

Cell type-specific differences in β -glucan recognition and signalling in porcine innate immune cells

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Vaccines often require adjuvants to trigger potent immune responses. β -glucans, the major component of the yeast cell wall, are a potential vaccine adjuvant. These carbohydrates exert their immunomodulating activities via several receptors, such as dectin-1 and complement receptor 3 (CR3). The role of these β -glucan receptors in the response of innate immune cells towards β -glucans is however still unresolved. Dectin-1 is considered as the main β -glucan receptor in mice, while recent studies in man show that CR3 is more important in β -glucan-mediated responses. This incited us to elucidate which receptor contributes to the response of innate immune cells towards particulate β -glucans in pigs. We show an important role of CR3 in β -glucan recognition, as blocking this receptor strongly reduced the phagocytosis of β -glucans and the β -glucan-induced ROS production by porcine neutrophils. Conversely, dectin-1 does not seem to play a major role in β -glucan recognition in neutrophils. However, recognition of β -glucans appears to be cell type-specific as both dectin-1 and CR3 are involved in the β -glucan-mediated responses in macrophages. Moreover, CR3 signalling through focal adhesion kinase (FAK) was indispensable for β -glucan-mediated ROS production and cytokine (TNF α , IL-1 β , IL-8) production in neutrophils and macrophages, while the Syk-dependent pathway was only partly involved in these responses. We conclude that as for man, CR3 plays a cardinal role in β -glucan signalling in porcine neutrophils, while macrophages use a more diverse receptor array to detect and respond towards β -glucans. Nonetheless, FAK acts as a master switch regulating β -glucan-mediated responses in neutrophils as well as macrophages. Altogether, our results could lead to a rationale-based decision process to implement β -glucans as vaccine adjuvants.