infection for TNFα and IFNγ (P<0.027). The proportion of samples producing detectable IL-1β, IL-10 and IL-17 was higher in INFECTED compared to CONTROL samples (P=0.031). These data demonstrate that there are age-associated changes in VDR expression and related cytokine production in equine AMϕ in response to *R. equi* infection. Further research is needed to elucidate the immunomodulatory role of the vitamin D pathway in the horse.

Session 1.3.2 – Saturday 18 November | 10:48

046 - Modelling immune responses of cattle to mycobacteria using magnetic bioprinted granulomas

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Tuberculosis (TB) remains a threat for human and livestock health. Mycobacteria causing TB are host-adapted pathogens which occasionally spillover to other species. Mycobacterium bovis causes bovine TB, a well-known zoonosis. Mycobacterium tuberculosis (Mtb) is adapted to humans, may trigger symptomatic infection in cattle yet these show resistance to Mtb experimental challenge. A hallmark of TB in all hosts are multicellular tissue lesions termed granulomas. Using bovine leukocytes and nanotechnologies we developed a three-dimensional granuloma model which we designated in vitro granuloma-like structure (IVGLS). We generated stable IVGLS resembling TB granulomas at innate, made of macrophages, or adaptive stages, containing also lymphocytes. Mycobacteria replicated within IVGLS and triggered progression of macrophages towards foamy phenotypes. IVGLS released abundant phagocyte chemoattractants and Th1 cytokines. Magnetic bioprinted bovine granulomas facilitate studying immune responses to mycobacteria, including spatial mapping. Deciphering protective immune responses within IVGLS could contribute to vaccine development for cattle, whereas unveiling resistance mechanisms may help devise novel interventions for human TB.

Session 1.3.2 – Saturday 18 November | 11:06

Theme 7. Immunology of parasite diseases

002 - Improved mucosal response against hemonchosis related to β^A allele of ovine beta-globin gene

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Background: Two β-globin haplotypes have been identified in domestic sheep: A and B. In A haplotype, the β-globin gene cluster includes three highly similar β-globin genes: fetal (β^F), pre-adult (β^C) and adult (β^A); while in B, which bears the adult β^B allele, the cluster underwent a deletion, including the β^C gene. In adult sheep of A haplotype, the expression of β^A can be switched back to β^C during anemia, as a compensatory mechanism, since β^C has an increased oxygen affinity. Therefore, the deletion of β^C globin in sheep of Hb-BB haplotype

leads to decreased tolerance to anemia or hypoxemic conditions. Association between ovine β-globin polymorphisms and resistance against hemonchosis was described, but there are no studies regarding the involved local host responses.
Objectives: Phenotypic parameters and local responses were evaluated in sheep from different β-globin haplotypes naturally infected with *Haemonchus contortus*.

Methods: Morada Nova lambs were monitored at 63, 84, and 105 days of age for faecal egg counts and packed cell volume under natural infection with *H. contortus*. At 210 days of age, lambs of Hb-AA and Hb-BB β-globin haplotypes were euthanized and the fundic region of abomasum was sampled for evaluation of microscopic lesions and relative expression of genes related to immune, mucin, and lectin activities.

Results: Lambs harboring the β^A allele presented an improved resistance against clinical hemonchosis, showing higher PCV during infection. Hb-AA animals presented increased eosinophilia in the abomasum compared to Hb-BB animals, accompanied by higher Th2 profile (*IL4*, *MS4A2*), mucin (*CLCA1*) and lectin activity transcripts (*ASGR1*, *GAL11*), while inflammatory response was increased in Hb-BB animals (*IL1B*, *IL10*).

Conclusion: To our knowledge this is the first study to demonstrate an enhanced local response in the primary site of *H. contortus* infection related to β^A allele of β-globin haplotype.

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Session 1.2.3 – Saturday 18 November | 15:25

007 - Effects of experimental ***Fasciola hepatica*** infection on the long-term immune response of the foot and mouth disease vaccine

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Fasciola hepatica, a worldwide distributed helminth, has a robust immunoregulatory effect in the host, increasing the susceptibility to secondary infections. Foot and mouth disease (FMD) is a highly contagious acute vesicular viral disease effectively controlled by vaccination. Despite the evidence of immunoregulatory effects, the impact of fasciolosis on the immune response induced by FMD vaccination in cattle has never been assessed. Our objective was to evaluate whether the infection by F. hepatica in cattle influences the long-term immunity elicited by the currently used commercial FMD-inactivated vaccines. This experiment used eighteen to twenty-month-old Aberdeen Angus steers negative for F. hepatica. Animals were divided into three groups of 12 (I. Infected; II. Infected-TCZ treatment; III. Control). Animals were infected with 500 metacercariae/animal. After 115 days post-infection (dpi), group II was treated with triclabendazole. Steers were vaccinated twice against FMD virus (FMDV) during the first 6 months of age with Oleolauda bivalent (from Paraguay series 5967700A, formulated with A24/Cruzeiro and O1/Campos strains). Individual serum samples were collected at days 0, 15, 28, 43, 59, 71, 87, 115, 157, and 213 dpi. Indirect ELISAs were used to detect A24/Cruzeiro specific bovine IgG and IgG subtypes. The IgG antibody levels and avidity against FMDV did not show significant differences between all the groups. The commercial vaccine induced higher IgG2 than IgG1 titers in vaccinated animals. Anti-FMDV IgG1 levels significantly decreased in both infected groups at 28 dpi. In addition, the avidity of IgG1 FMDV-specific antibodies at day 28 in the infected group was reduced compared to the control. These results show that F. hepatica infection modified anamnestic responses against FMDV, reducing serum IgG1 titers and avidity. This is the first report of immune-regulation of F.hepatica altering the immune response of FMD vaccines.