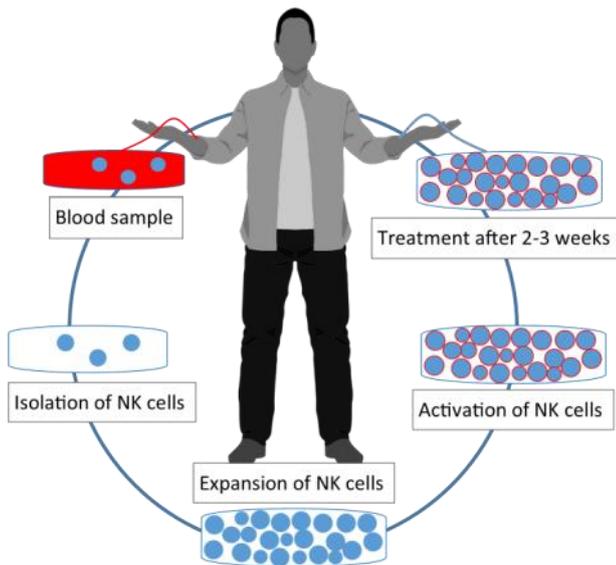


Cancer Immunotherapy

With Natural Killer Cells



Natural Killer Cells (NK cells)

- NK cells are a type of lymphocyte (a white blood cell) and a component of innate immune system.
- NK cells play a major role in the host-rejection of both tumours and virally infected cells.
- NK are able to detect abnormal cells and directly kill them without any specific antigens.
- NK cells regulate immune and inflammatory responses by inducing the activity of acquired immune cells (Dendritic cell, T-cell, B-cell)
- NK cells effectively inhibits the proliferation, recurrence, and metastasis of cancer cells.

The Innate Immune System

The innate immune system is the first line of defence against infection. It is non-specific and less effective than the acquired immune system, however it can respond to an immunological threat much faster and hold off the threat until a specific response can be mounted.

This immune system involves the physical barriers of the skin and other epithelial surfaces, inflammation, the complement system, and various cells, including phagocytes, dendritic cells, mast cells and natural killer cells.

Once NK cells are active, they insert their lytic granules, which contain cytotoxic chemical, into the infected cell. An immunological synapse is formed between the NK cells and the infected cell before perforins and granzyme B are released. Perforins create pores in the membrane which allow death-inducing enzyme granzyme B to enter the cell and induce apoptosis (programmed cell death). Activated NK cells also produce cytokines (Interferon gamma and Tumour necrosis factor alpha) which recruit other members of the immune system and activate the acquired response.

Natural killer cells and virus infections

NK cells are activated in response to interferons or macrophage-derived cytokines and induce apoptosis (programmed cell death) in target cells.

They serve to contain viral infections while the adaptive immune response is generating antigen-specific cytotoxic T cells that can clear the infection.

The distinction between apoptosis and cell lysis is important in immunology - lysing a virus-infected cell would only release the virions, whereas apoptosis leads to destruction of the virus inside.

Studies on the treatment of HIV and Covid 19 with NK cells are ongoing.



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Comparison with other Immunotherapies

NK cells are the only immune cells that detect abnormal cells such as cancer cells and remove them immediately without any specific antigens. In accordance with this principle, NK cell based anti-cancer immunotherapy is known to be much safer than other immunotherapies.

Cell type	T cells	Dendritic Cells	Natural Killer Cells
Target Antigens	specific	specific	non-specific
Presence of antigens	artificial	natural	none
Cancer-killing	direct killing	T cell activation	direct killing
Immune response	direct	indirect	direct
Safety	low (cytokine syndrome)	high	high

Banking of autologous NK cells and Dendritic Cells

It is well known that viral infections and cancer can weaken the Natural Killer cells and even infect Dendritic Cells (DCs). To avoid this, and the delay in preparing sufficient numbers of these cells, we can offer the

- Isolation of NK cells and DCs from your blood
- Expansion of NK cells over a period of 2-3 weeks
- Transformation of monocytes in DCs
- Activation of NK cells and DCs
- Banking of your cells in liquid nitrogen during several years until needed



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