POLYACRYLAMIDE FOR JOINT THERAPY –CRITICAL THINGS UNKNOWN

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Polyacrylamide for joint therapy–critical things unknown

pOsteoarthritis (OA) is the leading cause of lameness in horses. OA is a debilitating disease characterized by chronic inflammation and a progressive loss of the normal joint surface, resulting in pain, lameness or other compromised mobility, which often gets so serious that the horse is euthanized. OA can be very challenging to treat over the long term. Commonly used therapies often work for short periods of time or only provide partial relief of symptoms. There is a critical need for treatments that can not only prevent disease from getting worse but offer lasting effects.

A new treatment called polyacrylamide hydrogel (PAAG) has been investigated as a treatment for OA showing lasting improvements (up to 24 months). Even though clinical improvements from PAAG in the treatment of OA are very positive, how PAAG works to provide joint pain relief is uncertain and debated. Resolving joint inflammation is a primary goal of joint therapies. However, research into how PAAG affects joint inflammation has not been reported. Further, concerns have been raised among equestrian authorities that PAAG could affect pain sensitivity, preventing detection of imminent more serious injuries. Indeed, for Thoroughbred racehorses, a national regulatory rule states, “Intra-articular injections of polyacrylamide hydrogels are prohibited within 180 days prior to Post Time.” A previous study in 3 goats suggested that PAAG-treated joints had normal nerve counts and shape. As such, significant work is still required to characterize how PAAG injection modulates the inflammatory response in joints, and confirm, on a larger scale, that PAAG does not impair proper function of pain-sensing nerves. Therefore, we propose the following studies as high priority questions in addressing concerns from equine authorities and the safe use of this promising joint therapy.

Study 1: Characterize the changes in the inflammatory response of OA joints after treating with PAAG. This will be accomplished by studying mediators of inflammation and pain recognition in the joint fluid and internal lining.

Study 2: Characterize how pre-treatment of joints with PAAG affects the inflammatory response and recognition of pain long term after inducing joint inflammation experimentally.

These are very important question directly related to the safety of intraarticular PAAG therapy in Thoroughbred racehorses and other equine athletes. In addition to studying mediators of inflammation and pain recognition in the joint fluid and internal lining as describe for Study 1, we will use load-sensing boots on both front limbs with experimentally inflamed joints (previously treated with PAAG or inert vehicle), to assess pain recognition.

Our long-term goal is to assess the safety of using polyacrylamide hydrogel (PAAG) to treat equine osteoarthritis (OA). Knowledge generated by this study will provide tools for informed decision making regarding the effects of PAAG and its appropriate use.

Importance to the Equine Industry: The equine industry is a huge economic driver in many states in the US and globally. Significant sums of money are invested annually in breeding and training the most outstanding equine athletes. Intensive training and competition pressures frequently lead to joint inflammation and degeneration (arthritis) that prevent horses from reaching their potential or necessitate retirement. Estimated annual financial losses of between 600 million and 1 billion dollars occur due to treatment and early retirement of equine athletes in the US. In addition to

the significant economic cost of equine joint disease, there is the very important emotional impact that cannot be quantified and affects most horse owners in their lifetime. Regardless of the cause of the joint disease, the ultimate result for horses and their owners can be devastating.

Despite many advances over the years in the prevention, early detection, and treatment of equine joint disease, a critical need still remains to identify more effective ways to control inflammation in the joint and hold the advancement of arthritis in horses, enabling them to have an extended and good quality of life. The use of polyacrylamide hydrogel (PAAG) to treat OA has shown significant results with remarkably long-lasting effects. Data collected in this study will provide essential information of the effect of this promising treatment, to allow veterinarians, owners and authorities to make an informed decision about the safety of using PAAG to treat arthritis. Should we confirm PAAG provides improvements by resolving inflammation but not masking pain, PAAG treatment could improve the life quality and athletic longevity of thousands of horses.

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