



Review

The piglet as a model for B cell and immune system development

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ARTICLE INFO

Keywords:

Swine

Gnotobiotic

Models

Developmental immunology

Review

ABSTRACT

The ability to identify factors responsible for disease in all species depends on the ability to separate those factors which are environmental from those that are intrinsic. This is particularly important for studies on the development of the adaptive immune response of neonates. Studies on laboratory rodents or primates have been ambiguous because neither the effect of environmental nor maternal factors on the newborn can be controlled in mammals that: (i) transmit potential maternal immunoregulatory factors in utero and (ii) are altricial and cannot be reared after birth without their mothers. Employing the newborn piglet model can address each of these concerns. However, it comes at the price of having first to characterize the immune system of swine and its development. This review focuses on the porcine B cell system, especially on the methods used for its characterization in fetal studies and neonatal piglets. Understanding these procedures is important in the interpretation of the data obtained. Studies on neonatal piglets have (a) provided valuable information on the development of the adaptive immune system, (b) lead to important advances in evolutionary biology, (c) aided our understanding of passive immunity and (d) provided opportunities to use swine to address specific issues in veterinary and biomedical research and immunotherapy. This review summarizes the history of the development of the piglet as a model for antibody repertoire development, thus providing a framework to guide future investigators.

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1. Introduction

1.1. Why the piglet model?

Understanding the intrinsic immunological capability of fetal and neonatal mammals can be compromised by transfer of maternal passive antibodies and other factors in

utero (Fig. 1). Furthermore, since altricial newborns (rodents and primates) cannot be reared separate from their mothers, it limits the experimental control of external factors that have been shown to impact postnatal development of adaptive immunity (Fig. 2). Some reasons why the piglet is a useful model for studies on development of the adaptive immune system are listed in Table 1.

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