Importance of Interleukin-1 and Interleukin-1 Receptor Antagonist in Short-Term Glucose Sensor Function in Vivo

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Abstract

Background:
The importance of the interleukin (IL)-1 cytokine family in inflammation and immunity is well established as a result of extensive in vitro and in vivo studies. In fact, much of our understanding of the in vivo importance of interleukin-1beta (IL-1B) is the result of research utilizing transgenic mice, such as overexpression or deficiencies of the naturally occurring inhibitor of IL-1 known as interleukin-1 receptor antagonist (IL-1RA). For the present studies, we utilized these transgenic mice to determine the role of IL-1B in glucose sensor function in vivo.

Methods:
To investigate the role of IL-1B in glucose sensor function in vivo, we compared glucose sensor function in transgenic mice that (1) overexpressed IL-1RA [B6.Cg-Tg(Iil1rn)Dih/J] and (2) are deficient in IL-1RA (B6.129S-Iil1rn^{tm1Dih}/J), with mice that have normal levels of IL-1RA (C57BL/6).

Results:
Our studies demonstrated that, during the first 7 days post-sensor implantation (PSI), mice deficient in IL-1RA had extensive inflammation and decreased sensor function when compared to normal or IL-1RA-overexpressing mice.

Conclusion:
These data directly support our hypothesis that the IL-1 family of cytokines and antagonists play a critical role in controlling tissue reactions and thereby sensor function in vivo during the first 7 days PSI.