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IL-1β, IL-2 and IL-4 concentration during porcine gestation

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ABSTRACT

In pigs, given the type of epitheliochorial and non-invasive placenta, the trophoblast is in intimate contact with maternal tissues. The dialogue established between the *conceptus* and the endometrium involves, among others, the immune system, which minimizes the chances of rejection of the embryo and promotes the establishment of pregnancy. The aim of this work was to determine the concentration of IL-1β, IL-2 and IL-4 in sera and in extracts of maternal and fetal placenta from sows of different gestational periods. Reproductive tracts from 23 crossbreed sows, between 30 and 114 days of gestation (dg), and from 8 non-pregnant sows were used. The concentration of the cytokines was determined by ELISA. IL-1β, IL-2 and IL-4 demonstrated a similar pattern of concentration at the placental interface and serum; they were found elevated in tissues at 30 and 60–70 dg, and significantly decreased at term, period in which the cytokines were significantly increased in serum. These results show that IL-1β, IL-2, and IL-4 are differentially modulated during pregnancy and at term, and suggest an important role of these cytokines in defining the proinflammatory stage of these periods.

1. Introduction

In mammals, at the initial stages of pregnancy, the blastocyst begins a molecular dialogue with the endometrium in order to obtain its receptivity. This cross-communication involves, in addition to other factors, the generation of an inflammatory immune response, resulting in the implantation of the conceptus and the generation of the placenta [1]. In earlier stages after implantation, this local inflammatory immune response produces a particular type of anti-inflammatory response, regulating the intrauterine and systemic environment [2].

One of the main cytokine-producing cells is the CD4 helper (Th) T lymphocyte, which according to the pattern of cytokines produced may differentiate into cytotoxic (Th1), anti-inflammatory (Th2) or regulatory (Th3 and Tr1) cells [3]. Raghupathy [4] postulated that, during gestation in women and mice, the physiological balance between the Th1/Th2 cytokines is modified towards Th2/Th3/Tr1 activity, regulating the maternal immune response to allow embryo tolerance. These changes occur in pigs as well as in humans [5].

After the implantation period in the porcine, there are two crucial stages for the development of a successful gestation. First, around 32 dg begins the ossification of the embryos and the stage of exponential growth of the placenta. Second, between 60 and 80 dg, occurs the end of placental development and beginning of the exponential growth of fetuses. It has been shown that during these stages there is a higher apoptotic index in the maternal-fetal interface [6], which occurs as a consequence of an increased proinflammatory environment. This is concomitant with the presence of certain cytokines, such as IL-6, IL-12, IL-15 and IL-18, which might be involved in regulating the immune system at the tissue level [7].

Interleukin 1-β (IL-1β) is a proinflammatory cytokine that acts as a central mediator of inflammation and innate immunity in humans and mice [8,9]. The role of IL-1β in the implantation of the *conceptus*, invasion and maternal-placental immunotolerance was

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