

Cancer Immunotherapy in the Clinic

Jonathan Thompson, MD, MS
Assistant Professor
Division of Hematology/Oncology
Medical College of Wisconsin



Take Home Points

- Cancer Immunotherapy has dramatically improved outcomes in advanced cancer
- Immunotherapy can cause unique side effects
- Further research is needed to bring the benefit of immunotherapy to all patients with cancer



Outline

- Examine why cancer immunotherapy offers hope for patients with advanced cancer
- Discuss clinical impact of available cancer immunotherapies and side effects
 - PD-1/PD-L1 inhibitors
 - CTLA-4 inhibitor
 - CAR T-cells
- Brief look at the future of cancer immunotherapy



Immunotherapy extends life in...

- Melanoma
- Non-small cell lung cancer
- Small cell lung cancer
- Head and neck cancer
- Kidney
- Bladder
- Cervical
- Stomach
- Certain types of colon cancer
- Liver cancer
- Merkel cell carcinoma
- Primary mediastinal large B-cell lymphoma
- Hodgkin Lymphoma
- Acute Lymphoblastic Leukemia
- Diffuse Large B-cell lymphoma

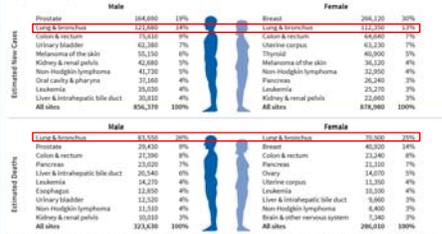


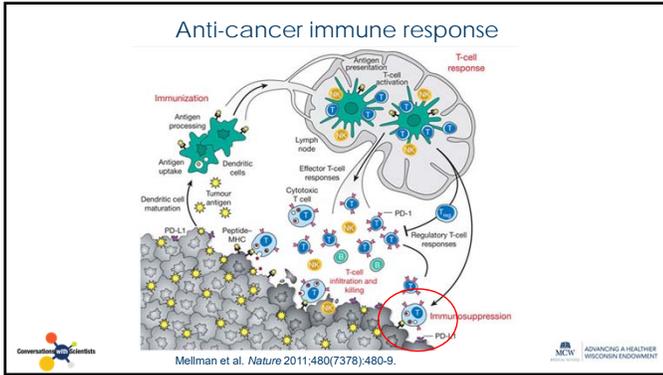
Immunotherapy extends life in...

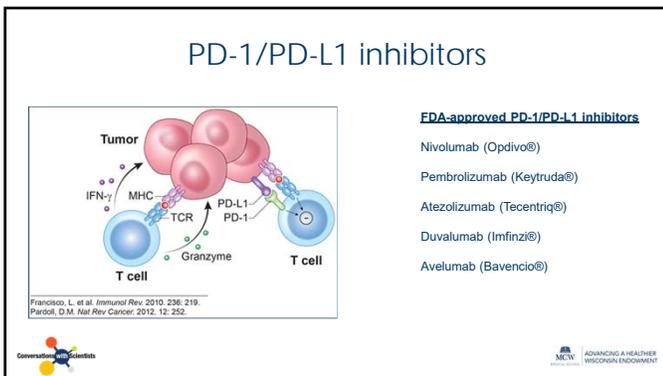
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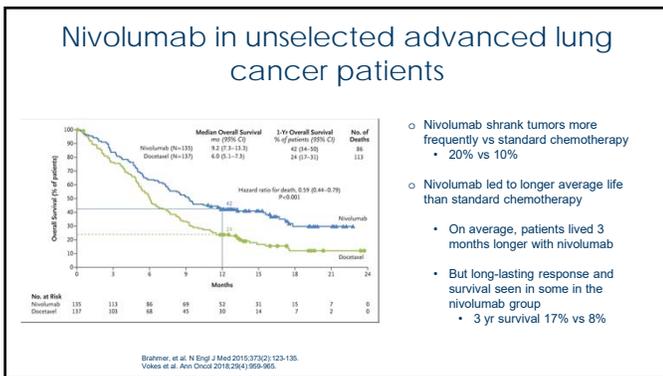


Figure 3. Leading Sites of New Cancer Cases and Deaths - 2016 Estimates



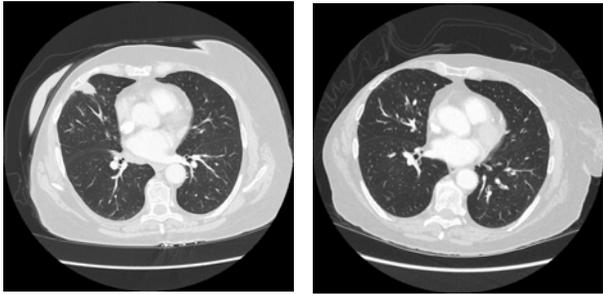






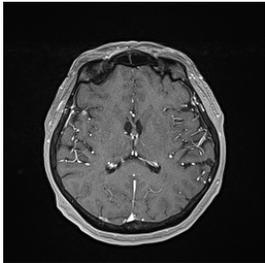
- Nivolumab shrank tumors more frequently vs standard chemotherapy
 - 20% vs 10%
- Nivolumab led to longer average life than standard chemotherapy
 - On average, patients lived 3 months longer with nivolumab
 - But long-lasting response and survival seen in some in the nivolumab group
 - 3 yr survival 17% vs 8%

High PD-L1 example

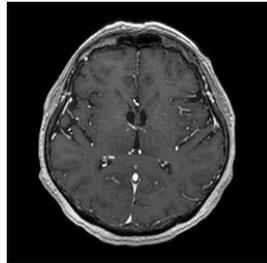


Before pembrolizumab

After pembrolizumab

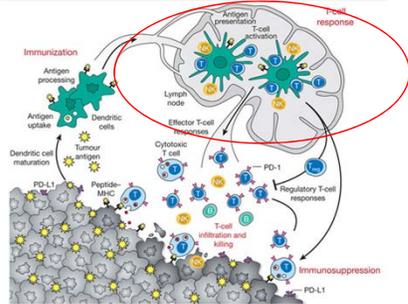


Before pembrolizumab

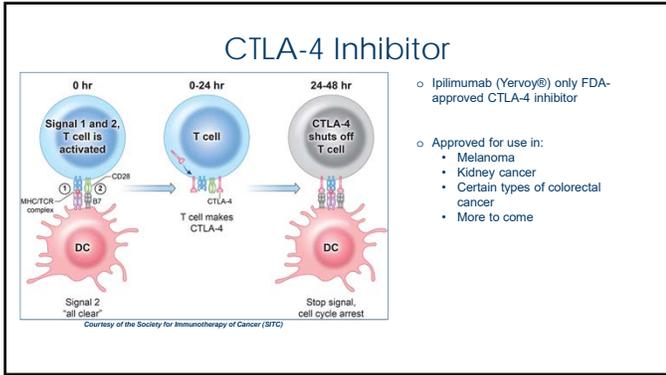


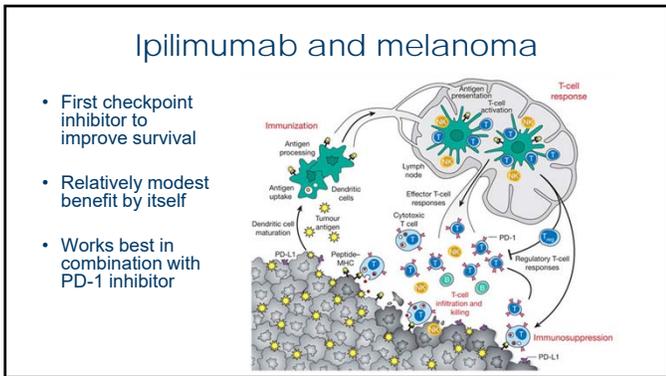
After pembrolizumab

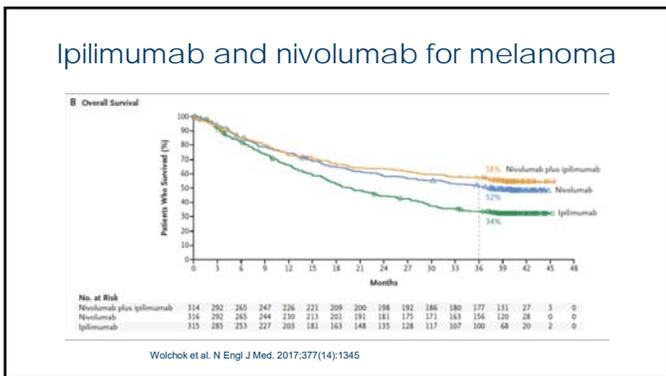
Anti-cancer immune response



Mellman et al. *Nature* 2011;480(7378):480-9.

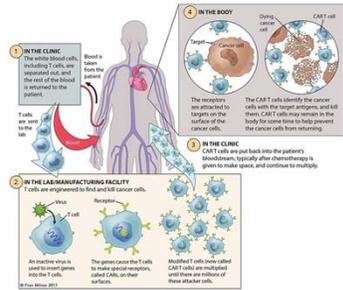






Chimeric Antigen Receptor (CAR) T-cells

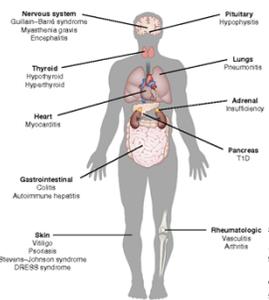
- FDA approved CAR T-cells
 - Tisagenlecleucel (Kymriah®)
 - Axicabtagene ciloleucel (Yescarta®)
 - More in development
- FDA approved for treatment of multiply relapsed/refractory
 - Acute lymphoblastic leukemia (ALL)
 - Large B cell lymphoma (DLBCL)
- Treatment leads to complete remission in many patients
- Remission can be durable
- Requires treatment at an accredited facility due to risk of cytokine release syndrome (CRS)



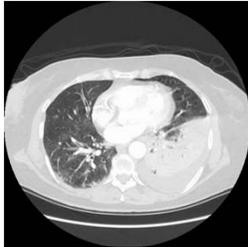
CAR T-cell MCW example



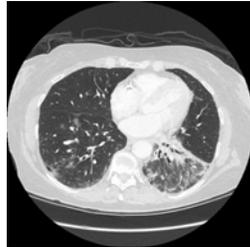
Immunotherapy Side Effects



Immune Related Pneumonitis



After 2 months of pembrolizumab



After corticosteroids

Immunotherapy Future

- Cancer vaccines
 - Introduce non-harmful cancer proteins into the body to activate the immune system
- Combining immunotherapy with chemotherapy and/or radiation
 - Chemo and radiation can activate the immune system
- Drugs that turn on “helpful” immune cells or turn off “harmful” immune cells
- Using the body’s natural bacteria to turn on the immune system

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