Protective Immune Responses during Epstein Barr Virus (EBV) Infection

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What is Epstein Barr Virus (EBV)?

- EBV is a “common human γ-herpesvirus that persistently infects more than 90% of the human adult population.”

- Individuals, who are infected with the virus early in life, acquire and carry the virus usually without symptoms; however, 20-30% of Europeans and North Americans are infected later during adolescence and a high proportion of these will experience symptoms during primary infection.
Infectious Mononucleosis (IM)

• EBV is the virus that causes IM, which is often referred to as “The Kissing Disease”, because it is transferred through saliva.

• The reason why some acquire EBV with IM at increased age is still unclear, but it is thought that inefficient innate immune control might allow the virus to replicate to a higher level.¹
Main symptoms of Infectious mononucleosis

Central
- Fatigue
- Malaise
- Loss of appetite
- Headache

Visual
- Photophobia

Tonsils
- Reddening
- Swelling
- White patches

Throat
- Soreness
- Reddening

Respiratory
- Cough

Systemic
- Chills
- Fever
- Aches

Lymph nodes
- Swelling

Spleen
- Enlargement
- Abdominal pain

Gastric
- Nausea

Image from “Epstein-Barr Virus: Infectious Mononucleosis.”
Natural Killer (NK) Cells

- NK cells are lymphocytes that were originally discovered for their spontaneous cytolytic potential against tumor cells.\(^1\)

- As part of the innate immune system, NK cell recognize altered components of the infected or transformed cell surface that indicate cellular stress like DNA damage or an unfolded protein response.\(^1\)

- “They are antibody-independent killers of tumor cells and also can participate in antibody-dependent cell-mediated cytotoxicity.”\(^3\)
Natural Killer (NK Cells)

Image from Silva, et al., Blood (2011)
The immune response to primary EBV infection: a role for natural killer cells

Image from Williams, British Journal of Haematology (2005).
Methodology of the Experiments

- Human Natural Killer cell lines NKL, NK-92, and Nishi will be exposed to EBV-infected cells.

- Using antibodies and a confocal microscope, “SP5,” the synapse between the cells will be imaged to view the interaction between the cells and the recruited receptors and their ligands.
Aim of the Experiments

• One receptor has been identified in the specific EBV protective NK cell subset (CD94/NKG2A).

• Through imaging, I will identify other receptors and ligands that are recruited to the interaction between NK cells and EBV infected cells.

• NK receptor candidates: NKG2D and DNAM-1.
Expected Results

Why is this important?

• Not much is known about the role of NK cells in primary EBV infection.

• Monitoring the human NK cell compartment could allow us to identify adolescents at risk for IM, which could benefit from EBV specific vaccination.¹
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References


