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Pharmacokinetic and clinical study of intra-articular insulin in healthy horses

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Horse has approximately 6,000 years of being domesticated, also it has been used by man-kind for several athletic activities, from which we have the different equine sports today. However, these activities make horse an athlete, making it more prone to excessive loads to the bones and soft tissues, and therefore injuries, and because of that, equine sports medicine has been developing several combinations of treatments for those conditions in order to maintain their health for sports. Insulin has been used empirically for intra-articular injection without really knowing both its local joint and systemic effects and therefore, its dose. There is scientific evidence that insulin produces mitosis in equine chondrocytes *in vitro* with concentrations 150 ng/ml, also it enhances type II collagen production. In this study, we managed to adapt the dosage used in cell cultures to the actual joint, by measuring the articular surface from a specimen, also we determined if there were changes in synovial fluid composition, blood and synovial glucose levels, insulin concentration in synovial fluid by High Performance Liquid Chromatography (HPLC) to know its area Under the Curve (AUC), half-life ($T_{1/2}$), Time of Maximum Concentration (TC_{max}) and Residence Time (RT). Previous clinical studies were performed which include insulin resistance and radiology evolving the radio-carpal joint to all 6 mixed breed horses that were used in this study; three different doses were used: 10, 15 and 20 IU of insulin, obtaining significant changes through time in blood glucose levels for the 3 doses ($P < 0.0001$); no significant difference was found between synovial fluid protein and cell count in both treated and control (SSF) joints ($P > 0.05$); also, no significant difference was found regarding synovial glucose levels between treated and control joints ($P > 0.05$). HPLC revealed that the pharmacokinetic parameters are dose dependent, however, there was no significant difference when compared with the three different doses ($P = 0.9851$). Insulin used in this study proved to be innocuous to the equine joint, however, since the lowest blood glucose level was seen one hour post injection, it is recommended to monitor the horses' signs for about one hour and use no more than 20 IU for a 350-400 kg horse. To this day, there are not studies of insulin used intra-articularly in human or veterinary medicine, thus this is the first *in vivo* study.

Biography

Fernando García Lacy received his degree of Veterinary Doctor and Master's from the National Autonomous University of Mexico. He is dedicated to private practice in sport horses. He is a Professor at the same University.

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