

STIMULATING INNATE IMMUNE CELLS FOR CANCER THERAPY OR VACCINE ADJUVANTS

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Technology Description

Researchers in Prof. Marco Colonna's laboratory have identified a receptor-ligand interaction that could be harnessed to activate the innate immune system to treat cancer or enhance the response to vaccines for infectious disease. Specifically, platelet-derived growth factor (PDGF)-DD binds the NKp44 receptor on a range of immune cells, including natural killer (NK), innate lymphoid cells (ILCs) and plasmacytoid dendritic cells (pDCs)].

PDGF-DD is a ligand secreted by many solid tumors and known to promote tumor growth through the PDGFRb signaling pathway. However, Dr. Colonna and colleagues discovered that PDGF-DD is also a ligand for NKp44 (also known as natural cytotoxicity receptor 2, "NCR2") and this binding can stimulate an immune response. Furthermore, it triggers the cells to release cytokines that can boost the immune response and arrest tumor growth. This mechanism could enable NK cell-mediated control of tumor cells, augment existing cancer therapies or improve vaccine responses.

Stage of Research: The inventors demonstrated that PDGF-DD binding to NKp44 stimulates cytokine secretion by NK and ILC cells. Further in vivo experiments validated that NKp44 expression in mouse NK cells controlled the dissemination of tumors more effectively than control mice and enhanced immunotherapies.

Publications: Barrow, A. D., Edeling, M. A., Trifonov, V., Luo, J., Goyal, P., Bohl, B., ... & Bugatti, M. (2018). [Natural killer cells control tumor growth by sensing a growth factor](#). *Cell*, 172(3), 534-548.

Applications:

- **Cancer therapeutics:**
 - PDGF-DD could be used to activate NK cells ex vivo for immune boost to augment existing cancer therapies
 - potential to incorporate receptors that recognize PDGF-DD into CAR-T cells to enhance recognition of solid tumors
- **Vaccine adjuvant** - PDGF-DD could be used to stimulate cytokines from dendritic cells and innate lymphoid cells to enhance immune response to infectious disease vaccines

Key Advantages:

- **First in class approach** - new mechanism of NK cell-mediated control of tumor cells
- **Potential for broad applications** in cancer and infectious disease

Patents: [Activation of natural cytotoxicity receptor 2 \(ncr2\)](#) (PCT Application, Publication No. WO2018201088)

Related Web Links: Colonna [Profile](#) and [Lab](#)