s) of this lesion were:

- (1) intense training regimen throughout its career. This horse consistently had more high-speed furlongs, when compared to controls over a four-month period.
- (2) observable development of degenerative joint disease in the left front fetlock (joint effusion noted on pre-race exams) without reduction in training intensity prior to forced cessation of training due to lameness (February 4, 2018).
- (3) continued and intense training regimen after return to full training and racing in August 2018.

CONCLUSION: This horse represents a case of chronic degenerative joint disease of a high-motion joint (i.e., fetlock) following repetitive overextension as a result of excessive training and racing. A diagnosis of osteoarthritis (OA) had been made approximately nine months earlier. While the horse was afforded time off from racing and training, the layoff period may have been inadequate. In addition,

there appeared to be no adjustment in terms of training intensity upon the horse's return to full training, despite the previous diagnosis of OA. In the near term, the horse's physical status may have been in question based on: (1)

an atypical gap in recorded workouts and (2) processing for potential IA therapy (IRAP) preceding the horse's final start.

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- i Pre-race Grading (1 = slight; 2 = mild; 3 = moderate; 4 = severe; 5 = extreme).

Case #2

Incident Summary:

On January 4, 2019, this horse ran his third race, the 9th race at 6½ furlongs on the downhill turf course for 3-year-old maidens special weight. The weather was clear and the turf was rated as firm. At 4:34 p.m. The horse broke well from the starting gate with the other contenders and made a right-hand turn, unique in U.S. racing, then a wide left-hand turn before the flat home stretch. Racing mid-pack, the jockey thought they were going to win the race as the horse was running 'silky smooth'. However, leaving the hill near the 5/16 marker, the horse sustained a catastrophic injury to his left front fetlock joint. He was evaluated and attended to by Track Veterinarian, who sedated the horse prior to loading him onto the ambulance, where the horse was humanely euthanized with pentobarbital before being removed from the track.

Necropsy Summary:

The necropsy examination revealed fractures of the biaxial proximal sesamoid bone of the left front fetlock joint with associated extensive soft-tissue injury. The medial proximal sesamoid bone had a pre-existing area of focal discoloration and bone porosity/osteopenic focus associated with the fracture surface; the lateral, proximal sesamoid bone fracture was apical. The injury was open.

Track Summary:

The horse was racing on the downhill turf course when injured. This is a unique event and different than a typical flat race due to the unique configuration with the right hand turn, downhill slope, and dirt crossing. There have been clusters of injuries associated with the hillside turf course when it is especially fast. Fractional times can reflect the condition of the course. In the previous few days the course had fast fractions, which indicate it could have been firmer than usual. Additionally, another horse, case #3 in this report, was injured in the same race. Coincidentally, a later third fatality, case #15, also participated in same race. He subsequently had a cardiac event during training a few weeks later.

Veterinary History Summary:

After entry and prior to his final race, on January 2, 2019, this horse received both flunixin, (a non-steroidal anti-inflammatory drug or NSAID) and methocarbamol (a muscle relaxant) by injection. On January 3 he received phenylbutazone, also by injection. The horse received furosemide the day of the race administered by third-party Lasix veterinary staff.

Routinely, the horse received dexamethasone/trichlormethiazide (compounded Naquasone, a corticosteroid/diuretic

combination) prior to high-speed workouts or phenylbutazone post-workout. Furosemide was administered prior to some workouts.

Pre-race Examination History:

Based on pre-race examination history, this horse exhibited only mild signs of front fetlock osteoarthritis.

According to documentation, the horse received detomidine prior to euthanasia. However, the report stated xylazine was detected in the blood sample and not detomidine.

Possible Contributing Factors:

Pre-Existing Lesion:

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. This is considered a chronic, repetitive, overuse injury. The lesion is often clinically silent and not amenable to standard diagnostic imaging.

From the history of the horse, the possible source(s) of this lesion were:

- (1) intense early training program; the horse was breezing roughly every third or fourth day for its first four workouts
- (2) multiple consecutive gate works following the intense early workout pattern. In the month leading up to his first race (from 9/29/18-10/16/18), the horse breezed from the gate three consecutive times in workouts of 5 furlongs or more. Gate works are considered to place more strain on a horse, compared to starting a workout when the horse is already galloping around the racetrack.
- (3) relatively intense training regimen; in addition to weekly timed workouts, this horse also performed weekly "two-minute licks" (fast gallop) as part of its training routine
- (4) familial or inherent predisposition for osteoarthritis based on pedigree.

CONCLUSION: This horse had a steady training pattern in the near term but was racing on a downhill turf course with a higher fatality rate during a period of questionable excessively fast fractional times. The intense training program implemented at the very start of the horse's training career (short time between works and multiple consecutive gate works) may have initiated the distinct osteoarthritic changes seen on necropsy by stressing a relatively unconditioned musculoskeletal apparatus. Combined with racing on a relatively higher-risk racecourse, this could have predisposed the horse to the breakdown event.

Case #3

Incident Summary:

On January 4, 2019, this horse ran his fourth race, the 9th race at 6½ furlongs on the downhill turf course for three-year-old maiden special weight. The sky was clear and the turf was rated as firm. At 4:34 p.m. the horse broke well from starting gate position #6, with case #2 in gate position #4, and made the right-hand turn, then left-hand turn. The jockey had ridden the horse in all his race starts, and knew the horse had a “hot head” temperament and liked coming from the back of the field. The jockey placed the horse towards the rear of the pack and was sitting on the inside right behind case #2 as they cruised down the hill. When case #2 sustained an injury, this horse’s jockey did shift slightly, but did not feel they were affected significantly. After crossing the dirt main track, a short section of the downhill turf course before reaching the turf home stretch, the horse switched from his left lead to his right lead. A few strides later he sustained a catastrophic injury to his right front fetlock joint near the 1/8 pole. His jockey felt this immediately and pulled the horse to a halt as he dismounted and waited for the outrider. The Track Veterinarian arrived shortly after attending case #2. This horse was sedated with detomidine and examined by the Track Veterinarian, then humanely euthanized with pentobarbital at 4:40 p.m. and ambalanced off of the racetrack.

Necropsy Summary:

A necropsy examination revealed biaxial proximal sesamoid bone fractures of the right front fetlock joint with associated extensive soft-tissue injury and open luxation of the fetlock joint. The medial proximal sesamoid bone had a transverse basilar fracture and a pre-existing area of focal discoloration and bone porosity/osteopenic focus associated with the fracture surface; the lateral proximal sesamoid bone fracture was apical. The injury was open.

Track Summary:

The horse was racing on the downhill turf course when injured. There have been clusters of injuries associated with the hillside turf course when fractional times reflect the fast condition of the course. In the previous few days the course had fast fractions, which indicate it was firmer than usual. Additionally, another horse, case #2, was injured in the same race. Coincidentally, a third fatality case also participated in this race. The horse subsequently had a suspected cardiac event during training a few weeks later.

Veterinary History Summary:

After entry and prior to his final race, on January 2, 2019, the horse received flunixin and ACTH by injection. On January 3 he received phenylbutazone. The horse received

furosemide the day of the race, administered by third-party Lasix veterinary staff. For his previous race, the horse received dexamethasone three days before the race, then flunixin, methocarbamol, calcium and thiamine two days out, and phenylbutazone one day prior to the race.

The horse was known to be temperamental, so received multiple medications (dantrolene, branched chain amino acids, ACTH, acepromazine) and twice-daily hand walking to manage recurrent exertional rhabdomyolysis (RER, “tying up”). These episodes of muscle cramping can be an indirect sign of subclinical musculoskeletal injury. The treatments for the RER condition may have confounded the ability to identify his other physical problems.

In early December 2018, after a routine training workout the trainer palpated a slight swelling along the inside of the horse’s left front lower limb, between the fetlock joint and carpus (knee). The horse did not react with pain to palpation nor display lameness. An ultrasound exam performed by the attending veterinarian on December 23, 2018, revealed mild inflammation in the left front superficial digital flexor tendon. No medical treatment was performed; however, the trainer modified the training program, so that the inflammation would not worsen. This led to a gap in the training with no timed works between December 11 and December 29.

Pre-race Examination History:

This horse exhibited mild signs of bilateral front fetlock OA in pre-race examinations.

Possible Contributing factors:

Pre-Existing Lesion:

At necropsy the horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its right front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. Similar changes were seen in the proximal sesamoid bones in the left limb, which represents a bilateral (both limbs) repetitive, overuse injury.

Speculating from the history of the horse, the possible source(s) of this lesion were:

(1) intense early training program; between July and September 2018, this horse breezed every 5-6 days; this was immediately preceded by a 30-day gap after its first recorded breeze (at which time exertional rhabdomyolysis was observed).

(2) history of RER; episodes of rhabdomyolysis could be an indirect sign of subclinical musculoskeletal injury; RER management could confound the ability to identify other physical problems.

CONCLUSION: This horse had a decreased training pattern in the near term associated with concern for a soft-tissue structure (left front tendon) not directly related to the joint that was ultimately injured in the race. Diagnostic imaging was performed the results of which, according to the connections, did not indicate the need for interrupting training. A chronic physical problem (RER) was also identified that was managed to the satisfaction of the connec-

tions. From a broad perspective, taking both the short-term (left front tendon) and long-term (chronic RER) physical issues along with running on a relatively higher-risk (down-hill turf course) with questionable excessively fast fractional times, the risk of acute musculoskeletal injury appears amplified in this case. A more conservative approach to the soft-tissue concerns may have prevented the subsequent—though seemingly unrelated—injury.

Case #4

Incident Summary:

On January 8, 2019, this horse was performing his 12th high speed track workout in preparation for his upcoming first race. It was approximately 6:30 a.m., and the weather that day would be partially cloudy with a daytime high of 72 degrees F and low of 47 degrees F. The main track was rated as fast, just as it had been for all of the horse's prior morning workouts; however, there had been rainy conditions in the preceding days. The main track had been sealed on January 5, 6, and 7, and the horse was only hand-walked the two days before his workout. The horse had his regular exercise rider aboard, and the pair had been training together five or six mornings each week for the previous five months. The rider would have preferred to wait a few more days after the recent rain, but with more rain predicted, this was deemed the best option to breeze. The trainer had instructed the rider to perform an easy work without asking for speed. The rider galloped the horse to warm up, then approached the designated striped marker pole along the inside rail and let him run. The rider had a strong relationship with the trainer to share any concerns with any of the horses in the barn, but did not have any concerns about the horse's soundness that morning or any other day. Coming down the home stretch at racing speed, the rider felt and heard a snap in one of the horse's front legs. The rider was able to steady and stop him, then dismounted and waited beside him for the horse ambulance. The attending veterinarian evaluated the horse's injured left front limb and euthanized him in the ambulance with pentobarbital at 6:45 a.m. after receiving permission from the trainer.

Necropsy Summary:

A necropsy examination revealed biaxial proximal sesamoid bone fractures of the left front fetlock joint with associated extensive soft tissue and suspensory apparatus disruption, including both suspensory ligament branches. The medial proximal sesamoid bone had a transverse basilar fracture and a pre-existing area of focal discoloration and bone porosity associated with the fracture surface; the lateral proximal sesamoid bone fracture was mid-body, transverse, and comminuted. The injury was closed.

Track Summary:

The horse did not breeze on a sealed track. However, the breeze on the day of injury (January 8) was after the main track had been sealed the previous three days (Jan 5-7).

Veterinary History Summary:

Less than a month prior to the fatal training session, the horse underwent a "pre-purchase" radiographic examination of the fetlock and carpal joints of both front lower limbs. The attending veterinarian reported no significant findings from the pre-purchase evaluation.

Additional Notes:

The trainer related having been pressured for the past year by racetrack management, specifically by the previous Santa Anita Racing Secretary, to race horses, indicating that the Racing Secretary wanted the trainer to have a minimum of 50 starts in a year and once stated, "Quit working them and start running them."

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have a focal osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. This is a chronic, repetitive, overuse injury.

Speculating from the history of the horse, the possible source(s) of this lesion were:

- (1) intense early training pattern; quick progression to galloping; relatively more high-speed furlongs than controls.
- (2) familial or inherent predisposition for osteoarthritis; two half-siblings (same dam) had historical evidence of soundness issues (one on CA Vet List, one on AZ Vet List).

CONCLUSION: The horse had a steady training pattern in general but was training during a time when the main track was repeatedly sealed. The relatively intense early training pattern may have initiated the development of the pre-disposing lesion that eventually was associated with the breakdown event. The recent diagnostic examination was not associated with a physical complaint. Likewise, the delay in onset of full race training was not related to physical infirmity. According to the interview subjects, the horse appeared to be asymptomatic at the time of the acute injury.

Case #5

Incident Summary:

On January 11, 2019, this horse ran her eighth race, the 1st race going 6 furlongs on the dirt for maiden fillies and mares, 4 years old and up. The weather was cloudy and the sealed dirt track was rated as fast. At 12:31 p.m. the horse broke from post position #7. She felt good underneath the jockey, and the pair settled mid-pack. The horse switched leads nicely going into the far turn. When passing the ¼ pole, she was getting tired and allowed other horses to pass. The jockey noted his mount was still on the left lead, so asked her to switch leads by switching the “stick” (riding crop) to the left hand. The jockey then struck the horse with the crop on her left hindquarters, and she immediately switched to her right lead. After switching leads, the horse immediately sustained an injury to her right front limb near the 1/8 pole. She was sedated with detomidine and examined by the Track Veterinarian, then ambulated off the racetrack. The attending veterinarian clinically evaluated the horse and recommended euthanasia. After the trainer saw the horse and spoke with one of the owners, the attending veterinarian performed euthanasia with pentobarbital at 12:42 p.m.

Necropsy Summary:

A necropsy examination revealed biaxial proximal sesamoid bone apical fractures of the right front fetlock joint with associated extensive soft-tissue injury. The medial proximal sesamoid bone had a transverse mid-body fracture and a pre-existing area of focal discoloration and bone porosity/osteopenic focus associated with the fracture surface. The lateral proximal sesamoid bone fracture was a transverse mid-body fracture. The injury was open. Articular cartilage erosion was present in the same location in the contralateral (left front limb) medial proximal sesamoid bone as the focal discoloration and bone porosity. Arthritic changes including peri-articular fragmentation were present in the left carpus.

Track Summary:

The horse was injured while racing on a sealed surface. Sealed tracks are considered harder than a normal surface, which could precipitate injury, especially on horses with pre-existing lesions. The horse lived and trained at Los Alamitos racetrack, where most of her races had been run. This was the horse’s second racing start at Santa Anita.

Veterinary History Summary:

After entry and prior to her final race, on January 9, 2019, the horse received both flunixin and methocarbamol by injection. SynChill (a calming supplement) was dispensed. On January 10 she received phenylbutazone by injection.

She received furosemide the day of the race, administered by third-party Lasix veterinary staff.

Previously, the horse was noted to have back soreness and suspected osteoarthritis (OA) of the knees (carpi). The attending veterinarian noted the horse to have warm and sore knees, although no discernible lameness was detected. No signs of carpal osteoarthritis were noted in pre-race examinations; however, a “chip” fracture was noted in the left carpus on necropsy. Radiographs and diagnostics were not pursued, although the horse was treated with Adequan, then the trainer declined further treatment because of the expense. The horse received reserpine (long-acting tranquilizer) and Regu-mate (altrenogest, a progesterone used to suppress estrus in horses) as she was known to be nervous and high-strung. The horse received furosemide prior to high-speed workouts, and on August 12, 2018, she received flunixin with the furosemide injection. On November 18, 2018, she was treated with Tetracycline (antibiotic) with dexamethasone.

Pre-race Examination History:

This horse exhibited mild signs of bilateral front fetlock OA in pre-race examinations. No signs of carpal osteoarthritis were noted.

Possible Contributing factors:

Inappropriate Crop Use:

On January 12, 2019, the jockey was fined by the Santa Anita Board of Stewards for use of the riding crop after the horse had already obtained her maximum placing per CHRB Rule 1688 (LATS Ruling #022).

Pre-Existing Lesion

This horse was noted to have osteopenic lesions on the abaxial articular surface of both medial proximal sesamoid bones (PSB) on necropsy. These are considered bilateral, repetitive, overuse injuries. The fracture line of the medial PSB of the right front went through this lesion during the breakdown event.

Speculating from the history of the horse, the possible source(s) of these lesions include:

(1) intense early training; rapid progression in speed; multiple consecutive gate works; subsequent extended lay-off; there were fast work times and three consecutive gate works (between 6/01/17 and 6/14/17) during the first four months of her racing/training career. Significantly, in just three months after this intense pattern, the horse was laid up for seven months. These extreme (both intense and sparse) training patterns punctuated by multiple layoffs (both long and short) suggest both physical problems and inadequate management.

(2) intense program upon return to training; rapid workout times without slower foundational works; rapid return to gate training. After returning to the work tab in April 2018, this horse underwent a brief but intense work pattern. Her first work back (April 18) was 3 furlongs in a rapid :35 2/5. Her next work was a ½ mile in :48 flat. Her third work back was a ½ mile in :46 flat while breaking from the gate. Such concentrated blocks of intense work, especially with a gate work, could possibly expose the horse to musculoskeletal injury (i.e., osteoarthritis) if recovery time or fitness level is inadequate.

(3) fractious temperament; according to the trainer, this horse was difficult to control and manage during training; tended to “run-off” (train too aggressively at higher speeds than desired by the rider).

CONCLUSION: This horse was on a declining training program (sparse works, 23-day gap) heading into its final start despite a relatively sparse racing campaign over the summer/fall. A pattern of overly intensive training followed by a declining pattern or layoff that occurred early in its career (2017) was essentially repeated in 2018 upon return to training. According to the trainer, these conflicting training patterns developed as a result of: (1) behavioral issues with the horse, (2) the frustration of campaigning the horse at a class level beyond its ability, and (3) training logistics (relying on the availability of certain riders to exercise the horse). Regardless, the intense periods of training could have initiated the osteoarthritic changes that predisposed the horse to fracture. These suspect long-term and short-term training patterns combined with racing on a sealed surface could have precipitated the breakdown event.

Case #6

Incident Summary:

On January 18, 2019, this horse made her first start in the 1st race, \$20,000 maiden claiming for 3-year-old fillies. The track surface was listed as good. The trainer believed the track was drying out. Overall, the connections did not consider the horse to be a top-class prospect, and there were earlier discussions of starting her career at a lower-tier racetrack, such as Turf Paradise, instead of Santa Anita. Nonetheless, the horse was calm and professional when the jockey met her in the paddock, and he was instructed to school (educate) the horse and give her a good first-time experience. After warming up they loaded into the #6 gate position; the gates swung open at 1:04 p.m. The horse took a slow first step breaking from the gate, which is not unusual for a horse's first race. The jockey decided to stay behind the other horses, so that his mount could go nice and easy, while getting the experience of having dirt fly towards her face. The jockey described the track as sticky in some spots, wet and dry in other places. He planned to ask the horse to finish strongly, and the horse was running to the best of her ability, even though they were in last place. They passed the finish line, then the horse switched leads to gallop out after the race. The jockey heard something near the 6½ furlong pole, so pulled the horse up right away. The horse was sedated with detomidine by the Track Veterinarian; a Kimzey splint was applied to her right front limb for the ambulance ride to the barn. The attending veterinarian sedated the horse with xylazine and butorphanol in order to obtain radiographs of the right front fetlock joint. Based on the extent of the injury, the horse was humanely euthanized with pentobarbital at 1:35 p.m.

Necropsy Summary:

The necropsy examination revealed biaxial proximal sesamoid bone fractures of the right front fetlock joint. The medial proximal sesamoid bone fracture is basilar with the distal fragment in two pieces. A region of increased porosity is present at the abaxial aspect of the articular surface on both opposing fracture surfaces. The fracture line propagates through a pre-existing subchondral focus of very subtle brown discoloration surrounded by highly compacted, sclerotic, trabecular bone. There is a mid-body fracture of the lateral proximal sesamoid bone and a full thickness transverse rupture of the intersesamoidean ligament continuous with the fracture line of the proximal sesamoid bone. The injury was closed.

Track Summary:

This horse raced on a sealed racetrack surface. The track had been sealed that day prior to the races and she ran in the first race on the card. Her last breeze on the main track

(January 9) was on a surface that had previously been sealed for consecutive days (January 5-7).

Veterinary History Summary:

After entry for her race, the horse received DMSO on January 14. The horse also received flunixin on January 16 and phenylbutazone on January 17. She received furosemide the day of the race (January 18) administered by third-party Lasix veterinary staff.

Previously, the horse received dexamethasone/trichlormethiazide powder prior to workouts and phenylbutazone orally post-workout. A treatment with systemic corticosteroid (Vetalog, 10/26/18) was considered "maintenance" by the trainer, as he believed it helpful for young horses as they progress through their early training towards race fitness.

The horse was treated for cellulitis or a blister on one leg prior to her first race. She was treated with the antibiotic tetracycline twice; dexamethasone was added with the first day's tetracycline injection. The condition reportedly resolved itself after approximately two weeks.

Pre-race Examination History:

This horse exhibited mild signs of bilateral front fetlock osteoarthritis (OA) in her only pre-race examination.

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have a focal osteopenic lesion on the abaxial articular surface of its right front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. This is considered a repetitive, overuse injury.

Speculating from the history of the horse, the possible source(s) of this lesion were:

- (1) intense early training pattern; in the face of delayed training this horse had fairly intense early training; breezing within a few weeks of shipping to the barn is fairly early compared to most unraced horses; her accumulated high-speed furlongs in the first month of training was above average
- (2) frequent, consecutive gate works; the horse breezed from the gate in three of the last four workouts prior to racing
- (3) genetic predisposition; several of the horses that appear in the five-generation pedigree of this horse had their racing careers interrupted by significant injury

CONCLUSION: This horse had a disparate training record that combined delays and gaps with periods of intense

training. She had vague physical issues (RER) and bloodlines that may have pointed to developing yet asymptomatic osteoarthritis. Combined with recent training and racing

on a compromised (sealed) surface, this could have precipitated the breakdown event.

Case #7

Incident Summary:

On January 20, 2019, this horse ran her 26th race, the 8th race, the Astra Stakes for fillies and mares, 4 years old and upward, going 1½ miles, starting on the downhill turf course. The weather was clear and the turf was labeled as good while the main track was rated as fast that afternoon. The 7-year-old horse began her racing career in France, and all but her first two races had been on turf. In the Grade 3 Astra Stakes, the jockey was very familiar with his mount, having ridden the horse in four previous races, and he had worked her on several occasions. She warmed up well, loaded into the gate smoothly, and broke well from the gate at 3:46 p.m. During the running of the race, the jockey placed her mid-pack behind flights of horses. Approximately one-half mile into the race, when the horse transitioned from the turf course to the dirt crossing, then back to the turf coming into the stretch the first time, the jockey felt the horse was traveling a little differently. He believed one of her hind legs stepped on the transition area where the dirt track meets with the turf, so that the hind foot was halfway on the turf and halfway on the dirt. Within three strides of transitioning back to the turf, the horse was injured near the ¼ pole. The jockey heard and felt the horse's leg break, then for safety reasons steered her to the outside rail in order to be out of the way when the field circled back to this point of the track. The Track Veterinarian sedated the horse with detomidine and performed a clinical examination. The attending veterinarian was not present at the track, so the decision to euthanize the horse was made by the Track Veterinarian. He administered pentobarbital at 3:50 p.m. The trainer did not observe the horse following the incident, so was informed afterwards that the horse had been euthanized due to the extent of her injuries.

Necropsy Summary:

The necropsy examination revealed a highly comminuted, bi-articular, medial condylar, open fracture of the right hind third metatarsal (MTIII/cannon) bone with transverse fractures of the second and fourth metatarsal bones (medial and lateral splint bones). Multiple bone fragments were missing. Pre-existing focal porosity surrounded by highly sclerotic bone in medial condyle and dorsal cortex remodeling were identifiable in the remaining bone fragments. Dorsal metatarsal changes with periosteal thickening and multifocal, subtle petechiae in the proximodorsal cortical bone on the contralateral, left, third metatarsal were also present.

Track Summary:

The horse was racing "down the hill" when injured. This course is unique due to the configuration with a wide right-hand turn, downhill slope, and dirt crossing. There have been clusters of injuries associated with the hillside turf

course. The jockey noted the horse felt unusual at the dirt transition area. The trainer remembered it rained that day and he had some concerns with the turf that day because Santa Anita usually waited two or three days before running on the turf after a rain. He thought it was unusual that the race was kept on the turf. He would have scratched the horse if the race came off the turf.

The horse galloped regularly approximately two weeks in early January when the main track was sealed.

Veterinary History Summary:

After entry for her final race on January 20th, 2019, the horse was prescribed and dispensed dexamethasone/trichlormethiazide (dispensed) on 1/15/19 to be administered by stable personnel, and Adequan injection on 1/16/19. On 1/18/19 the horse received flunixin, methocarbamol, Polyglycan and DMSO. On 1/19/19 she received phenylbutazone and one liter of fluids with vitamins. She received furosemide the day of the race, administered by third-party Lasix veterinary staff.

Previously, the horse was treated with multiple medications (furosemide, glycopyrolate, tranexamic acid and aminocaproic acid) to decrease Exercise Induced Pulmonary Hemorrhage (EIPH) prior to her three recent works. On 12/29/18 the horse received flunixin and acepromazine after a race, and then walked for five days instead of her usual three days post-race. The horse received daily aspirin (½ oz) for chronic (undiagnosed) foot issues, and the farrier had noted "no foot, just tightened nails" before the final pre-race appointment.

The attending veterinarian noted a chronic right front limb proximal suspensory ligament issue, which was diagnosed by an ultrasound examination once. The horse was treated twice with Shock Wave Therapy (ESWT) and was placed on the Veterinarian's List for 10 days. The first incident was in December 2017, when the proximal suspensory ligaments of the left and right front limbs were treated. The more recent application was December 3, 2018, as a "preventative" for the suspensory ligaments because the horse had recently raced in Kentucky where the tracks were thought to be deeper. Also, the horse had sustained a minor shipping injury returning from Kentucky, according to the trainer. December 3 was the first day the horse galloped at Santa Anita since returning from Kentucky.

The attending veterinarian believed the horse had a general weakness in her hind-end area, so wasn't pushing. The horse was positive to flexion and palpation of the high suspensory area in the hind limbs (Churchill's test), and tight behind at the trot. Hock injections were performed May 1 and July 3, 2018, without diagnostic imaging being performed. The trainer said the hock injections were "maintenance" because of the horse's age and European origin.

The attending veterinarian had previously performed two surgeries for an entrapped epiglottis on the horse, with the most recent being 3/20/18.

Pre-race Examination History:

This horse intermittently exhibited mild, non-specific signs of altered gait in the hind limbs in the pre-race examination record. No notation of right hind fetlock osteoarthritis was ever recorded.

Additional Notes:

In the Necropsy Report Case Summary, the pathologist concluded "...horses with bilateral dorsal metatarsal/metacarpal disease should always be considered at risk for catastrophic fractures."

The race program incorrectly did not show the race going down the hill.

Possible Contributing factors:

Pre-Existing Lesion:

This horse had two lesions in the right hind cannon bone noted on necropsy that predisposed the horse to fracture. There was focal cartilage depression and a subchondral bone lesion in the medial condyle of the right hind distal cannon. There was also evidence of mild dorsal metatarsal disease (periostitis).

Speculating from the history of the horse, possible source(s) for these lesions include:

(1) prolonged racing career; this 7-year-old horse was raced beyond the age of most females with broodhorse potential and, therefore, had accumulated more high-speed furlongs than other racehorses in general; this is compounded by the fact that the horse was a middle distance-to-staying type of runner that frequently raced in long-distance events.

(2) prolonged history of altered gait in the hind end; this was a common pre-race finding throughout its U.S. career. Whether referable to a primary cause or not, such a chronic condition could have stressed multiple anatomical structures over time—including the fetlock joints and metatarsal bones—to the point where they developed pathology.

CONCLUSION: While campaigned appropriately and afforded periodic rest from training (whether intentional or by necessity), based on age and number of campaigns, this horse accumulated a large number of high-speed furlongs over its entire career. The horse had earned several stakes-placings but had yet to achieve full "black type" (i.e., a stakes win) that would maximize broodhorse value; therefore, the horse was kept in training. The chronic osteoarthritic changes that developed in the hind fetlock joints over a prolonged career coupled with a brief (two weeks) but regular period of galloping over a consistently sealed surface, along with racing on a relatively unfamiliar course with unique stresses (hillside), perhaps combined to precipitate the fatal injury.

Case #8

Incident Summary:

On January 21, 2019, this horse ran his second race, the 7th race going 6½ furlongs on the dirt for 3-year-old maiden claiming, \$50,000.

The weather was clear and the track was listed as fast. The horse showed speed at the break, while six horses wide in the middle of the track. Entering the backstretch from the chute, the jockey set his mount just off the pace behind the first group of horses. Near the 5/8 pole, after only running less than ¼ mile, the jockey felt the horse go wrong in one of the front legs, so immediately pulled the horse up. The horse was attended to by the Track Veterinarian. The horse walked into the ambulance, was removed from the track, and then met at the “gap” (track exit) by the attending veterinarian and the trainer. The attending veterinarian sedated the horse with detomidine and butorphanol, performed a clinical examination, and recommended that the horse be humanely euthanized. With the trainer’s permission, the horse was euthanized with pentobarbital at 3:30 p.m.

Necropsy Summary:

The necropsy examination revealed a transverse, mid-body, comminuted fracture of the medial proximal sesamoid bone of the left front fetlock joint with associated soft-tissue injury, including rupture of the intersesamoidean ligament leading to loss of support to the fetlock. The medial proximal sesamoid bone had a pre-existing area of focal discoloration and bone porosity (osteopenic focus) associated with the fracture surface. The injury was closed. Bilateral, biaxial palmar osteochondrosis was noted in both front fetlocks.

Track Summary:

The dirt track was sealed the day before this horse was injured. The horse’s final breeze prior to the race was on a sealed surface. In addition, the track had been sealed for nine consecutive days leading up to the race. The horse had galloped over the track on six of those days.

Veterinary History Summary:

After entry for his final race on January 21, 2019, the horse received Legend and Adequan, which both are systemic joint-therapy medications, and ketoprofen (non-steroidal anti-inflammatory drug) on January 19. The horse also received pulsed electromagnetic wave (“Papimi”) treatments (non-veterinary procedure, performed prior to both races), as well as dexamethasone powder and ranitidine (anti-ulcer medication) tabs. On January 20, the horse received phenylbutazone, and then furosemide the day of the race, administered by third-party Lasix veterinary staff.

Previously, the horse was treated routinely with Adequan after a diagnosis of fetlock capsulitis was made in May 2018. Radiographs of the left and right front fetlock joints on May 28, 2018, revealed small osteochondral fragments (“chips” or “flakes”). No lameness was reported at the time. On July 21, 2018, the left front fetlock was radiographed again when the horse displayed a Grade 2/5 lameness in that limb, but no radiographic changes were seen. The horse was put on a brief regimen of phenylbutazone (4-5 days) and training was decreased for nine weeks.

Pre-race Examination History:

This horse exhibited mild-to-moderate signs of bilateral front fetlock osteoarthritis (OA) in pre-race examinations. Based on the record, there was a significant difference in appearance of the front fetlocks between the horse’s two pre-race examinations.

Additional Notes:

The horse had two slow works leading up to his final race. He worked 5 furlongs on January 4 in 1:05 flat, which was 2-3 seconds slower than his recent previous works. The final work was a slow ½ mile in :50 flat, slightly slower than previous. Such slow works, if intentional, might indicate cautious training due to physical problems. If unintentional, it might be construed as “poor performance”.

Physically, the trainer characterized this horse as having “slack” (long) pasterns.

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have a focal osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone, through which a fracture line propagated during the breakdown event. This is considered a repetitive, overuse injury.

Speculating from the history of the horse, the possible source(s) of this lesion were:

- (1) rapid progression into full race training; this horse had its first official breeze within a month of appearing at a CHRB training facility; its first gallop was on its second day of training.
- (2) rapid development of degenerative joint disease of the front fetlocks
- (3) consistent, full race training (i.e., no precautionary adjustment) on a sealed surface over a relatively prolonged period.

(4) familial or inherent predisposition for osteoarthritis and/or fracture based on pedigree, including a half-sibling that also suffered a catastrophic LF fetlock injury after two starts. This horse's sire was a late-starting horse that made just four lifetime starts with two separate layoffs of nearly one year in duration. The dam made just six starts and had a long layoff (eight months) during her career. More significantly, this horse's older half-sister was fatally injured in a workout at Santa Anita (03/26/18) when suffering a similar injury (LF biaxial PSB fractures) with another trainer. Implementing regulations related to pedigree is far-fetched and beyond regulatory authority. However, that does not dismiss the relevance of such information

CONCLUSION: This horse had recent (gross fetlock appearance on pre-race) and past evidence of fetlock osteoarthritis (radiographs, layoff, systemic joint treatments). The horse had also been training on a sealed surface routinely in the two weeks prior to injury. This combination of a chronic physical issue and a compromised racing surface could have possibly triggered the acute fatal injury. While the horse appeared to be asymptomatic in the near term with respect to its fetlocks, perhaps the slow workouts (poor performance) were a subtle indication of an impending physical issue.

Case #9

Incident Summary:

On January 21, 2019, this horse ran in the Megahertz Stakes for fillies and horses, 4-year-olds and upward, the 8th race going 1 mile on the turf. It was her 16th race. The weather was clear and the turf was rated as good. The jockey had worked the horse on several occasions. She loaded into the starting gate well. At 3:43 p.m. the horse broke from the gate and began the Grade 3 stakes race well. Less than a half-mile into the race, the horse was trailing the field. Near the 5/8 pole, the jockey felt her take an unusual step with her hind leg. The jockey pulled her to a halt, dismounted, and waited with her for the ambulance. The jockey believed it was very uncommon for a horse to breakdown early in a race, especially a hind limb. The Track Veterinarian sedated the horse with detomidine, clinically evaluated the injured left hind limb, and euthanized the horse with pentobarbital at 3:46 p.m. for humane reasons without waiting to consult the trainer.¹

Necropsy Summary:

The necropsy examination revealed a comminuted medial condylar fracture of the left hind metatarsal (cannon bone/MTIII) with incomplete sagittal stress fractures in the dorsal cortex mid-shaft. The fracture was complete, displaced, articular, diaphyseal, oblique and parasagittal with multiple fragments missing, and there were transverse fractures of the second and fourth metacarpal (splint) bones. The dorsal metatarsal disease was diffuse, with red petechiae in cortical bone, moderate thickening of the mid-dorsal cortex with multiple sagittal stress fractures, and mild thickening of the remaining periosteum. Similar, but lesser pre-existing lesions were present in the dorsum of the uninjured right third metatarsal bone. There was relatively modest remodeling of the distal plantar condyle visible in the distal fracture segments. The injury was open.

Track Summary:

The turf course was rated as good the day of the race. The horse worked on the training track but would gallop on both the training track and main track. The horse only raced on turf courses and not on the main track. She was scratched three times in the fall of 2018 due to the races being moved to the main track, which the trainer did not want her to race on.

Veterinary History Summary:

After entry for her final race on January 21, the horse received phenylbutazone on January 20 and furosemide the day of the race, administered by third-party Lasix veterinary staff.

Previously, the attending veterinarian had treated the horse for two episodes of exertional rhabdomyolysis (“tying up”). On November 27, 2018, the horse displayed stiffness and myositis in the left shoulder and was treated with flumethasone (a corticosteroid), flunixin meglumine and methocarbamol (muscle relaxant). On December 27, 2018, bloodwork to monitor the rhabdomyolysis revealed continued mild elevation in the muscle enzymes CPK and SGOT. On January 16, 2019, the horse was stiff in the hind-end with myositis of the back and gluteal areas, and was treated again with flumethasone and methocarbamol. Two days later the horse was entered into the Megahertz Stakes. She received the pre-race phenylbutazone injection on January 20 and furosemide on race day.

This horse traveled extensively in 2018 and arrived in California Oct 25, 2018. She trained for one month at Del Mar before moving to Santa Anita in December. She arrived in California with a skin fungus and secondary bacterial infection on her neck, which was treated with antibiotics and antifungals systemically and topically. In prior months she trained at Fair Hill Training Center in Maryland. The current attending veterinarian did not receive medical records from the previous attending veterinarians. Earlier in 2018, this horse trained and raced at Keeneland, Pimlico, Delaware Park, Saratoga, and Kentucky Downs. There is a potential level of stress associated with frequent shipping and exposure to multiple different types of surfaces during racing and training.

This horse had time off from training from September 17, 2016, to May 23, 2017, and from November 16, 2017, to January 20, 2018. The trainer presumed this was for bucked shin. However, it is unclear if any diagnostics were performed.

Pre-race Examination History:

This horse exhibited mild, non-specific signs of altered gait in the hind limbs in the pre-race examination record. No notation of left hind fetlock osteoarthritis was ever recorded. Neither the Examining Veterinarians nor attending veterinarians noted the dorsal metatarsal disease nor anyone else. In spite of the necropsy appearance, it is unclear how clinically apparent the condition would have been, if at all.

Possible Contributing factors:

Pre-Existing Lesion(s)

On necropsy, this horse was noted to have a focal porosity involving the subchondral bone of the left hind medial condyle, as well as severe dorsal metatarsal disease. The dorsal metatarsal condition was undetected by the trainer, attending vet, and examining vets. The fracture line propagated through both areas during the breakdown event.

From the available history of the horse, the possible source(s) of these lesions were:

(1) intense training patterns, especially surrounding race events; ahead of both its California starts the horse breezed multiple times accumulating a relatively large number of high-speed furlongs in a short time frame. The horse breezed three times in a 10-day span (January 4-14) for a total of 14 high speed furlongs ahead of its race. For recent timed workouts, the horse trained exclusively on Santa Anita's training track. The training pattern leading up to her previous start on November 9 was similarly intense. According to submitted training charts, the horse worked October 29 and November 4. This would add up to two works and one race (18 total high-speed furlongs) in an 11-day span. These workouts were not listed in Equibase.

(2) continued training in the face of episodic recurrent exertional rhabdomyolysis (RER); intermittent or chronic RER may be an indirect symptom of an otherwise subclinical musculoskeletal problem; clinical signs related to a distinct musculoskeletal problem may resemble primary RER.

3) familial predisposition for injury—this horse had two half-siblings with histories of suspect physical condition. The trainer of the present case trained both of those horses. The first made just two career starts. The other horse had an extensive race career, but was often flagged in pre-race exams for suspect jog scores.

CONCLUSION: In the near term, this horse experienced two instances of exertional rhabdomyolysis, the first of which resulted in a brief period of scaled back training. The most recent of these RER episodes was within a week of its final start and appeared to affect the hind end of the horse, which ultimately failed (left hind leg) in the race. Although the connections took appropriate steps to manage what was diagnosed as primary RER (physical examination, treatment, training adjustments, bloodwork) it is possible that RER was secondary to an underlying musculoskeletal issue. Perhaps a more conservative approach — considering the proximity of the most recent episode to the race — would have avoided the subsequent acute injury.

i CHRB 1562 Duties of the Racing Veterinarian: "... The Racing Veterinarian has the authority to treat any horse in event of an emergency, accident or injury, and he is authorized to humanely destroy any horse which in his opinion is so seriously injured that it is in the best interests of racing to so act, and every horse owner and trainer in participating in a race in this State does consent thereto..."

Case #10

Incident Summary:

On January 23, 2019, this horse was performing his first timed workout on the main track at Santa Anita Park. The horse had shipped to Santa Anita from Golden Gate Fields (GGF) on January 16, seven days earlier, because races for the horse were not being used at GGF. All prior timed workouts had taken place on the all-weather Tapeta surface at GGF. This horse had run eight races, and finished ninth in his most recent race on December 31, 2018, when he, “had no speed and was never a threat” according to the chart caller. He was described as “big, strong, mellow” and “kind”. He was an easy-going horse that shipped to fairs where he broke his maiden, thus the trainer was not concerned about an acclimation period for the horse before breezing on a different track surface. The trainer was not present at Santa Anita during the morning training when this horse worked. The intention was to have the horse perform an “easy blowout” and race 4-5 days later. At about 8:00 a.m. on January 23, this horse performed a 3-furlong work. The jockey riding him said the horse warmed up fine. Near the finish line, the horse pulled himself up with an injury to his left hind. The horse was ambulated off the track where the attending veterinarian sedated him with xylazine and clinically examined the injured left hind fetlock joint. The trainer at GGF was contacted and informed that the injury was not repairable. He told the attending veterinarian to do what needed to be done. The attending veterinarian euthanized the horse at 8:30 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed a complete, displaced, lateral condylar fracture of the left MTIII with pre-existing biaxial plantar osteochondral disease, biaxial, comminuted, fractures of the proximal sesamoid bones, and a non-displaced, chip fracture of the proximal lateral plantar eminence of P1. The injury was open. There was moderate degenerative joint disease with plantar osteochondral disease bilaterally and moderate/severe proximal sesamoid bone (PSB) osteophytosis both apical and basilar.

Track Summary:

The horse was injured while working on the main dirt track. Three days prior to the injury the track had been sealed for 10 consecutive days due to rain (January 11-20).

Veterinary History Summary:

After entry for his last race on December 31, 2018, the horse received a ketoprofen injection on December 29, a flunixin injection on December 30, and then race day furosemide. Previously the horse had been treated with flunixin

on November 15; phenylbutazone tabs were dispensed on November 19 (a day the horse worked).

The attending veterinarian at Golden Gate Fields performed a lameness examination on January 07, 2019. The clinical findings suggested a bilateral condition of the forelimbs (right front limb lameness grade 1/5, left front limb positive to flexion test). While this was not consistent with the limb that was ultimately injured, it does suggest that the horse was experiencing an active physical issue in the near term. The horse was shipped from GGF to SA just over a week later. No follow-up examination was reported. At the time he was interviewed, the trainer claimed it was a “hot foot” that resolved in 3-4 days with hoof packing although the attending veterinarian had noted the foot pulse was within normal limits and the feet cold.

The trainer further reported that this horse had a delayed racing debut due to a tibial stress fracture when the horse was a 2-year old and almost ready to race.

Pre-race Examination History:

This horse exhibited a prolonged history of mild-to-moderate, non-specific signs of altered gait in the hind limbs in the pre-race examination record (“choppy”, “stabby both hind”, “adducts both hind”, “sore back”, etc.). No notation of left hind fetlock osteoarthritis was ever recorded.

Additional notes:

This was the horse’s first recorded breeze since its last race (December 31). This may represent a declining activity pattern. Based on the number of high-speed furlongs performed in its final two months, this horse’s activity was 1-2 standard deviations below average, as compared to 198 controls.

Possible Contributing factors:

Pre-Existing Lesion:

On necropsy, this horse was noted to have a focal porosity involving the subchondral bone of the left hind cannon bone’s lateral condyle. The fracture line propagated through the area during the breakdown event. Speculating from the available history of the horse, the possible source(s) of the lesion were:

- (1) continued racing/training in the face of chronic DJD; this horse had a history of osteoarthritis (OA) of both hind fetlock joints based on the necropsy findings and supported by pre-race exam findings (“choppy”, “stabby both hind”, “adducts both hind”, “sore back”, etc.).
- (2) prolonged history of altered gait in the hind end; this was a common pre-race finding throughout its career and

whether referable to a primary cause or not, such a chronic condition could over time stress multiple anatomical structures—including the fetlock joints and metatarsal bones—to the point where they developed pathology; there was also a reported history of tibial stress fracture of one hind limb.

CONCLUSION: This horse had a history of a physical setback (tibial stress fracture) early in its career that delayed the onset of racing. The necropsy report identified chronic hind fetlock OA which confirmed pre-race exam findings noting an altered gait behind prior to multiple races. The

connections of the horse expressed no knowledge of hind fetlock OA and had no concerns in general with the horse's hind end. In the near term, there was few timed workouts in its final two months. There was also a physical examination for a presenting complaint of front-end unsoundness conducted less than three weeks prior to injury that identified a transient right front lameness. The chronic OA combined with an abrupt switch to an unfamiliar and compromised surface (sealed several consecutive days) may have predisposed the horse to an acute injury.

Case #11

Incident Summary:

On January 25, 2019, this horse was performing a ½-mile workout on the main track at Santa Anita Park. The time was shortly before 8:00 a.m. and the track was listed as fast. The weather was clear and sunny. The jockey had worked the horse on several occasions and ridden him in four races, including the last race. The horse had 13 career starts. He warmed up well and worked in company. Working on the outside, this horse could not keep up with his workmate. The jockey noticed his mount did not have his usual energy that day. The pair completed the 4-furlong breeze in 47.80 seconds. The jockey felt the horse's injury in the hind end just past the finish line and pulled the horse up near the 7/8 pole. The trainer witnessed the workout, thinking the horse did not look like himself, and contacted the attending veterinarian when the horse was injured. The attending veterinarian sedated the horse with acepromazine, detomidine, and butorphanol. After a clinical assessment of the injuries to the left hind fetlock, the attending veterinarian made the decision that the horse needed to be euthanized. The trainer was present during the euthanasia, which the attending veterinarian performed at 8:25 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed a complete, displaced, lateral condylar fracture of the left hind third metatarsal bone (MTIII) with moderate pre-existing plantar osteochondral disease, and biaxial fractures of the proximal sesamoid bones. The medial proximal sesamoid bone fracture was comminuted and transverse, and the lateral proximal sesamoid bone had an axial fracture. There was also a highly comminuted fracture of the proximal half of P1 (long pastern bone). The medial branch of the suspensory ligament and intersesamoidean ligament were ruptured. The injury was closed.

Track Summary:

The dirt track had last been sealed five days before this horse worked. According to training records, the horse jogged or walked on many of the days in which the main track had been sealed in the two weeks prior to breezing. The horse trained on both the main track and training track during morning sessions.

Veterinary History Summary:

The horse received furosemide prior to the fatal work. After entry for his most recent race, the horse received DMSO (January 10), flunixin and vitamins (January 11), phenylbutazone and fluids (January 12), and furosemide the day of the race (January 13) administered by third-party Lasix veterinary staff.

The horse's left front medial splint bone was injured in July 2018. The structure was treated with cryotherapy ('freeze fired'), and there were some complications during healing. The horse was treated with intra-articular corticosteroids in the left front fetlock joint on March 17, 2018. The horse was also treated routinely with Adequan for joint health.

The horse was placed on the Veterinarian's List on January 14, 2018, due to a right front lameness after a claiming race, and the claim was voided. The horse was vanned off the track to the barn. The horse was examined immediately following that race, and radiographs of the horse's right front fetlock were obtained. No injuries were identified. The horse did not display an overt lameness in the barn. The horse returned to racing in February. The trainer described the incident as a possible episode of heatstroke or recurrent exertional rhabdomyolysis (RER, 'tied up'). The horse did suffer episodes of RER on occasion. Magnetic blanket therapy, acepromazine, and dantrolene were utilized to manage this issue.

The horse did not make his first start until he was 4 years old, and had a four-month layoff from racing after his first start.

Pre-race Examination History:

This horse exhibited mild, non-specific signs of altered gait in the hind limbs in the pre-race examination record. No notation of left hind fetlock osteoarthritis (OA) was ever recorded. Pre-race examination history did identify chronic evidence of osteoarthritis of both front fetlocks.

Possible Contributing factors:

Pre-Existing Lesion(s)

This horse had a severe subchondral bone lesion of the left hind lateral condyle of the third metatarsal bone (MTIII), as well as severe plantar osteochondral disease. The fracture line propagated through the former lesion. Similar changes were noted in the right hind fetlock. These are considered bilateral, repetitive, overuse injuries which predisposed the third metatarsal bone (MTIII) bone to failure.

From the history, the possible source(s) of these lesions include:

(1) prolonged racing career; this 7-year-old made just 13 starts but accumulated many high-speed furlongs through workouts; the horse had periods of steady workouts punctuated by several layoffs.

(2) continued racing/training in the face of chronic DJD; this horse had evidence of front fetlock osteoarthritis ("oss-elets", "choppy" gait) throughout the pre-race exam record (starting in 2016) and was brought back several times despite numerous layoffs presumably for physical setbacks.

CONCLUSION: This horse was racing and training at an older age (7) relative to most horses after a late start. Horses starting their racing careers late have a higher risk of catastrophic injury. In the near term, the horse had recently raced on the hillside turf course which had been experiencing an increased relative risk of injury and he was returning

from a long layoff. Evidence of osteoarthritis during pre-race examinations were apparent throughout the horse's career. Though the horse was afforded time off periodically, given the delayed racing debut, physical setbacks, and multiple layoffs, perhaps the horse was inherently less able than other horses to withstand the rigors of racing and training.

Case #12

Incident Summary:

On February 2, 2019, this horse ran his fifth and last race in the Grade III Robert B. Lewis Stakes for 3-year-olds going 1 1/16 mile on the dirt. The weather was rainy and the track was sealed, listed as sloppy; it was the 6th race on the card. The trainer opted for this horse to wear hind ‘stickers’, traction devices, due to the track conditions. This horse had previously raced on a sealed track at Del Mar on November 29, 2018. The jockey had ridden this horse in the prior two starts and believed he was very competitive, perhaps a potential champion. The horse warmed up and entered the starting gate well. The race was off at 2:58 p.m. and this horse broke fast. Racing in second place, the jockey felt the horse take a bad step, so pulled the horse up just after passing the 3/4 pole. The Track Veterinarian sedated the horse with detomidine and, suspecting a fetlock injury, applied a Kimzey splint to the injured left front limb for the ambulance ride. The attending veterinarian performed a clinical examination, administered phenylbutazone, and sedated the horse with xylazine, detomidine, and butorphanol. Radiographs of the left carpus revealed the extent of the injuries. The attending veterinarian recommended humane euthanasia. The trainer observed the horse on the ambulance and also consulted with a veterinary surgeon at the track, who confirmed that euthanasia would be the most humane option for the horse. The owner was contacted and approved the recommendation. The attending veterinarian euthanized the horse at 3:30 p.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed multiple fractures in the left carpus, including comminuted, complete, displaced, bi-articular, slab fracture of the radial carpal bone, ulnar carpal bone and third carpal bone. There were multiple chip fractures of the axial margin of the intermediate carpal bone and fourth carpal bone with complete rupture of the palmar intercarpal ligaments. The injury was closed.

Track Summary:

The main dirt track was sealed the day this horse was injured and the two prior days (January 31 and February 1). The trainer expressed concern with the condition of the track on race day, as he is “always afraid of a sealed track”. Looking back, the trainer felt he should have scratched this horse due to the track conditions.

Veterinary History Summary:

After entry for his final race, this horse received intra-articular corticosteroid injections in both carpi (knees) on January 30, which was three days prior to the race, performed by the attending veterinarian. The horse was treated with

flunixin, methocarbamol, and DMSO on January 31, all IV, by the attending veterinarian. On February 1, this horse was administered phenylbutazone and vitamins by the same veterinarian. The horse received furosemide on race day, administered by a third-party Lasix veterinary professional.

On January 25, one day after a 5-furlong breeze on the main track, this horse was examined by another veterinarian (A), who noted bilateral carpal and left front fetlock joint effusion and a mild Grade I left forelimb lameness. The left carpus was sensitive to palpation of the distal lateral radius. This veterinarian (A) recommended radiographs of both carpi, but the trainer and owner declined, stating radiographs had been performed by another veterinarian (B) on December 3, 2018. The radiographic findings were reportedly consistent with osteoarthritis (OA). The recommending veterinarian (A) did not review those radiographs nor communicate with the previous veterinarian (B). Veterinarian A performed intra-articular corticosteroid injections of the left front fetlock and both carpi. Veterinarian A noted thinning and slight xanthochromia (yellowish discoloration indicative of previous hemorrhage) of the joint fluid from the carpal joints at the time of her treatment.

Previously, veterinarian B performed intra-articular treatments of both carpi on November 25 and December 24, 2018; the tarsal joints were injected on December 24. Typically, phenylbutazone was administered orally the night before workouts. This was dispensed by the trainer’s primary veterinarian (C), who never examined the horse.

Before this horse began training, the owner reported a “wire surgery” on both knees. This is presumed to have been transphyseal bridging, a surgical correction technique for carpal angular limb deformities.

Pre-race Examination History:

This horse exhibited mild-to-moderate signs of bilateral carpal osteoarthritis (OA) in the pre-race examination record. For the last start, bilateral carpal effusion in both intercarpal joints was identified. Previous exams also noted similar changes. In addition, evidence of fetlock OA was noted in multiple exams.

Additional Notes:

The attending veterinarian expressed his opinion on racing on sealed tracks. In his opinion, a single exposure to high-speed performance on a sealed surface places a horse at subsequent risk for acute injury in the near term (~30 days). Veterinarian B said this was based on his clinical experience and unpublished research from the 1980s.

Possible Contributing factors:

Pre-Existing Lesion

On necropsy, this horse was noted to have chronic changes associated with bilateral carpal osteoarthritis (OA). These findings were noted to be moderate to severe, including bilateral subchondral bone bruising in multiple carpal bones. Mild-to-moderate osteoarthritis of both front fetlock joints was also noted. There was also moderate left front suspensory origin desmitis. In spite of multiple intra-articular injections, no pre-existing lesions directly associated with the subsequent fractures could be identified in photographs of the carpal bone fragments. This may be due to the degree of comminution (fragmentation of bone into many pieces). The bones were not retained for further examination or enhanced necropsy after the original necropsy was completed.

From the history of the horse, the possible source(s) of these changes were:

(1) rapid development of degenerative joint disease of the carpal joints; this horse underwent a recent radiographic examinations within two months of its final start; the joint that failed in the race was treated with intra-articular steroids four times in the previous 69 days; two of those treatments occurred five days apart and within two weeks of the final race. The two treating veterinarians were unaware the other had treated the same condition.

(2) continued racing/training in the face of active osteoarthritis; the horse breezed and raced multiple times during the time of radiography and intra-articular injections; the horse was noted to be mildly lame on January 25 but was entered for a race scheduled for February 2; training at speed (i.e., workouts and gallops) between race starts was significantly scaled back (large proportion of 'walk' days).

CONCLUSION: This horse represents a case of advanced carpal osteoarthritis. In the near term there was recent diagnostic examination (radiographs), clinical signs of OA including lameness and effusion, and multiple instances of intra-articular corticosteroid injection of the affected joints. The horse was also on a declining pattern in terms of training activity (significant number of 'walk' days). Furthermore, two independent veterinarians were examining and treating the horse in the same time frame without one veterinarian being aware of the other's findings and treatments. The responsibility for this situation lies mostly with the trainer. Given all of the above, the pre-race examination was likely confounded by the multiple intra-articular injections and anti-inflammatory use. This horse may not have been entered to race and the catastrophic injury probably could have been avoided with more conservative and better organized management.

Case #13

Incident Summary:

On February 3, 2019, this horse ran her fifth race, a maiden claiming race for 3-year-old fillies at 5 ½ furlongs on the dirt. The claiming price was \$50,000; this was the 3rd race on the card. There were rain showers; the track was listed as sloppy. The jockey had worked the horse three times. The horse warmed up and loaded well. The race went off at 12:02 p.m. She broke well from the starting gate. The horse was racing in second place by a head at the 3/8 pole, but weakened in the final furlong of the race. The jockey pulled her up near the finish line. The Track Veterinarian applied a Kimzey splint to the injured right front distal limb, and the trainer accompanied the horse in the ambulance to the barn. The attending veterinarian clinically evaluated the right front limb and observed that the fetlock was dropped and there was swelling over both suspensory ligament branches. The limb was stabilized with a heavy bandage and the horse was treated with the anti-inflammatory medications dexamethasone, flunixin, and phenylbutazone. The horse was monitored daily and the right front fetlock was radiographed three days later by one attending veterinarian. Due to the extent of the injury, the attending veterinarians recommended euthanasia as the most humane option. The horse was euthanized on February 6, 2019, at 11:30 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed right forelimb suspensory ligament failure with severe, incomplete rupture of both medial and lateral suspensory ligament branches, biaxial apical proximal sesamoid bones fractures, and full thickness, transverse rupture of the intersesamoidean ligament following the fracture line of the medial and lateral proximal sesamoid bones. Pre-existing proximal suspensory desmitis in the right forelimb, bilateral dorsal metacarpal periostitis, exostosis of the right front medial splint bone (MCII) and a pre-existing distal radius chip fracture in the left carpus were also noted. The injury was closed.

Track Summary:

The dirt track was sealed the day this horse was injured. The day of the race was the fifth consecutive day the track was sealed due to rain. The horse had also raced on a sealed track on January 19.

The trainer considered scratching the horse due to heavy rain and the condition of the track, but was concerned the Racing Secretary would be upset. The trainer had heard that the Racing Office complained when other trainers scratched horses, and he anticipated the same pressure from the Racing Office. The trainer was already having problems acquiring stalls, so decided to hope for the best and run.

Veterinary History Summary:

After entry for her final race on February 3, 2019, the horse received a dexamethasone sodium phosphate injection on January 31, a flunixin injection on February 1, and a phenylbutazone injection on February 2. Furosemide was administered on race day by third-party Lasix veterinary professionals.

The horse underwent a radiographic examination of the right front fetlock (injured structure) on January 25. The attending veterinarian noted a unique calcified body or apical fragment over one of the proximal sesamoid bones. He presumed this was due to a possible prior episode of osteomyelitis (bone infection). The horse breezed two days after the examination on January 27, and then raced seven days later on February 3.

Previously, the horse was treated with intra-articular corticosteroids in the left carpus on December 24, 2018, and January 28, 2019. Necropsy findings included a large osteochondral fragment ('chip fracture') off the distal radius in the left carpus.

Pre-race Examination History:

This horse exhibited mild-to-moderate signs of bilateral front fetlock osteoarthritis (OA), particularly of the right front, in the pre-race examination record. In two of the last three starts, effusion was noted in the right front fetlock. Chronic exostosis of the right front medial splint bone was also noted. During the pre-race exam for the final race, the horse was noted to be agitated. This can make detection of subtle lameness difficult.

Program Trainer:

During the investigation it was discovered that this horse was actually cared for and trained by one of the owners.

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have severe desmitis of the right front suspensory origin at the time of necropsy, which may have pre-disposed the horse to suspensory apparatus failure and acute proximal sesamoid bone fracture. There was also severe outgrowth of the right front medial splint bone that may have contributed to the desmitis. The three-day period between the injury and euthanasia complicates differentiation between acute and soft tissue chronic lesions.

From the history of the horse, the possible source(s) of this lesion were:

(1) consistent, full race training on a sealed surface over a relatively prolonged period of time despite recent diagnostic examination and intra-articular therapy. There does not appear to be any precautionary adjustment to training due to track and weather conditions.

(2) a vaguely described proximal sesamoid bone calcified body or apical fragment in the right front fetlock noted in the January 25 radiographic examination that may have compromised the suspensory apparatus in the right forelimb.

(3) familial or inherent predisposition for osteoarthritis and/or fracture based on pedigree; the horse's sire was retired from racing with a soft-tissue injury; the dam appeared on the Veterinarian's List as 'unsound' during her racing career after being vanned off from a race.

CONCLUSION: There were multiple trainers of record for this horse. Questionable oversight by those trainers

confound the history of this horse. Furthermore, training records were not kept. Despite this, the horse appeared to have raced and trained regularly since November 2018. In the near term, there was evidence of both active and chronic physical problems. The affected structure, the right front fetlock, was radiographed only nine days before the breakdown event. The reportedly atypical findings of that examination may have been evidence of a chronic issue that compromised the integrity of the horse's suspensory apparatus. There was also recent treatment with systemic anti-inflammatories, including intra-articular treatment of the left carpus. Considering the close proximity of the above treatments to the day of the race, the ability to conduct an accurate pre-race examination was likely compromised. Combined with consistent racing and training on a repeatedly sealed surface, this horse's long-term and short-term physical condition likely predisposed the horse to injury.

Case #14

Incident Summary:

On February 17, 2019, this horse performed a high-speed workout on the main track at Santa Anita. The trainer received the horse on January 20; this was just the second work after a layoff. The horse was noted to be big and good-looking, with a good temperament. The trainer surmised later that the unraced horse would need at least two more months of training to be race fit. It was approximately 8:30 a.m. and the weather was clear. The trainer was looking for a 4-furlong work in approximately 49 seconds. The rider, who had also worked the horse for the prior breeze, backed the horse up to the $\frac{3}{4}$ pole then kept him along the rail for the work in company. The rider felt his mount was going too hard and too fast, so did his best to slow the horse; however, the horse continued to run aggressively and was clocked at 47 seconds. The rider thought the horse might have been competing with the stablemate on the outside. During the gallop out, this horse switched back to his left lead going into the turn near the $\frac{7}{8}$ pole, then was suddenly injured. The rider pulled him to a halt, dismounted, and the outrider and ambulance arrived soon after. The attending veterinarian met the ambulance, where he sedated the horse with detomidine and clinically evaluated the injured right front fetlock joint. The trainer also observed the horse in the ambulance. Based on the attending veterinarians recommendation, the horse was euthanized at 8:50 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed biaxial proximal sesamoid bone fractures of the right front fetlock joint. There was an oblique, displaced, apical fracture of the lateral proximal sesamoid bone and a transverse, comminuted, displaced, basilar fracture of the medial proximal sesamoid bone. There was a region of increased porosity at the abaxial aspect of the articular surface on both opposing fracture surfaces of the medial proximal sesamoid bone. There was a complete rupture of the lateral branch of the suspensory ligament and the intersesamoidean ligament. The injury was closed.

Track Summary:

The horse performed this high-speed workout and his previous work (February 10, 2019) on a sealed surface. The trainer opined that the track was hard and fast after being sealed.

Veterinary History Summary:

A different attending veterinarian initially cared for this horse in October 2017, when the horse was with another trainer. This horse was noted to be “back sore” and had

possibly suffered exertional rhabdomyolysis (“tied up”). Methocarbamol was prescribed to treat the issue. In December 2017, the horse was presented to the attending veterinarian for left hind lameness. The attending veterinarian noted the horse was lame on both hind limbs (Grade 2/5, AAEP scale). Joint effusion was noted in the right stifle and the horse showed a positive response to full limb flexion of the right hind. A nuclear scintigraphy study was recommended but declined by the connections. Radiographs of both stifles and the left tibia revealed an OCD (osteochondritis dissecans) lesion on the lateral femoral condyle of the right stifle, and a bone infarct (“bone island”) with multiple cortical stress fractures in the left tibia. Based on these findings, a recommendation of turn out for four-to-six months was made.

After returning to training and performing a 6-furlong work at San Luis Rey Downs in September 2018, the racing manager, who was acting as the trainer at the time, reported that this horse was again lame, this time in his forelimbs. A radiographic examination of the front knees (carpi) and ankles (fetlocks) did not reveal any significant findings. The horse continued training and after two more works became “sore behind”. The racing manager reported that the issue involved the horse’s stifles. The decision was made to decrease the horse’s training intensity (jogging only); the horse returned to the ranch where it was previously laid up. After four weeks of jogging and two weeks of galloping, the racing manager believed this horse had improved sufficiently to return to full training. The racing manager no longer had a string of horses at San Luis Rey Downs, so the horse was sent to the trainer at Santa Anita to resume full training.

Possible Contributing factors:

Pre-Existing Lesion(s):

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of the right front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. This is considered a repetitive, overuse injury. There was also evidence of significant dorsal metacarpal disease (“bucked shin”) with associated stress fractures in the left front cannon bone. From the history of the horse, the possible source(s) of these lesions were:

(1) intense training patterns; despite multiple layoffs punctuated its career, this horse’s last two training periods were characterized by rapid progression in speed and distance; the horse was recording increasingly fast workouts between July and September 2018 before a noticeable decline in speed in the two final works (September 22, 29) preceding a four-month layoff; in his most recent training stint the horse progressed rapidly back to timed workouts and the second (and final) work was a very fast half-mile.

CONCLUSION: Based on a history of multiple layoffs and multiple trainers, it appears that this horse was unable to withstand full race training and experienced distinct musculoskeletal problems necessitating cessation of training. Despite this, based on workout patterns and times, the horse appeared to have been trained intensely each time he

was returned to full training. Furthermore, there was no recent history of veterinary examination since shipping to Santa Anita in January. Considering the intense training patterns, the multiple periods of inactivity, and the contemporary compromise of the main track due to a sealed surface, this horse was at high risk for injury.

Case #15

Incident Summary:

On February 18, 2019, this horse was scheduled to perform a routine 4-furlong breeze (high speed workout) on Santa Anita's main track at approximately 7:50 a.m. The sky was clear, and the high that day would be 59 degrees, with a low of 49 degrees. The horse was tacked up with his standard ring bit, nose band, and tongue tie. The trainer instructed the regular exercise rider to complete the workout in an easy 49 or 50 seconds. The horse warmed up well, and would work in company with a stablemate. The horses and riders followed the routine workout pattern: they backed up to the 3/8 pole, then began the work. The rider felt the horse change leads well during the breeze. Around the 1/4 pole, the horse seemed tired and took an unusually deep breath. The rider began to cautiously pull the horse up instead of completing the workout, thinking it was unusual for a horse to be tired at the 1/4 pole. By the 1/16 pole the horse felt wobbly and the rider quickly stopped the horse and dismounted near the wire. The horse suddenly collapsed and shortly thereafter stopped breathing, and died, according to the rider. The horse was ambulated off the track and confirmed deceased at 7:55 a.m.

Necropsy Summary:

The necropsy examination concluded the case was a sudden death with no definitive findings. The pathological diagnosis was presumptive acute heart failure with severe pulmonary edema. The lungs were congested and firm with a diffuse fleshy consistency and a small amount of stable froth in the trachea and lower airways. No other significant gross abnormalities were observed. The cause of death of this horse was not determined definitively despite extensive laboratory testing. While arsenic was detected at low concentration in the liver, no lesions compatible with arsenic intoxication by this heavy metal were detected.

Sudden death accounted for about 8.2% of all exercise related fatalities in California between July 1, 2007, and June 30, 2017. The frequent absence of pathological findings and logistics of transporting horses in a timely manner found our understanding of exercise-related sudden death in spite of considerable effort.^{2,3}

1. Arthur, RM; Sudden Death in Racehorses; AAEP Regulatory Veterinarian's Meeting, 2017
2. Lyle CH, Uzal FA, McGorum BC, Aida H, Blisitt KJ, Case JT, Charles JT, Gardner I, Horadagoda N, Kusano K, Lam K. Sudden death in racing Thoroughbred horses: an international multicentre study of post mortem findings. *Equine veterinary journal*. 2011 May;43(3):324-31.
3. 3 Diab SS, Poppenga R, Uzal FA. Sudden death in racehorses: postmortem examination protocol.

Journal of Veterinary Diagnostic Investigation.
2017 Jul;29(4):442-9.

Track Summary:

The fatal incident occurred when this horse was working on the main dirt track.

Veterinary History Summary:

The horse did not have any reported history of heart abnormality, syncope (fainting), nor general poor performance.

In preparation for his workout, the horse received Adequan and was dispensed dexamethasone/trichlormethiazide on February 17. He received a furosemide injection the morning of February 18 prior to his work. Previously, the horse received Adequan and dexamethasone/trichlormethiazide on February 11, then furosemide the morning of February 12 for a successful 4-furlong workout in 49 seconds.

Back on December 22, 2018, the horse received furosemide and glycopyrolate prior to a workout. Routinely only furosemide was administered pre-work. On December 28, he received only furosemide prior to a workout. Later in the day the left and right radiocarpal joints were injected with hyaluronic acid and triamcinolone (corticosteroid); the horse was previously diagnosed with carpal osteoarthritis. On January 2, 2019, he received the pre-race medications flunixin, methocarbamol, ketoprofen, and dexamethasone/trichlormethiazide. The following day he was treated with phenylbutazone, and then furosemide prior to his fourth and what turned out to be his last race on January 4, 2019.

The horse was castrated on January 6, 2019. The trainer believed the horse needed to be gelded for safety reasons. He was known for ornery behavior and was difficult to handle in the crowded paddock area during his last race. The horse was sedated with detomidine, butorphanol, and acepromazine for the standing castration surgery procedure. He received phenylbutazone and procaine penicillin G (PPG, an antibiotic) once daily for three days. On January 11, the horse received a routine flu vaccine; his prior vaccinations were 6/20/18 and 10/1/18. On January 18, the horse developed post-castration complications: a fever and swelling at the surgery site, which created a hind-end lameness. He was treated with flunixin, methocarbamol, and ketoprofen. On January 19, bloodwork was performed and the horse received phenylbutazone. On January 21, a five-day course of once daily PPG was re-initiated, and the horse received dexamethasone/trichlormethiazide for three days. On January 25, Iodine Dextrose powder was dispensed. The clinical signs resolved within 10 days, and the horse was cleared to return to training. Reflecting back, the attending veterinarian suspects the castration surgery may have caused a blood clot.

Possible Contributing factors:

Multiple Systemic Challenges— The horse underwent multiple systemic challenges in the eight-week period prior to death. The horse had breezed multiple times, raced once, and had undergone castration surgery. It had received both intra-articular and systemic corticosteroids, multiple administrations of loop diuretics, two courses of antibiotic therapy, a vaccination, and two instances of pre-race multiple NSAID treatments. Post-operative complications related to the castration surgery necessitated a second course of antibiotics. It is purely speculative that these individual stresses would have some sort of cumulative effect or that would lead or expose the horse to an acute cardiac event.

Medication (Chronic administration of dexamethasone/trichlormethiazide) This horse was prescribed dexamethasone/trichlormethiazide powder more than 20 times in the six-month period preceding death. Diuretics in general have significant effects on serum concentrations of electrolytes such as calcium, which is important in cardiac function and blood pressure. It would be purely speculative that chronic treatment of this medication would expose the horse to an acute cardiac event.

Medication (Iodine) Iodine-dextrose powder was dispensed to treat an infection less than 30 days before death. Iodine is an essential mineral for the production of thyroid hormones. Thyroid hormones have a significant role in cardiovascular function (heart contractility, blood pressure).

CONCLUSION: Necropsy findings did not reveal any gross or histological cardiac lesions, resulting in a presumptive diagnosis of acute heart failure. No historical information identified any pre-existing cardiac problem. That is usually the case with exercise-related sudden deaths. It is speculative whether any or all the systemic challenges noted above had a singular or cumulative effect leading to an increased risk of sudden death in this horse. This appears to be an anomalous instance of sudden death with no identifiable primary cause. Nevertheless, considering the compromised physical condition of the horse in the near term, arguably this fatality could have been avoided with a slower and more progressive return to full race training. Perhaps more recovery time from the post-operative complications would have led to a serendipitous outcome.

Case #16

Incident Summary:

On February 22, 2019, this horse ran his 10th race, a \$25,000 waiver claiming race for 4-year-olds and up at 1 1/8 mile on the turf. The weather was clear and the track was listed as firm, with the temporary rail set at 30 feet; it was the 9th race on the race card. The horse was described as lean with a long stride, characteristic of a grass horse. The jockey had been aboard for the horse's prior two races. At 5:16 p.m. the horse broke well from the starting gate and moved into the jockey's desired position. They completed the first turn, and as the horse switched leads on the backside, the jockey felt a funny step. A gut feeling caused the jockey to move the horse out to get out of the way of horses behind them, although the jockey was unsure if it was a serious injury or just a slip. Then the horse fell near the 1/2-mile pole, throwing the rider, stood up, and ran loose. The Track Veterinarian clinically examined the horse after sedation with detomidine, applied a Kimzey splint to the injured right front fetlock joint, and then the horse was vanned off the racetrack. There was a stewards inquiry before a ruling that determined no other runner was responsible for the trouble. The trainer was present on the equine ambulance when the horse was being evaluated by the attending veterinarian. Based on the attending veterinarian's recommendation following clinical examination to determine the extent of the injuries, the horse was euthanized at 5:35 p.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed a right front fetlock injury with fractures of the third metacarpal (MCIII), proximal sesamoid bones (PSB) and proximal first pastern bone (P1). The MCIII has a complete, displaced, articular, parasagittal, lateral condylar fracture with the presence of a pre-existing palmar osteochondral disease lesion. The condylar fracture courses through an area of brown discoloration of increased bone porosity surrounded by highly sclerotic bone. There is moderate dorsal metacarpal disease bilaterally. The medial PSB has a comminuted, transverse, basilar fracture and the lateral PSB has an axial fracture. The P1 fracture is bi-articular and highly comminuted. The injury was open.

There was also a comminuted fracture of the accessory carpal bone in the left front limb. This injury can be seen when a horse tries to catch its fall after a primary injury using the uninjured, opposite forelimb. There was no evidence of chronic stress within the carpus or carpal canal, thus this secondary injury was most likely of traumatic origin during the fall.

Track Summary:

The horse was racing on the turf when injured. His previous race (January 31) was the first race on the card on a sloppy, sealed track. That was his only career start on a dirt track. All timed workouts since September 2018 were conducted on the Santa Anita training track.

Veterinary History Summary:

After entry for his final race, the horse received flunixin, methocarbamol and vitamins on February 20. On February 21 he received phenylbutazone, and then on race-day, February 22, was administered furosemide by third-party Lasix veterinary professionals.

Previously, the horse received flunixin and furosemide the morning of and prior to his recent timed workouts.

In the prior trainer's barn, the horse was noted to have carpal joint effusion (presumed osteoarthritis) and a "hocky" gait. Prior to the horse being claimed in its December 2018 race, the tarsal (hock) joints were treated with intra-articular corticosteroid therapy by the attending veterinarian. Back before the horse raced in October 2018 at Santa Anita, the attending veterinarian had treated both carpi (knees) with intra-articular corticosteroid therapy. Early in the horse's training he reportedly had 'shins' (dorsal metacarpal disease) and 'curbs' (plantar ligament desmitis).

Pre-race Examination History:

On pre-race examinations, the horse was noted to have mild osteoarthritis of both front fetlocks. This was a consistent pre-race finding although the horse was never deemed unfit to race based on this condition. During the final pre-race exam, the horse was noted to be excitable, which can make it difficult to detect a subtle lameness.

Additional notes:

The trainer described the horse as 'nervous' and prone to 'stall walking'. To manage this issue, he elected to space the horse's timed workouts further out, included more walk days in the training regimen, and frequently 'ponied' the horse rather than sending him to the track with a rider. He also described the horse as 'high headed' when galloping. The horse trained regularly on the training track.

Possible Contributing factors:

Pre-Existing Lesion(s)

This horse was noted to have severe palmar osteochondral disease of the right front distal cannon bone on necropsy. In addition, a focal osteopenic lesion of the subchondral bone

of the lateral condyle was noted through which the fracture line propagated during the breakdown event. These are considered repetitive overuse injuries which predisposed the cannon (MCIII) bone to failure. Concomitant proximal sesamoid bone fractures and first pastern bone fractures are often seen with MCIII or MTIII condylar fractures. A similar focal osteopenic lesion of the subchondral bone of the lateral condyle was noted in the left front distal cannon bone. This represents a bilateral, repetitive, overuse injury.

From the horse's history, the possible source(s) of these lesions include:

(1) intense training schedule; this horse consistently performed more high-speed furlongs monthly well above (>2 standard deviations) that would be considered average

(2) no history of periodic rest; this horse raced and trained without interruption from September 2017 until the day of injury.

CONCLUSION: This horse represents an advanced case of chronic degenerative joint disease of a high-motion joint (fetlock) following repetitive overextension as a result of excessive training and racing. The fact that the horse was never afforded any time off from racing/training over an 18-month time frame likely explains the severity of the classic osteoarthritic lesions unique to the fetlock joint. While these lesions are often asymptomatic in their early development, the subchondral bone changes in the lateral MCIII condyles should have been identifiable with either plain radiography or nuclear imaging.

Case #17

Incident Summary:

On February 23, 2019, this horse was breezing on the Santa Anita main track. The exercise rider jogged and galloped the horse to the 5/8 pole and began the work in company. This horse responded well, switching leads properly while getting in and out of the turn. Just before the finish line, the rider heard a pop and the horse stumbled. The rider tried to pull up his mount but the horse fell. The horse stood up on his own and a pony rider held the horse until the ambulance arrived. This horse had not made contact with the other horse when the incident occurred.

One veterinarian met the ambulance and sedated the horse with xylazine before clinically examining the horse's right front fetlock joint. The regular attending veterinarian reached the horse shortly thereafter, but left the horse under the other veterinarian's care. The trainer was present at Santa Anita when the horse was injured. Based on the extent of the injuries, the treating veterinarian humanely euthanized the horse at 8:30 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed biaxial, transverse, displaced, mid-body fracture of the lateral and medial proximal sesamoid bones of the right front fetlock. The proximal sesamoid bones were highly sclerotic along the fractures line. Both the medial and lateral suspensory ligament branches and intersesamoidean ligament were ruptured. A small osteochondral fragment was found on the abaxial margin of the medial proximal sesamoid bone in the left front fetlock. Pre-existing remodeling was present at the apical margins of the forelimb proximal sesamoid bones bilaterally and biaxially. The injury was open.

Track Summary:

On February 23, 2019, the main track was listed as fast and it had been sealed two days prior, on February 21. This horse was one of two training fatalities that morning.

This horse first four works were on the training track, as the trainer had concerns with the main track during the poor weather. However, three of the four recent works were switched to the main track. The owner wanted the horse working on the main track because the horse would be racing on the main track, although the trainer believed the horse was still six weeks out from racing.

Veterinary History Summary:

This horse was treated with one gram of phenylbutazone the night before workouts. A prescription for phenylbutazone tablets and dexamethasone/trichlormethiazide was made by the attending veterinarian on December 20, 2018.

The trainer reported that this horse displayed "body soreness" in December 2018. Dantrolene was dispensed by the attending veterinarian to treat this muscle soreness; however, the attending veterinarian did not routinely examine the horse nor perform any diagnostic procedures.

Possible Contributing factors:

Pre-Existing Lesion(s)

On necropsy, this horse was noted to have stress fractures on the abaxial surfaces of the proximal sesamoid bones (suspensory branch insertions) of the right foreleg. A similar lesion was noted on the medial proximal sesamoid bone of the unaffected left foreleg. In addition, the synovial pads of both front fetlocks were hypertrophic, resulting in lysis of the adjacent bone (MCIII).

From the history, the possible source(s) of these lesions include:

- (1) poor conformation; a clubbed right front hoof (narrow, higher hoof capsule noted in history and on necropsy) could have pre-disposed the horse to uneven loading, which affected the stability of the front fetlocks to the point that pathology developed; regular training could cause osteoarthritis (OA) to advance at a more rapid rate in this horse than an average horse with more ideal conformation
- (2) continued training in the presence of OA; despite a belated career start, the horse was breezing significant distances less than 60 days after arriving in the trainer's barn; the initial breezes were six-or-seven days apart; subsequent training was spaced out and took place on a repeatedly sealed surface. Furthermore, no veterinary examinations were conducted during this time period.
- (3) genetic or inherent predisposition for osteoarthritis; this horse had three half-siblings, all of whom failed to start and none of which recorded more than nine total career workouts.
- (4) unraced 4-year-old maidens are known to be at higher risk for catastrophic musculoskeletal injury.¹ In this case, the poor conformation described above was a likely factor. The horse was a give-away by his breeders.

CONCLUSION: This horse had a significant conformation fault ('clubbed' right hoof) and what presumably would be observable gross changes to the fetlock joints, as evidenced by proliferative synovitis that nevertheless did not draw enough concern to warrant veterinary examination nor diagnostic imaging. The trainer did attempt to adjust to the weather by delaying the horse's workouts until satisfactory track conditions developed in the final two months of training. However, it was likely an inopportune decision to switch to the main track for breezing during the severe weather season (sealed track). The combination

of fetlock synovitis-osteoarthritis, high speed training on a frequently sealed racing surface, and the horse's status as an

unraced 4-year-old likely put this horse at an increased risk of injury.

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- i October 4, 2019 1 Parkin, TDH; Jockey Club Welfare and Safety Summit(2015); https://courses.grayson-jockeyclub.org/courses/WSS/WSS_VI/story.html

Case #18

Incident Summary:

On February 23, 2019, this horse performed a high-speed workout on the main dirt track at Santa Anita. The 5-year-old did not start racing as a 2-year-old, yet finished third in the Kentucky Derby in his 5th career start. After winning the Breeder's Cup Dirt Mile, this horse was retired to stud duty at the end of his impressive 2017 campaign, but proved to be sub-fertile in the breeding shed. The horse returned to race training in the spring of 2018. The horse was coming off a win in his 16th race, the 9-furlong San Pasqual Stakes (GII) on February 2, 2019, in a very fast 1:46.95 on a track listed as "sloppy (sealed)". He was being prepped for the Dubai World Cup.

On February 23, with an apprentice jockey riding him, this horse jogged around the track to warm up; another horse was injured on the track. This horse was calm as all the horses and riders on the track had to wait for the injured horse to be ambulated off the track. Once cleared to proceed, the apprentice jockey rode the horse to the 5/8 pole and began the workout in company, positioned on the outside. The two horses both were traveling beautifully and free of trouble until the apprentice jockey felt and heard a pop in one of his mount's hind limbs between the 3/8 and 1/4 poles. The apprentice jockey guided the horse to the outside rail and waited for the ambulance. The trainer immediately informed his attending veterinarian of the injury, who sedated the horse with detomidine and instructed that he be ambulated to the on-site Southern California Equine Foundation (SCEF) Hospital. The attending veterinarian, along with another veterinarian, clinically evaluated the horse. After radiographs revealed multiple fractures and the catastrophic extent of the injuries, the attending veterinarians recommended that the horse be euthanized. The trainer was present at the SCEF Hospital and was in contact with the owners. The attending veterinarian euthanized the horse at 8:45 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed a right hind limb injury with a comminuted, displaced, lateral condylar fracture of the third metatarsal bone (MTIII) with the presence of pre-existing plantar osteochondral disease bilaterally with biaxial, comminuted fractures of the proximal sesamoid bones, and a highly comminuted, bi-articular fracturing of the proximal pastern bone. There was a medial suspensory ligament failure with longitudinal separation and full thickness, longitudinal and transverse rupture of the intersesamoidean ligament. The injury was closed.

Track Summary:

The horse had recently breezed on January 20, and then raced on February 2; the track had been sealed in the previous 24 hours. The horse had also breezed two other times, January 5 and 11, when the track was repeatedly sealed due to weather.

Veterinary History Summary:

The horse received furosemide prior to his workouts, including on Feb. 23, and Adequan, and a weekly intra-muscular joint supplement. The attending veterinarian never observed any hind-end issues, nor joint effusion. The horse's pre-race routine included electrolytes, Polyglycan, and ketoprofen two days pre-race, phenylbutazone one day prior to racing, race-day furosemide, then vitamins and electrolytes the morning following the race.

The horse was placed on the Veterinarian's List in October 2016 when his left and right front "shins" were treated with shockwave therapy (ESWT). The area treated was not associated with the anatomical structures injured in the breakdown event. Radiographs taken during a pre-purchase examination in April 2017 identified a radiographic lesion of the third carpal bone of the right carpus. The attending veterinarian believes the only time the horse was administered intra-articular corticosteroids was in 2017. The radio-carpal and intercarpal joints of both carpi were treated at that time. A nuclear scintigraphy study was performed in late 2017 prior to the horse retiring to stud duty. No clinically significant findings were noted.

Pre-race Examination History:

This horse exhibited mild, non-specific signs of altered gait of the hind limbs in the pre-race examination record. No notation of right hind fetlock osteoarthritis (OA) was ever recorded. Pre-race examination records did note evidence of front fetlock and carpal OA. The horse was also noted to have special shoeing, frequently racing in medial 3/4 front shoes.

Possible Contributing factors:

On necropsy, this horse was noted to have plantar osteochondral disease, including a focal porosity involving the subchondral bone of the lateral condyle of the right hind cannon bone (MTIII). The fracture line propagated through the subchondral bone lesion during the breakdown event. This type of lesion is considered a repetitive overuse injury, which predisposed the right hind cannon bone to failure.

From the available history of the horse, the possible source(s) of this lesion were:

(1) intense training/racing patterns; this horse averaged a timed breeze every six days and often worked back within eight days of a race, whereas the average for most other training programs are seven days and 10-12 days, respectively; furthermore, this was a consistent pattern for the horse's entire career (two campaigns); such regimens result in a significantly greater number of accumulated high-speed furlongs than other horses over time, which in turn increases the likelihood of repetitive, overuse injuries or stress-related injuries

(2) rapid return to race fitness; this horse came out of retirement in the summer of 2018 and was entered to race less than two months after its first recorded workout; this rapid progression in training could have activated, advanced, or instigated the bone lesions noted on necropsy.

CONCLUSION: This horse represents an advanced case of chronic degenerative joint disease of a high-motion joint, the right hind fetlock, following repetitive overextension as a result of excessive training and racing. Palmar or plantar osteochondral disease is a common condition in thoroughbred racehorses; however, definitive diagnosis is often difficult with conventional diagnostic imaging. Based on 250 controls, the horse was well above average in terms of accumulated high-speed furlongs. Despite a layup period of more than six months, the fact that the horse was immediately returned to a highly intensive program may explain the severity of the classic osteoarthritic lesions noted in the right hind fetlock joint. Combined with prolonged training on a repeatedly sealed training and racing surface, the above factors may have put the horse at an elevated risk of musculoskeletal injury.

Case #19

Incident Summary:

On February 25, 2019, this horse breezed on the main track at Santa Anita at approximately 8:00 a.m. It was the first high-speed workout since his racing debut February 14, which had been on a rainy, sloppy, sealed track. The exercise rider had breezed the horse on three prior occasions, and the horse always warmed up and worked well. The trainer's instructions were to complete the half-mile workout in 49 seconds. During the work, the horse switched to the right lead around the 3/16 pole. By the second stride after the horse switched leads, the rider believed he heard a leg break, so he tried to stop the horse. The rider was unable to stop the horse, so he jumped off and the horse ran loose. The trainer witnessed the injury as the horse approached the 1/8 pole and helped attend to the horse on the track after he pulled up near the wire. The horse was ambulated off the track. The attending veterinarian sedated the horse with xylazine, then clinically examined the injured left front fetlock joint, after which he recommended euthanasia. He euthanized the horse at 8:15 a.m. with pentobarbital.

Necropsy Summary:

The necropsy examination revealed a left front fetlock injury with biaxial, comminuted, transverse fractures of the proximal sesamoid bones with a pre-existing area of focal discoloration and bone porosity/osteopenic focus associated with the fracture surface. A corresponding lesion of focal, blue subchondral bone discoloration is visible through the slightly depressed cartilage of the abaxial aspect of the medial proximal sesamoid bone of the contralateral right front fetlock. There was a full thickness, transverse and longitudinal rupture of the intersesamoidean ligament with extensive soft-tissue injuries. The injury was closed.

Track Summary:

The track was labeled fast on February 25; it had been last sealed February 21. The horse worked twice (January 11 and 30) and raced once (February 14) on a sealed track.

Veterinary History Summary:

The horse received furosemide at 5:10 a.m. prior to his workout on February 25. The trainer treated the horse with phenylbutazone prior to high-speed workouts.

Leading up to the race on February 14, the attending veterinarian and the trainer believed the horse displayed a "hocky" gait. Shockwave therapy (ESWT) was applied to the horse's tarsal (hock) joints February 2, 2019, but the treatment did not appear to be effective. The attending veterinarian treated the tarsal joints on February 9 with intra-articular corticosteroids and administered flunixin. There is no record of diagnostic imaging or other diag-

nostic procedures. Starting on February 10, the horse was treated with tetracycline (an antibiotic) for two days after a recent course of Baytril (another antibiotic). He received dexamethasone (corticosteroid), flunixin, and vitamins on February 12. The horse also had a Salt Treatment. The horse received phenylbutazone and vitamins on February 13; race day furosemide was administered by third-party Lasix veterinary staff on February 14. Previously, the horse had a four-month break in training from June 2018 to October 2018 for dorsal metacarpal disease ("bucked shins"), for which his shins were pin-fired.

Pre-race Examination History:

From the pre-race examination record, the horse exhibited signs of mild osteoarthritis (OA) of both front fetlocks.

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. A corresponding lesion was found in the right front medial proximal sesamoid bone. This represents a bilateral, repetitive, overuse injury.

Speculating from the history of the horse, the possible source(s) of this lesion were:

(1) intense training regimen; this horse broke from the gate in three separate events in a ~30-day time frame leading up to and including his only start; the last several workouts were performed at a significantly higher speed than previously by about a full second; onset of training both before and after being turned out for shins included galloping and breezing within a week of arrival at Santa Anita.

(2) familial or inherent predisposition; this horse was sired by a late-starting 4-year-old that was winless in four career starts; his dam was a late-starting 3-year-old that made a single unsuccessful start; a half-sibling also started as a late 3-year-old.

CONCLUSION: This horse had a fairly regular training pattern after an interruption due to dorsal metacarpal disease in the summer of 2018. A brief gap in training occurred, apparently associated with systemic illness. Although there was some mild evidence of front fetlock OA ("osselets"), any musculoskeletal concerns by the connections in the near term focused on the hind end (tarsal joints). While the increased speed in recent workouts, increased frequency of gate work, and consistent racing/training on sealed surfaces may have advanced the severity of the pre-existing PSB lesion noted on necropsy, there is no evidence that the lesion was symptomatic prior to injury. However, the train-

er and veterinarian agreed the horse was not moving well. Without diagnostics they assumed the origin of not moving well was the hocks. Speculating, the horse may have been

compensating in the hind end for the pre-existing lesions in both front limbs.

Case #20

Incident Summary:

On March 2, 2019, this horse ran her 12th race, a conditioned claiming race at one-mile on the dirt for fillies and mares, 4-years-old and up, non-winners of three races lifetime. The claiming price was \$16,000. It was the 3rd race on the card. The weather was rainy and the track was listed as “sloppy (sealed)”. The jockey had ridden the horse in the prior start February 9. The horse warmed up and loaded into starting gate well. As the race started at 1:29 p.m., the horse stumbled slightly coming out of the gate but was able to recover and take the lead. The jockey quickly evaluated the horse for any issues, concluded she was fine, and urged her to continue in the race. The horse remained in front until she stumbled again between the ½-mile and 7/16 poles. The jockey pulled the horse to a halt and related the stumble felt like hitting a pothole. The Track Veterinarian assessed the horse, sedated her with detomidine, and applied a Kimzey splint to the injured right front limb before loading the horse into the ambulance. The horse was transported to the gap (track exit) where her attending veterinarian clinically evaluated the horse and sedated her with xylazine. After a radiographic examination of the horse’s right front fetlock, the attending veterinarian recommended humane euthanasia. The trainer observed the horse on the ambulance, called the owner, who agreed with the recommendation, and the attending veterinarian euthanized the horse with pentobarbital at 2:00 p.m.

Necropsy Summary:

The necropsy examination revealed a right front fetlock injury with a highly comminuted fracture of the medial proximal sesamoid bone (PSB) with an abaxial avulsion fracture component and suspected pre-existing hemorrhagic bone lesion on the abaxial aspect of the distal fracture fragment. A corresponding lesion could be seen on the medial PSB in the left front fetlock. The medial branch of the suspensory ligament had a complete, transverse rupture and there was a full thickness rupture of the intersesamoidean ligament. There was extensive, full thickness cartilage loss of the medial condyle of the distal articular surface of MCIII. The injury was closed.

Track Summary:

The dirt track was sealed before the horse was injured on March 2, 2019. It is believed that the track was sealed the day prior and only open for races (no morning training). The horse had previously worked on a sealed surface February 21 and had previously raced on a sealed surface February 9; she had an additional race and workout during the month of January when the main track was sealed multiple times.

Veterinary History Summary:

After entry for her final race on March 2, 2019, this horse received flunixin, methocarbamol and DMSO, all by IV injection two days prior to racing. One day pre-race, the horse received phenylbutazone and vitamins, and then on race day furosemide was administered by third-party Lasix veterinary professionals. A few days prior to the race, the attending veterinarian noted a slight left front lameness. The left front foot was warm and positive to hoof testers over the medial quarter. The farrier applied a ¾ shoe, and the lameness reportedly resolved by the following day.

The horse received several recent treatments with intra-articular corticosteroids. The tarsal joints were treated September 13 and November 27, 2018. The right front fetlock joint, the injured structure, was treated three times in just over a two-month period (November 27, December 9, and February 6, 2019). The left front fetlock was also treated December 9. No diagnostic imaging was recommended in conjunction with these treatments. The horse was claimed for the third time on December 13, 2018, and the horse’s medical history was never shared with subsequent owners, trainers, nor veterinarians. Furosemide and flunixin were administered pre-work multiple times, including for the three most recent works.

Earlier in the horse’s career, the horse was turned out from July 2017 until March 2018 when the original trainer at Golden Gate Fields (GGF), suspected a stress injury involving a tibia. The attending veterinarian at GGF radiographed the right front fetlock on March 13, 2018, and diagnosed osteoarthritis. On June 17, 2018, radiographs of the left front fetlock revealed osteoarthritis, which was treated with IRAP (Interleukin-1 Receptor Antagonist Protein), a form of biological joint therapy.

Pre-race Examination History:

Pre-race examinations consistently noted chronic, mild-to-moderate front fetlock osteoarthritis. On the day of the final race, the horse was shod with a ¾ (medial quarter removed) shoe on the left front hoof.

Additional notes:

The horse received 11 PAPIMI treatments administered between 9/13/18 and 12/12/18, often a few days before racing and including immediately pre-race.

The trainer noted one occasion he had been pressured by the former Racing Secretary for entering a horse as “turf only”. This would scratch the horse if the turf race switched to the main dirt track due to weather. A few minutes after entering the horse the trainer received a phone call from the Racing Secretary saying “I can’t ‘f...’ believe that you

entered into turf only” race. The trainer did not give into the pressure. Later the Racing Secretary apologized for his behavior.

Possible Contributing factors:

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its right front medial proximal sesamoid bone through which a fracture line propagated during the breakdown event. Similar changes were noted on the left front limb. These are considered bilateral repetitive overuse injuries.

From the history of the horse, the possible source(s) of this lesion were:

(1) intense long-term race/work pattern; this horse made 12 starts in a period of nine months despite having a delayed career onset involving a prolonged period of inactivity; based on 178 controls, over the past 12 months, the horse’s total high-speed furlongs was well above (nearly 2 standard deviations) average.

(2) intense short-term race/work pattern; in October 2018, this horse performed three timed workouts and raced once in the span of 15 days, accruing 21 high-speed furlongs in the process.

(3) continued racing/training in the face of degenerative joint disease; this horse had pre-race exam findings and veterinary history suggestive of front fetlock osteoarthritis; the affected joint was treated with intra-articular medication three times in a short time frame (~2.5 months) without any concurrent diagnostic imaging.

(4) the horse had multiple trainers and veterinarians over a relatively short period of time; increasing time with the same trainer has been associated as a protective factor and a new trainer tends to be a risk factor for fatal injury. In addition, veterinarians even within the same associated practice group did not share previous medical history for the horse.

CONCLUSION: This horse represents a case of chronic degenerative joint disease of a high-motion joint, the fetlock here, following repetitive overextension as a result of excessive training and racing. This high-risk profile was exacerbated by several changes in trainer, class drops, repeated IA treatments, and racing/training on sealed surfaces. That the right front fetlock was treated with IA corticosteroids multiple times but was not evaluated with diagnostic imaging in the near term suggests an opportunity to avoid the catastrophic injury may have been missed.

Case #21

Incident Summary:

On March 05, 2019, this horse began a high-speed workout on the main dirt track at Santa Anita. It was her third work since racing February 2 on a sloppy, sealed track. She was set to breeze 5 furlongs but was injured at the 3/8 pole. The exercise rider heard a loud snapping noise and attempted to pull the horse to a halt. An outrider assisted the rider in stopping the horse after the injury. The injured left front limb was stabilized with a Kimzey splint and the horse was vanned to the on-site Southern California Equine Hospital. The attending veterinarian sedated the horse with detomidine and butorphanol, then performed a clinical examination. Based on radiographic findings, a salvage procedure to surgically arthrodesis (fuse) the fetlock joint was discussed, and opted against by the owner. The attending euthanized the horse with pentobarbital at 7:45 a.m.

Necropsy Summary:

The necropsy examination revealed a left front fetlock injury with transverse, basilar fractures of the lateral and medial proximal sesamoid bones. The medial proximal sesamoid bone (PSB) fracture was comminuted. There is an area of abnormal bone and articular cartilage on the abaxial portion of the left medial PSB and a suggestion of a similar lesion on the right front limb medial PSB. The fracture line courses through this area in the left front medial PSB. There is a transverse rupture of the medial branch of the suspensory ligament and full thickness, rupture of the intersesamoid ligament. There is biaxial palmar osteochondral disease with flattened and degenerated cartilage overlying condyles of the distal MCIII. The injury was closed. (Note: This horse was incorrectly submitted as a right front fetlock injury. The discrepancy on the necropsy submission form submitted to the CAHFS Laboratory was rectified on the final necropsy report.)

Track Summary:

One month prior to injury, on Feb. 2, the horse raced over a sealed track; the weather had been rainy and the track condition was listed as sloppy.

Veterinary History Summary:

The horse was given phenylbutazone orally prior to workouts including for her last work. Pre-race medications included methocarbamol and Legend two days prior to racing, phenylbutazone one day prior to racing, and then race-day furosemide. On February 15, this horse received dexamethasone for an episode of skin inflammation in the distal limbs.

Previously, the attending veterinarian diagnosed chronic moderate front fetlock osteoarthritis (OA). The horse

had received multiple periods of extended time off. Clinical signs would occur transiently and were managed with decreased training and routine joint supplementation with Adequan, OCD Pellets and Actistatin, the latter two are nutritional supplements. The most recent episode occurred in August 2018. After a radiographic examination, the left front fetlock was treated with intra-articular hyaluronic acid and the corticosteroid triamcinolone.

Pre-race Examination History:

This horse exhibited moderate signs of bilateral front fetlock OA in the pre-race examination record as well as a “choppy” gait.

Additional Notes:

The assistant trainer opined that having access to track-maintenance activity and schedules would be useful for horsemen to adjust their training, particularly in times of inclement weather.

He noted that the twin pressures of extensive poor weather and the lack of suitable races for the horse hampered her training and racing management.

Possible Contributing factors:

Pre-Existing Lesion

This horse was noted to have a focal, osteopenic lesion on the abaxial articular surface of its left front medial proximal sesamoid bone (PSB) through which a fracture line propagated during the breakdown event. This is considered a repetitive, overuse injury. There were also moderate-to-severe lesions associated with degenerative joint disease (DJD) of both front fetlocks (palmar osteochondral disease, transverse ridge arthrosis).

Speculating from the history of the horse, the possible source(s) of this lesion were:

- (1) intense training program overall; based on 181 controls the horse was above average in terms of number of workouts and total number of high-speed furlongs.
- (2) intense training in the near term; based on 181 controls the horse was above average in terms of activity (# high speed furlongs) in the past 12 months though activity was declining somewhat in the last 30 days.
- (3) familial or inherent predisposition for osteoarthritis; the sire of this horse was retired from racing due to long bone fracture (LH cannon bone condylar fracture); furthermore, multiple half-siblings had evidence of fetlock OA on available pre-race exam records.

CONCLUSION: This horse represents an advanced case of chronic degenerative joint disease of a high-motion joint (i.e., fetlock) following repetitive overextension as a result of excessive training. Despite sparse racing patterns, the horse still accumulated a total number of high-speed furlongs via workouts that was from 1-2 standard deviations above average. Furthermore, there was historical evidence of OA based on radiographs and joint therapies progressing into a chronic and transiently symptomatic stage. This is

supported by the necropsy findings, as evidenced by PSB articular score lines and focal porosity in the medial PSB.

While the connections of the horse appeared to monitor and manage the horse's physical condition appropriately with diagnostics, time off, race spacing, and joint therapy, the return to full training and racing during an inopportune time when the Santa Anita main track was repeatedly sealed may have increased bone stress and predisposed the horse to the acute catastrophic event.

Case #22

Incident Summary:

On March 14, 2019, this horse breezed on the main dirt track at Santa Anita Park. The main track was listed as fast, and the weather was clear and sunny. The horse had raced twice in her career, on December 29, 2018, and February 18, 2019. The exercise rider had worked the horse on several occasions and said she always worked slow, but “nice and easy”. The assistant trainer instructed the rider to perform an easy ½-mile workout in approximately 50 seconds. The trainer told the rider to use the crop to get the desired time of 49-50 seconds. The horse warmed up well and the rider thought she was “happy” as they backed up to the 5/8 pole, then turned around and jogged before breaking off at the ½-mile pole. The instructions were to breeze to the wire staying off the rail. The horse switched leads fine at the 3/8 pole and ¼ pole, but after the ¼ pole the horse began to lug in. The rider was able to keep his mount straight using the reins, then tapped her on the shoulder with the crop. Reaching the 1/8 pole the rider encouraged the horse to run faster by shaking the reins and making a kissing sound. The rider hit the horse with the crop on the shoulder again before the wire. Around the wire the rider felt something go wrong with the horse’s right front leg, so he pulled her to a stop and waited for the outrider. The Track Veterinarian was monitoring training that morning and quickly sedated the horse with detomidine, quickly evaluated the injuries, and euthanized the horse on the track with pentobarbital at 8:05 a.m. due to the severity of the injuries.

The trainer witnessed the workout and stated that the reportedly nervous horse “caught company” late in the work, which was not by design. The assistant trainer said the horse appeared to tire down the lane. He said the rider continued to ask the horse through the stretch with both his hands and the crop. He also noted that another horse came up alongside the horse approaching the wire, and that this horse appeared to shy away and duck inwards, switching back to her left lead in the process.

The outrider stationed at the ¼ pole noticed the horse take an awkward step as she passed. Then at the 1/8 pole the outrider saw the rider push the reins on the horse and tap the shoulder with the crop approximately three times. The outrider later asked the rider why he didn’t stop after the awkward step. The rider believed the horse was just tired. Other riders and the assistant trainer also informed the outrider they also saw the awkward step and that the rider whipped the horse afterwards at the 1/8 pole. When questioned, the assistant trainer did not validate that claim. He said the rider said the horse spooked near the wire when a nearby horse approached on the outside. The assistant trainer also claimed the attending veterinarian examined the horse approximately twice a week and especially before a workout. However, the attending veterinarian said he was never asked to conduct a physical exam on the horse.

Necropsy Summary:

The necropsy examination was for both front fetlocks. In the left foreleg, the medial proximal sesamoid bone (PSB) had a transverse, basilar fracture with subchondral bone discolored along the entire articular margin with a more distinct focus on the abaxial aspect. The fracture line propagates through the subchondral focus of red discoloration and is surrounded by highly compacted trabecular bone. There was a full thickness, transverse intersesamoidean ligament rupture, distal sesmoidian ligament tearing, a longitudinal rupture of the medial branch of the suspensory ligament at the level of the insertion on the medial PSB, and incomplete longitudinal splits and fraying of fibers of the lateral branch of the suspensory ligament. There was advanced biaxial palmar osteochondral disease with subchondral bone discoloration with flattened cartilage overlying the condyles of distal MCIII. Both distal splint bones (MCII & MCIV) were fractured.

In the right foreleg there were biaxial fractures of the PSBs. The subchondral bone on the medial PSB along the fracture line is slightly discolored along the entire articular margin with a more distinct focus on the abaxial aspect appearing to be a region of increased porosity. The fracture line propagates through this subchondral focus of red discoloration surrounded by highly compacted trabecular bone. The changes are very similar to those seen in medial proximal sesamoid bone in left front. Similarly, there was advanced biaxial palmar osteochondral disease with subchondral bone discoloration with flattened cartilage overlying the condyles of the distal right MCIII. There was a longitudinal rupture of the body of the suspensory ligament originating from the bifurcation resulting in complete separation of the lateral branch of the suspensory ligament. There was a full thickness, transverse intersesamoidean ligament rupture, and distal sesamoidian ligament tearing. Additional bony and soft tissue findings are described in the necropsy report.

Both front fetlock injuries were open.

Track Summary:

This horse had five recorded workouts between January 10 and March 1. The main track was sealed the day before or on the day of four of those workouts. Three of the breezes on sealed tracks were on January 30, February 10, and March 1.

With a race for this horse in the condition book coming up within eight or nine days, the trainer decided to breeze the horse on March 14 even though he didn’t believe the track condition was ideal.

Veterinary History Summary:

The horse was treated with one gram of oral phenylbutazone the day before timed workouts. Phenylbutazone tablets were dispensed to the horse by her attending veterinarian.

After entry for her second race on February 18, 2019, the horse received flunixin, methocarbamol, and dispensed BC2A on Feb. 16. On February 17 the horse received phenylbutazone, and vitamins.

According to the trainer, after the first race the horse developed a “stone bruise” of the left front foot, so a $\frac{3}{4}$ shoe (medial adjustment) was applied to alleviate the problem.

The horse was given time off between June and September 2018 for presumed dorsal metacarpal disease (“bucked shins”) based on palpation. No diagnostic imaging was performed and the shins were pin-fired.

Pre-race Examination History:

This horse exhibited mild signs of bilateral front fetlock OA in the pre-race examination record. The horse was also noted to have upright pastern conformation. The horse was wearing a $\frac{3}{4}$ shoe (medial adjustment) on its left front foot and both hind feet for the last race.

Possible Contributing factors:

Inappropriate Crop Use: There is discrepancy as to how aggressively and when the crop was used on this horse during the final portion of her work. Reports suggest the horse started to go wrong at the $\frac{1}{4}$ pole before the exercise rider began using the crop. There is also discrepancy as to how the crop was used. Only selected workouts are video recorded and this one was not so there is no video recording available to sort out conflicting reports. Nevertheless, this case led directly to Santa Anita banning crop use during training except for safety and horse control purposes.

Pre-Existing Lesion(s):

This horse was noted to have focal osteopenic lesions on the abaxial articular surface of both front medial proximal sesamoid bones through which fracture lines propagated during the breakdown event. These are considered repetitive overuse injuries. From the history of the horse, the possible source(s) of this lesion were:

- (1) rapid development of osteoarthritis (OA) of the front fetlocks; considering the relatively light high-speed training record and brief racing career the severe OA changes noted on necropsy likely developed in a short time frame.
- (2) consistent, full race training on a sealed surface over a relatively prolonged period (Jan to Mar).
- (3) familial or inherent predisposition for osteoarthritis; the sire and two half-siblings each appeared on the Veterinarian’s List for soundness issues (‘unsound’, ‘injured’, ‘shock-wave’).

CONCLUSION: Despite lack of clear evidence of intense high-speed training relative to controls, this horse had extensive chronic OA lesions affecting the fetlock joint. In fact, high-speed training was sparse (increased time between works and races) compared to typical training regimens. Pre-race exam records identified mild fetlock OA (‘osselets’) and moderate-to-severe lesions were noted on necropsy. Based on this, it is probable that the horse had at least transient external evidence of developing fetlock OA on both front fetlocks. However, there were no reports of diagnostic imaging or veterinary intervention of the front fetlocks in the horse’s record.

Considering the rapid progression of fetlock OA, continued training on repeatedly sealed tracks, and infrequent veterinary examination it appears that the horse was at an increased risk for injury. Additionally, the rider’s coaxing — including crop use — through the stretch while the horse was reportedly tiring or more likely reacting to a developing injury, may have contributed to the breakdown event or exacerbated her injuries.

Case #23

Incident Summary:

On March 31, 2019, this horse ran his 13th race, the San Simeon Stakes for 3-year-olds and up at 6½ furlongs on the downhill turf course. The San Simeon was the 4th race on the card; the weather was clear and the turf was listed as firm. The jockey had ridden this horse in his two prior starts and for his final workout at San Luis Rey Downs Training Center one week before the final race. The jockey said the horse ran incredible in that last workout. While warming up for the race, the jockey noted the dirt felt unusually deep. At 2:40 p.m. the horse broke out of the starting gate last but quickly caught up to the main group going down the hill. The horse crossed the turf to dirt transition, and then fell in the main dirt track crossover unseating his rider. Another horse was trailing this horse and could not avoid the fallen horse, so subsequently fell and unseated her rider. This other horse was vanned to her barn, was placed on the Veterinarian's List, and required a significant layoff.

The Track Veterinarian sedated this horse in the ambulance. The attending veterinarian was not at the track at the time of the injury. The Track Veterinarian performed a clinical examination and euthanized this horse at 2:45 p.m. with pentobarbital due to the extent of the injuries. The trainer was not involved in the decision, as he was out of the country.

Necropsy Summary:

The necropsy examination revealed injury to the right front fetlock including a comminuted, complete, displaced, lateral condylar fracture of the MCIII with pre-existing palmar osteochondral disease and biaxial proximal sesamoid bone (PSB) fractures. Similar palmar osteochondral lesions were seen in the left distal MCIII. The right front medial PSB fracture is mid-body and apical, complete, articular, transverse, and displaced; the lateral PSB fracture is axial. There was a full thickness, transverse and longitudinal rupture of the intersesamoidian ligament and tearing of the distal sesamoidian ligaments. The injury was open. In addition, there was a tear of the liver with hemoabdomen. Chronic distal radius and proximal intermediate carpal bone fractures were found in the antebrachial joint of the right carpus.

Track Summary:

This horse was racing off the downhill turf course and had just crossed onto the dirt when injured. This is potentially a more eventful course than a typical flat race due to the unique configuration due to the right-hand turn, downhill slope, and dirt crossing. There have been clusters of injuries associated with the hillside turf course, usually associated with very fast fractional times reflecting the condition of the turf course. In this race, the fractional time for a half-mile was exceedingly fast (:42 3/5). Another race on the

hillside course that day had a ½-mile fractional time of :42 4/5. The Equine Injury Database shows considerable year-to-year variation in racing fatality rates on the course. This horse ran on a similar downhill turf race in his prior start January, 27 and three other times in previous years.

The trainer opined that the dirt crossing was a significant factor in precipitating the breakdown event. He stated that the characteristics of the main track were very different from prior weeks. In response to the cluster of injuries, the main track had been tailored to be deep and slow, whereas previously it had been hard and relatively fast as a result of weather and sealing. The trainer thought this change exacerbated the already potentially problematic dirt crossing. The trainer described racing on the hillside as essentially running on a firm surface, then instantaneously switching to a patch of sand, then back to firm again.

Veterinary History Summary:

After entry for his final race on March 31, 2019, this horse received: phenylbutazone, estrone, dexamethasone and vitamins on March 27; vitamins on March 28; methocarbamol and DMSO in a half-liter of IV fluids, and phenylbutazone on March 29, and then race-day furosemide, administered by third-party Lasix veterinary staff. Routinely, furosemide and flunixin were given intravenously prior to workouts, followed by two grams of phenylbutazone post-work.

In 2016, the attending veterinarian (A) localized a right hind lameness to the horse's right hind fetlock. Radiographs revealed an osteochondral fragment off the first phalanx (long pastern bone) that was subsequently removed arthroscopically.

In March 2017, a different attending veterinarian (B) noted the horse displayed clinical signs of carpal osteoarthritis that was treated with intra-articular corticosteroids. In July 2017, radiographs of the carpal joints were obtained and veterinarian B treated the joints with autologous-conditioned serum (ACS), a form of biological therapy. ACS was also used intravenously. Veterinarian B administered the bisphosphonate Osphos*, thinking it might alleviate the osteoarthritic condition. In August 2017, nuclear scintigraphy was performed, and then radiographs of the left front fetlock, left knee, and left shin were obtained. Also, in August, the horse had an elevated Equine Protozoal Myeloencephalitis (EPM) titer. This was treated with a course of ponazuril (Marquis) followed by sulfadiazine/pyrimethamine the following month. In October 2017, veterinarian A treated the horse with Osphos* for chronic carpal and tarsal osteoarthritis. Veterinarian A reported that he used a half-dose. These treatments were during a 10-month layoff.

*Bisphosphonate administration— this horse was treated with Osphos (a bisphosphonate) on August 9 and October 10, 2017, by two different veterinary practices. Bisphos-

phonates are labeled in horses to control the clinical signs associated with navicular syndrome in horses 4 years and older. This horse was less than 4 years of age at the time of treatment. Bisphosphonates act by disrupting the normal cascade of bone remodeling in order to treat osteoporosis. There is strong evidence these drugs have an analgesic effect on bone and may delay natural healing patterns in young horses. Such characteristics are considered contraindicated in actively training racehorses undergoing a high and concentrated volume of stress. CHRB is moving a rule to prohibit bisphosphonate use at California racetracks.

Beginning in August 2018, the horse was treated with weekly intra-muscular joint therapy (Adequan). In October 2018, veterinarian A localized a left hind lameness to the horse's left hind proximal (high) suspensory ligament after blocking the region with local anesthesia. This was treated with local corticosteroid (triamcinolone acetonide) and a series of shockwave treatments (four total). The horse was placed on the Veterinarian's List four times as a result of shockwave (ESWT) therapy. In December, the horse was treated with a course of intra-muscular estrone injections. Veterinarian B described the use of estrone as a mild means of treating muscle soreness. On December 15, diclofenac (topical NSAID) was dispensed.

In February 2019, Veterinarian A examined the horse and noted a Grade 1 right front lameness. A different veterinarian (C) took radiographs of the horse's right carpus on February 11, 2019, while covering veterinarian B's practice. A chip fracture of the radiocarpal joint was noted. Veterinarian B examined the horse February 13 and observed a Grade 2 right front lameness. No diagnostic nerve nor joint blocks were utilized to localize the source of the right front lameness.

Pre-race Examination History:

The pre-race exam findings on this horse identified chronic, mild fetlock osteoarthritis. Chronic, moderate carpal osteoarthritis was also identified. A slight right front lameness and decreased range of motion in the right front fetlock was noted for the November 22, 2018, race.

Additional Notes:

This horse received Papimi treatments with the most recent being 3/27/19, 3/29/19, and 3/30/19.

Possible Contributing factors:

Pre-Existing Lesion:

This horse was noted to have severe palmar osteochondral disease of the right front distal cannon bone on necropsy. The fracture line propagated through a focal osteopenic lesion of the subchondral bone of the lateral condyle during the breakdown event. This lesion predisposed the horse to

lateral condylar and subsequent biaxial proximal sesamoid bone fractures. Similar lesions were noted in the left front distal cannon bone (MCIII). This represents bilateral repetitive overuse injuries.

Speculating from the horse's history, the possible source(s) of these lesions include:

(1) intense training schedule; this horse consistently performed an above average number of high-speed furlongs monthly as compared to 256 controls over the past year.

(2) brief intense training pattern; the horse breezed five times (23 high speed furlongs) in a 24-day time span leading up to its final start; this was subsequent to a period of sparse activity (one workout) in a 30-day period between January 28 and February 27.

(3) intense race schedule in the near term; between December 28 and January 27, the horse raced three times and worked twice for a total of 32.5 high speed furlongs; two of those races were eight days apart and both were 9-furlong races.

(4) history of bisphosphonate administration; the horse was treated twice with bisphosphonates in 2017 (August, October).

(5) familial or inherent predisposition for osteoarthritis; this horse's half-sibling appeared on the Veterinarian's List multiple times and had a history of condylar fracture and chronic fetlock OA.

CONCLUSION: This horse represents an advanced case of chronic degenerative joint disease of a high-motion joint (fetlock) following repetitive overextension as a result of excessive training and racing. The necropsy findings (severe bilateral front fetlock OA) and a comparative exercise history in the past 12 months (above average high-speed furlongs) support this conclusion. Within the last 12 months, there were two periods of scaled back activity: (1) October 2018 and (2) February 2019. From veterinary records, these were associated with physical issues (left hind suspensory desmitis and right carpal osteoarthritis). Subsequent to these setbacks, the horse resumed an intense training pattern.

Historically, the horse had been treated with bisphosphonates (twice in 2017), which are medications currently being investigated for their potential to increase risk of pathologic fracture. There is also an extensive history of intra-articular therapy using both corticosteroids and regenerative medication. Multiple NSAIDs (1-2 days prior to racing) and intravenous corticosteroids (four-to-five days prior to racing) were also administered in the near term, which may have confounded the ability of the connections and pre-race examiners to identify signs of inflammation ahead of the race.

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