The (Internal) War on Cancer: Using the immune system to fight tumors
October 1, 2014

Introduction
The immune system has evolved to recognize foreign invaders into our bodies, such as bacteria and viruses. In a similar fashion, it is able to recognize when healthy cells transform into cancer cells, and attempts to clear them. When patients come to the clinic with a tumor, the immune system has failed at this job, often because the cancer cells figure out ways to avoid the immune response. Exciting new therapies are emerging that attempt to shift the balance back in favor of the immune system. In this talk, we will review basics of how the immune system works in general and in response to cancer, as well as a few of the most exciting therapies currently in the clinic.

Speakers

Jernej Godec an Olympic swimmer-turned-scientist from Slovenia graduated from UC Berkeley in Molecular and Cell Biology and is now a 5th year PhD student in the Harvard Immunology Program. His work in the labs of Arlene Sharpe and Nick Haining is focused on identifying the molecular events leading to optimal killer T cell responses, whether they are fighting viruses or tumors. When he is not in the lab he tries to stay in shape while always on the lookout to find, cook, and try new cuisines from around the world.

Ezana Demissie is a 4th year PhD student in the Harvard Immunology Program. Together with colleagues in the Pillai lab, he studies how certain subtle sugar modifications on the surface of immune cells influence their homeostasis and response to danger (i.e. tumors or intracellular pathogens). Like any good Ethiopian, he enjoys running, playing soccer, and debating the geopolitics of East Africa with anyone who is interested.

Vikram Juneja is a 5th year PhD student in the Harvard/MIT Division of Health Sciences and Technology. He is in Arlene Sharpe’s lab, studying how PD-1 blockade (which you will learn about in this talk!) actually leads to a strong immune response against tumors. In his free time he enjoys running, despite Jernej’s attempts to convert him to swimming. He has recently gotten into grilling and thinks he may never make another meal in a kitchen again.
Glossary of Important Terms

**Immune system**: The body’s defense system against infection and other foreign invaders

**Cancer**: A disease caused by uncontrolled division of abnormal cells in the body

**T cell**: An immune cell that is responsible for killing and clearing abnormal cells

**Dendritic cell**: An immune cell type responsible for continuous surveillance of tissue to see if anything is abnormal; presents antigens to T cells

**Naïve T cell**: A T cell that has not yet been exposed to an antigen that matches its receptor

**Activated T cell**: A T cell that has been activated by a dendritic cell displaying its specific antigen

**Antigen**: A portion of a protein that stimulates the immune system

**T cell Receptor (TCR)**: A molecule on the surface of a T cell that recognizes and binds to a specific antigen presented by a dendritic cell, activating the T cell

**Lymph Node**: Small organs around the body where dendritic T cells take antigens to stimulate naïve T cells

**Checkpoints**: Stimulatory or inhibitory signals that regulate the immune response (for example: PD-1, CTLA-4, CD28)

**Adoptive Cell Transfer**: The transfer of immune cells back into the patient with the hope of inciting an immune response

**Chimeric Antigen Receptors (CAR) T cells**: Immune cells that have been genetically engineered to recognize tumor-specific antigens

**Autoimmunity**: A condition where the body generates an immune response against its own otherwise healthy tissue

Resources to learn more

Emily Whitehead’s website, [http://emilywhitehead.com](http://emilywhitehead.com), website about Emily Whitehead that chronicles her experience with Chimeric Antigen Receptor T cells.

**Blocking the Brakes: Helping Your Immune System Battle Cancer**, [http://sitn.hms.harvard.edu/flash](http://sitn.hms.harvard.edu/flash), SITNFlash article on cancer immunotherapy

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