



IMMUNE RECONSTITUTION

NOD2 Mediated Thymic Regeneration Boosts Compromised Immune Function

Brief Description of Technology

Promotion of thymic regeneration through reduction or inhibition of nucleotide-binding oligomerization domain-containing protein 2 (NOD2) by upregulating regenerative molecules [e.g., interleukin (IL)-22, IL-23, and bone morphogenetic protein 4 (BMP4)].

BUSINESS OPPORTUNITY

Exclusive license
Startup opportunity
Sponsored research

TECHNOLOGY TYPE

Therapeutic

STAGE OF DEVELOPMENT

Preclinical *in vivo*

PATENT INFORMATION

Patent pending

INVESTIGATOR

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Technology Overview

As the primary site for T cell development, thymic regeneration is critical for the renewal and development of immune competence following stress [e.g., conditioning required for hematopoietic stem cell transplant or cytotoxic cancer treatments]. IL-22 and BMP4 secretion through innate lymphoid (ILCs)- and endothelial (ECs)- cellular activity have been established as important for thymic regeneration. However, the pathways that trigger these mechanisms are poorly understood. Dr. Dudakov established how NOD2 governs these pathways and that mice deficient in NOD2 show increased intrathymic levels of IL-22, IL-23, and BMP4. By targeting NOD2 expression, thymus regeneration could be induced in patients whose thymus has been damaged by age, infection, and cancer therapies [e.g., chemotherapy and irradiation].

Applications

- Age-related immune decline
- Infection
- Cancer therapies [e.g., chemotherapy and irradiation]

Advantages

- Promotes thymic regeneration
- Selective mechanism of action conferred through cell-specificity

Market Overview

The global tissue regeneration market is predicted to reach USD 109 billion by 2024. With a strong CAGR of 34.5%, growth is driven by wound healing applications, technological advancements, and adoption of immunotherapy. In the US alone, approximately 650,000 cancer patients will undergo chemotherapy per year. According to the Centers for Disease Control, cancer patients treated with chemotherapy are more likely to get infections. In 2018, 60,000 patients were admitted to hospital due to compromised immune response, 14 of which were fatal.