

# History of Cancer Treatments

## Traditional forms of treatment:

Up to this point in the history of medicine, the classic ways to treat a cancerous growth involved at least one or several of the following types of procedures.

- a. **Surgery:** simply the removal of the tumor with the help of a surgical team.
- b. **Radiation Treatment:** radiation is a type of cancer treatment that uses high doses of radiation to shrink or eliminate a cancerous growth
- c. **Chemotherapy:** chemotherapy uses powerful drugs to kill the cancerous cells



## CANCER IN THE AGE OF BIOTECHNOLOGY

### **Modern/Non-Traditional forms of treatment:**

- **Immunotherapy:** this type of treatment uses the body's immune system to fight off the cancerous growth or cells. It involves the white blood cells, the organs that produce them and the lymph system.
  - **Immune Checkpoint Inhibitors**
    - This is an immunotherapy that targets inhibitors on our immune cells that regulate the speed at which the immune system reacts to a foreign invader. Imagine the inhibitors work to keep “overreaction” of the system. Their function is to regulate cellular action to remain in a moderate state of action, and not get too over anxious and work too hard. If these inhibitors can be “blocked”, it allows the immune system to work at full speed and aggressively work to remove the cancerous cells.



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Here is a brief description of the process from the MD Anderson Cancer Center at the University of Texas:

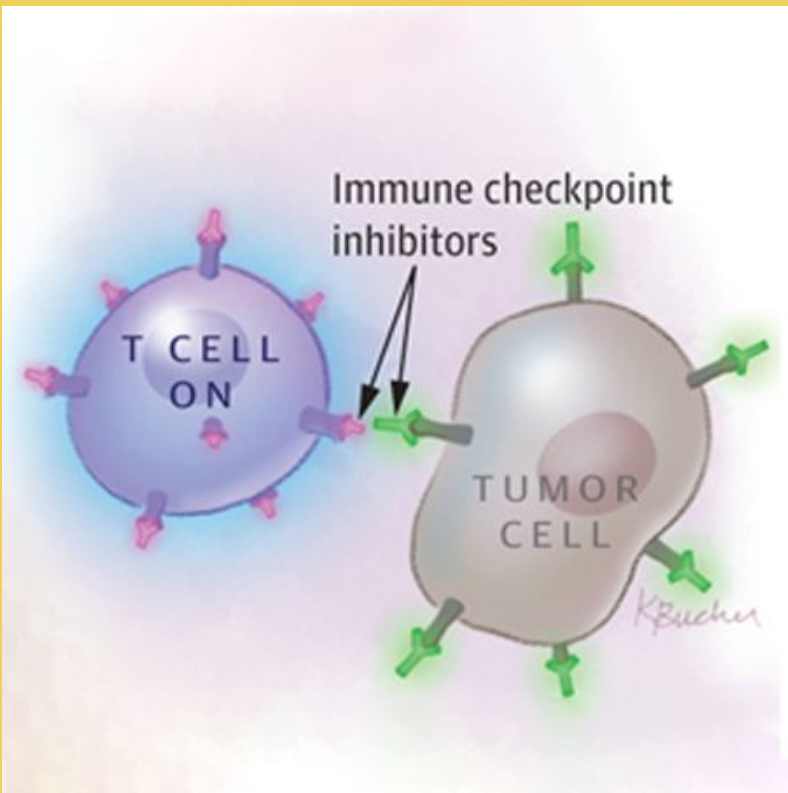
The immune system relies on T cells to fight cancer. These specialized cells are extremely powerful and have the potential to damage healthy cells. T cell activity is controlled through “immune checkpoints,” which can be positive or negative. Positive immune checkpoints help T cells to continue their work, while negative immune checkpoints shut T cells off.

Immune checkpoints were discovered in 1995 by Jim Allison, Ph.D. Allison found that T cells are controlled by a safety mechanism or “brake” – a negative immune checkpoint protein called **CTLA-4**. This checkpoint protein shuts a T cell off to prevent it from accidentally damaging healthy cells. By blocking CTLA-4, Allison allowed T cells to continue working and eliminate cancer in a laboratory setting.

Allison’s work led to the development and approval of the first immune checkpoint inhibitor, **ipilimumab**, which blocks the immune checkpoint protein CTLA-4. Blocking CTLA-4 allows T cells to continue to do their work. Ipilimumab has extended the survival of patients with advanced melanoma.

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### 1) **Monoclonal Antibodies**

These are lab created proteins that are intended to attach to the tumorous cells and act as a “marker” to identify their presence. They allow the white blood cells to find, attach to and eventually remove the cancerous cells or tumor.

### 2) **Immune System Modulators**

These are biochemicals that help boost the effectiveness of our immune system. The modulators can be very specific in their function and target only certain immune cells. Think of them as biochemicals to charge or speed up the response time of the immune system.