K33 Detection of Various Performance Enhancing Substances in Specimens Collected From Race Horses in Illinois: A Five-Year Experience

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After attending this presentation, attendees will understand the principles of testing of equine athletes for illicit performance enhancing substances, allowed medications, the scale of equine doping, and the most frequently detected drugs and substances.

This presentation will impact the forensic science community by demonstrating the pattern of use of performance enhancing drugs and substances in horse racing.

The goal of this study was to compile all analytical findings from five- year period of time (2004-2009) to determine what substances are used most frequently and to study drug use trends in general.

The Association of Racing Commissioners International classified all drugs having a potential of impacting the outcome from the race in the Uniform Classification Guidelines for Foreign Substances. All drugs and substances are categorized in five classes from Class 1 having the greatest potential for performance enhancing to Class 5, the least. All Illinois Racing Board rules and regulations regarding medication and testing for drugs are published in the General Assembly's Illinois Administrative Code, Part 603 (Medication). The rule lists thresholds of allowed medications in blood (serum) such as phenylbutazone, furosemide, flunixin, ketoprofen, thresholds of selected medications in urine (e.g., isoxsuprine, DMSO, selected anabolic steroids), as well as O- desmethylpyrilamine (pyrilamine metabolite) and benzoyloecgonine (cocaine metabolite). There is a "zero tolerance" established for Class 1- 3 drugs. If the Class 4 or 5 drugs are found in the specimen, the quantification is required to be reported.

Testing protocol for urine and blood samples collected post-race from winning horses and others collected for various reasons as determined by track personnel in Illinois includes preliminary screening, on 65+ ELISA plates. The laboratory also analyzes the specimens collected postmortem and special exhibits such as syringes, needles, neat drugs, etc., found on race courses. In some cases the instrumental screening is performed using triple quad or ion trap LC-MS (e.g. anabolic steroids) or GC-MS (DMSO). All presumptive positive samples were subsequently confirmed by GC-MS or LC-MS. The use of alkalinizing agents, such as sodium bicarbonate, commonly called "milkshaking," is revealed by measuring the total carbon dioxide (TCO_2) level in plasma.

During the five-year period of time (2004-2009) 91,808 specimens were analyzed (45,210 urine and 46,598 blood samples) collected post- race from the winning thoroughbred and harness horses at eight race tracks in Illinois. The total number of violations reported was 413 (0.45%). The total number of violations reported in blood was 207 (0.44% of all blood specimens), and in urine 206 (0.45% of all urine specimens). The number of reported violations ranged from 123 (2006) to 40 (2008). The total of 220 violations was reported for harness horses, and 193 for thoroughbred. The most frequent violations include the following substances: phenylbutazone (111), flunixin (44), cocaine (34), TCO_2 (33), furosemide (25), ergonovine and DMSO (21 each), O- desmethylpyrilamine (13), cromolyn, diclofenac and indometacin (9 each), isoxsuprine (7), acepromazine, (6), methocarbamol and procaine (5 each), naproxen (4), ketorolac (3), etorphine, lidocaine, and morphine (2 each). One violation of each was reported for the following drugs: acetaminofen, buprenorphine, carprofen, chloropromazine, codeine, desipramine, fluoxetine, glycopyrolate, guaifenesin, hydromorphone, imipramine, meperidine, mepivacaine, methamphetamine, nalbuphine, nalorphine, oxazepam, oxymorphone, phenobarbital, phentermine, prednisolone, prednisone, promazine, tramadol, and verapamil.

In conclusion, this presentation has demonstrated that while only a very small number of violations of the total tested samples were reported, a greatly varied pattern of performance enhancing drugs and substances in Illinois horse racing was revealed.

Equine Doping, Drugs, Forensic Toxicology

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