

Chapter VII

Natural Killer Cells: Flare Amidst the Grim

Squamous Cell Carcinoma

7.1 Natural Killer Cells: Flare amidst the grim

“You never let a serious crisis go to waste. And what I mean by that is it’s an opportunity to do things you think you could not do before”

Following the worldwide financial crisis in the year 2008, Rahm Emmanuel (Barack Obama’s Chief of Staff) said the abovefit perfectly within the ongoing COVID-19 pandemic. Just in a couple of years since the primary reported case of the novel coronavirus infection, it has briskly spread to over 200 countries and territories around the world infecting over 255 million people and killing more than 5.1 million people (1).

The "Theory of Evolution by Natural Selection" by Charles Darwin, which states that life forms, whether they be humans or viruses, best adapted to their environment are most successful in surviving and reproducing while all others die away, is still relevant today as the coronavirus catastrophe is wreaking havoc across the entire world. Furthermore, according to the idea of evolution, new types of life will continue to exist at random over time. In order to live, viruses like the Coronavirus will continue to compete for appropriate hosts like humans(2).Is the human race prepared to endure these disasters at this point? We think the answer is "Yes," and it is time to turn to one of our immune system's most powerful tools: natural killer (NK) cells. NK cells, which were initially known for their capacity to mediate tumor cell lysis, are now acknowledged as one of the most aggressive immune cells, significantly influencing host resistance to a variety of viral infections. Although we waited too long, research has finally been done to understand how NK cells contribute to the anti-tumor and antiviral response.Many such studies have shown that NK cells not only kill altered cells during the earliest stages of infection, prior to the development of adaptive immunity but also play a critical role in regulating a host of immunological processesduring the development of adaptive immunity(3).The theory of co-evolution gives us hope that our immune responses will eventually converge to an equilibrium state in this evolutionary "arms race," even though we are aware that cancer cells as well as many viral ligands will evolve to subvert the immune responses by devising methods to disrupt the host immune signalling cascades or by activating

the inhibitory receptors. It is unlikely that hosts or diseases would stray too far from this equilibrium over millions of years of evolution.

However, there is still much to be learned about the methods by which NK cells identify and react to various cancers and viruses. Unknown are several human NK cell receptors that could enable NK cells to directly detect altered cells. Additionally, it is crucial for future study to comprehend the primary signalling pathways used when NK cells are activated in response to various infections, as well as the receptor-ligand families involved. We will have a solid foundation for the creation of future immune treatments based on NK cells to regulate the anti-tumor and antiviral activity of human NK cells once we have a more thorough knowledge of these interactions and responses. We have been able to learn more about our immune system thanks to the present Covid-19 crisis, and NK cells will continue to be a glimmer of light in the gloom.

References:

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2. Smith JM, Maynard SJ. *The theory of evolution*: Cambridge University Press; 1993.
3. Jost S, Altfeld M. Control of human viral infections by natural killer cells. *Annual review of immunology*. 2013;31:163-94.