

“Innovations in Immunological Research”

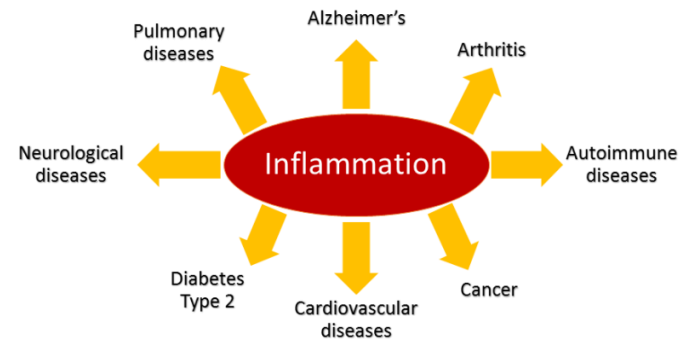
**Mountain Light Unitarian
Universalist Church**

Alexandra Tremblay, PhD

10/30/2016

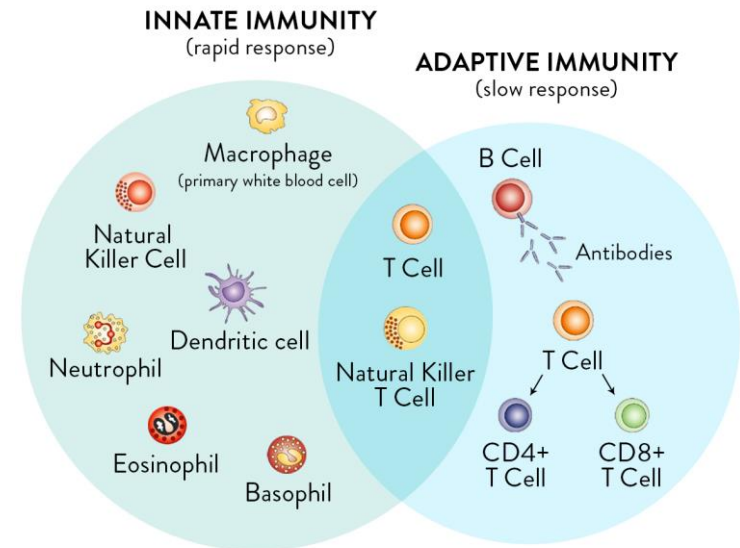
Immune Disorders

- Chronic inflammation
 - Millions affected worldwide
- Cancer
 - Plague on humanity
- Both caused by disruption of immune function
 - Two sides of same coin
 - Millions in healthcare costs each year
 - No true “cure” for either condition



Immune System

- Functions as a defense to:
 - Harmful pathogens
 - Bacteria/fungus
 - Damaged cells
 - Foreign cells
 - Parasites
 - Transformed cells
 - Cancer
- Uses many types of immune cells that circulate in blood and lymph system



A Double-Edged Sword

- Chronic inflammation-results from overstimulation of immune cells
 - Immune cells attack own tissue (Autoimmunity)
 - Arthritis, IBD, MS, Diabetes, etc.
- Cancer-results when immune cells function improperly, or not at all
 - Immune cells do not clear “altered” cancerous tissue cells



Traditional Treatments

- Cancer:
 - Radiological
 - Chemical
 - Surgical
- Chronic Inflammation:
 - NSAIDs
 - Surgical



Limitations

- Standard treatments for cancer are extremely detrimental to the patient
- Treatment strategies for both immune conditions are often times ineffective and costly
- Goal of new research is to make treatments more effective, and less detrimental to patients

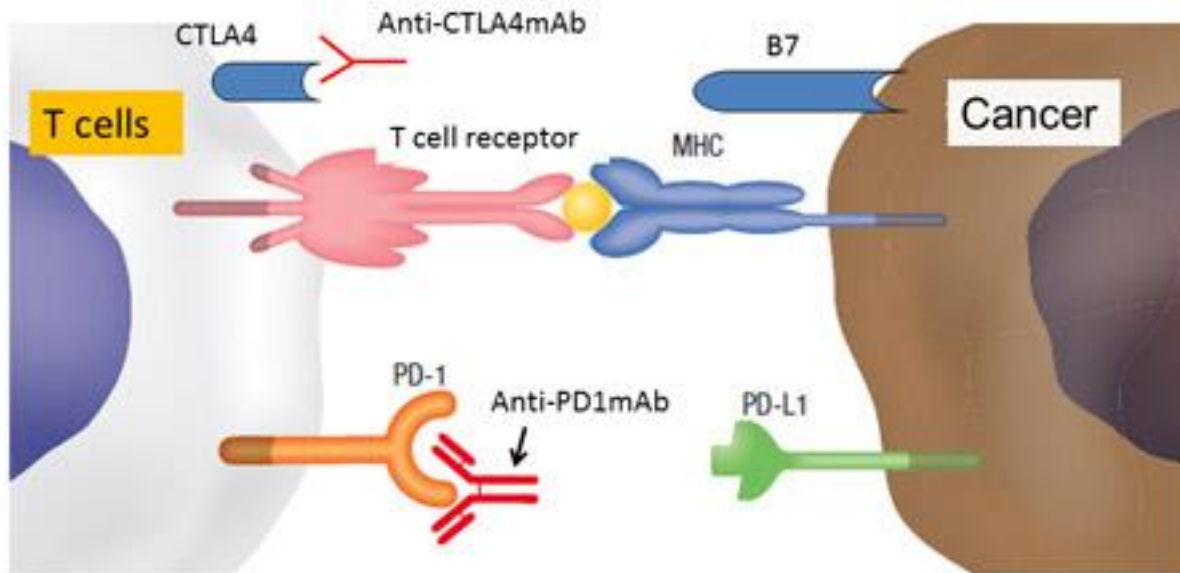
Biologics

- Autoimmune dysfunction due in large part to secretion of chemical signals
- Major hallmark of chronic inflammation is increased TNF- α and IL-17
- “Biologics” are antibodies (protein complexes) that act as immunosuppressants
- Very effective for treating RA, Psoriasis
 - Humira, Cosentyx



Check Point Blockade

- Works similarly to “Biologics”
 - Cancer cells selectively kill immune cells by blocking immune cell “weapons of mass destruction”



Adoptive CAR T Cell Therapies

- Chimeric Antigen Receptor
 - Artificially engineer immune cells to target cancer cells (Immunotherapy)
- Lowers side effects, VERY effective!



Emily Whitehead- 3-time cancer survivor

Treatment Challenges

- Enhancing immune function:
 - Increases risk of autoimmune disease
 - Increases chance of inducing shock in patient
 - Ex. CAR T cell therapy
- Diminishing immune function:
 - Increases risk of developing cancer
 - Ex. Biologics (antibody) therapeutics

Current Immunotherapy Support

- Comes from unlikely source-Sean Parker (Napster)
 - Created The Parker Foundation \$250 Million
- NIH only give 4% of total \$5 billion budget to immunotherapy



Western Culture

- Very clean environment of the western, industrialized world leads to higher incidence of autoimmune disease
- More autoimmune chronic inflammation drives cancer incidence
- Vicious cycle, must be addressed at the source
 - Diet, exercise, lifestyle changes