INTRAARTICULAR INJECTION OF PLATELET-RICH PLASMA REDUCES INFLAMMATION IN A HOUSE SWINE MODEL FOR ARTHRITIS OF THE KNEE JOINT

INTRODUCTION:
Rheumatoid arthritis (RA) is the most common inflammatory joint disease with an incidence of around 1% according to different authors. RA is a systemic disease that leads to destruction of joint and adjacent bone. Most authors agree on some major etiologic features that characterize all types of RA. Where ever RA becomes clinically evident local inflammation leads to the destruction of tissue. In joints characteristic changes are proliferation, increased vascularisation and hypertrophy of the synovial membrane. Therapeutic concepts for the treatment of RA involve a wide range of medical intervention. Dietary measures as well as physiotherapy play a role whereas pharmacological concepts range from rather unspecific anti-inflammatory medication to the specific inhibition of cytokine receptors ie Anakinra, an IL-1 receptor antagonist. Amongst all anti-inflammatory therapeutic concepts one has recently aroused interest of many medical specialties: The application of Platelet-rich plasma (PRP), an autologous thrombocyte concentrate that requires relatively little effort to be prepared from whole blood. Autologous Thrombocyte concentrates have gained popularity as an adjunct to a variety of surgical procedures. Platelets and the growth factors they release are essential for regulating the cellular events that follow tissue damage. A platelet concentrate is believed to improve tissue healing by producing higher than physiologic locally stimulating substances(1). Therefore the idea to use them as an immunogenically inert additive in cases where rapid healing and tissue regeneration is required seems self-evident.

In this study we have investigated the anti-inflammatory effect of PRP after intraarticular injection in a swine model for RA. For this purpose we established an arthritis model of immunogenic arthritis in the knee joint of the house swine. House swine knee biomechanics do certainly exhibit major differences to that of humans but nevertheless house swine models have proven to lead to much more comparable findings than rodent or other small animal models.

METHODS:
Approval was obtained by the local ethics committee for animal experiments. Immunization was achieved by intravenous injection of 0.8 ml/kg bovine serum albumin on day 0 and 14. On day 28 and day 42 BSA, 5 mg/ml in normal saline, was injected intraarticularly into the knee joint to induce arthritis. Intravenous and intraarticular injections of saline served as controls. The following study groups were formed: Five animals were immunized prior to knee joint injections of NaCl and BSA, right and left, respectively. Five animals were immunized and injected intraarticularly with BSA into both knees, right knees additionally were injected with freshly prepared PRP. Platelet-rich plasma was produced from 50ml of full blood in a two-step procedure according to a standard protocol.

After 42 days the pigs were sacrificed and samples of synovial membrane and cartilage were asserved. Calcified and decalcified tissue were measured at significantly elevated levels in synovial membrane and inflammatory markers IL-6, IL-1, VEGF, IGF-1 and TGF-beta were reduced accordingly with a trend towards control levels (Figure 2).

DISCUSSION:
In this study we constitute a house swine model for immunogenic arthritis and we demonstrate that Platelet-rich plasma can attenuate the subsequent inflammatory response. To our knowledge this is the first large animal model for rheumatic joint disease of the knee. Recently intraarticular knee injections for the treatment of degenerative osteoarthritis were reported by Anitua et. al. (2). The results of this clinical study were encouraging but preliminary within a limiting study design but after all they find support by our results.

REFERENCES