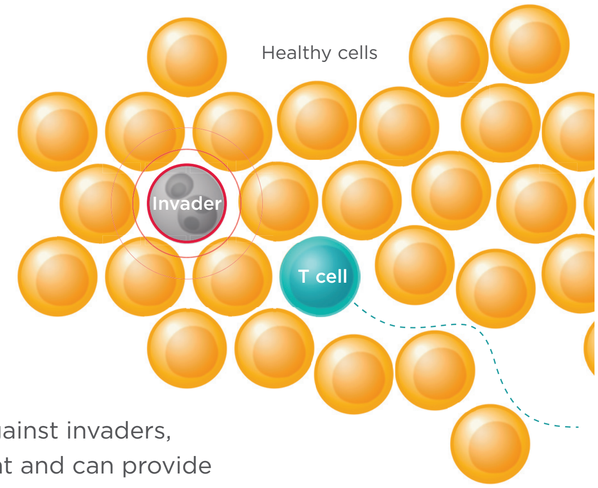
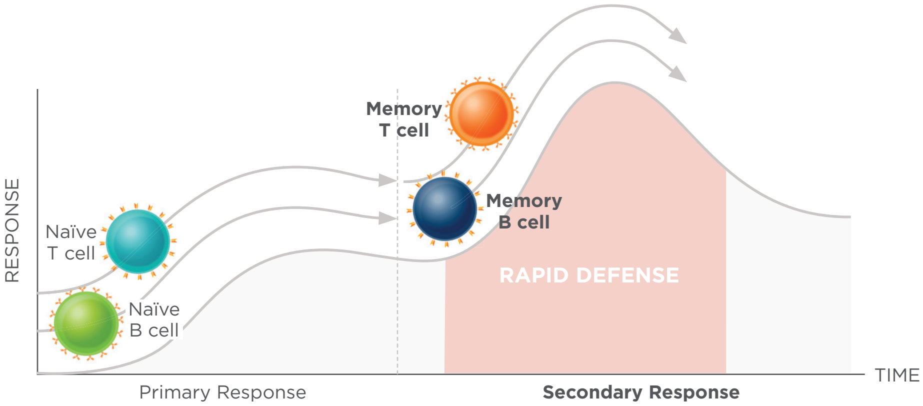
IMMUNOSEQUENCING EXPLAINED



Our body's immune system is astonishingly brilliant. It can recognize and attack cancer cells and harmful foreign invaders while leaving our own normal healthy cells alone.

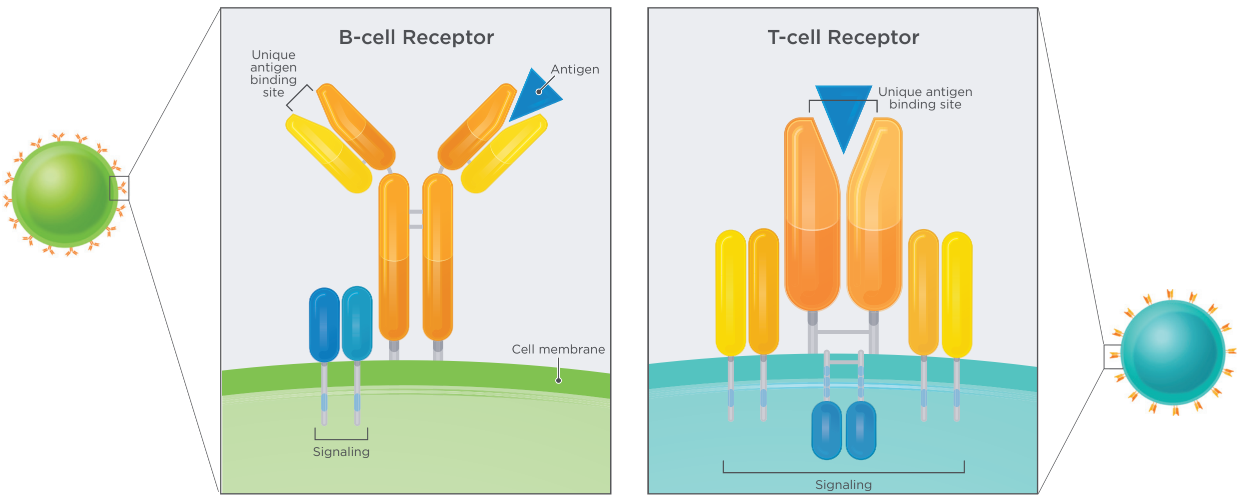
The **innate immune system** provides a rapid, but general first line of defense against invaders, whereas the **adaptive immune system** is highly specific to each individual threat and can provide long-lasting protection.



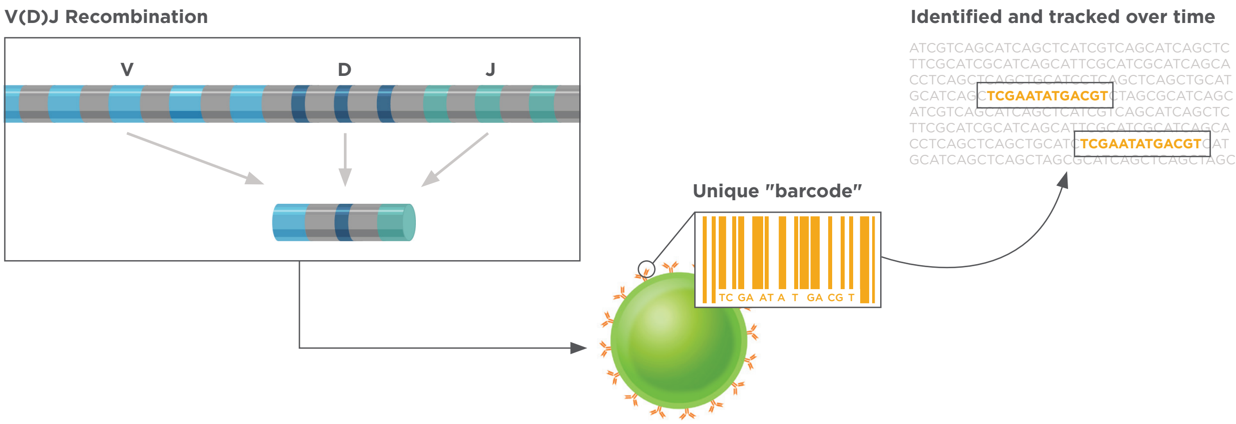
For example, if you are exposed to the measles virus, your adaptive immune system develops memory for this pathogen, and if the measles virus is encountered again, it will mount a rapid response to clear the invader before it can make you sick.

Anything capable of eliciting an adaptive immune response, such as pollen, dust, cancer cells, or an invading virus or bacteria (pathogen), is referred to as an **antigen**. The term comes from the fact that this invader stimulates immune cells to fight the invasion by being an **anti**body **gen**erator. By characterizing the cells in the adaptive immune system, it is possible to understand the antigens to which a person may have been exposed and their responses to treatment.

The keys to our body being able to mount responses against new antigens are the cells that comprise the adaptive immune system: **T cells** and **B cells**. These cells carry receptors on their surfaces that can distinguish self from foreign antigens. Each T and B cell has a unique receptor, which can recognize one or a small number of the millions of foreign substances to which our bodies are continuously exposed.



The diversity of these receptors is made possible by a unique reshuffling of their genetic code known as **V(D)J recombination**. This recombination process only occurs in T and B cells, and it results in each cell having a unique receptor-associated DNA sequence. This unique DNA sequence acts like a barcode and can be used to identify and track individual cells over time. The process of identifying these unique DNA sequences is called **immunosequencing**.

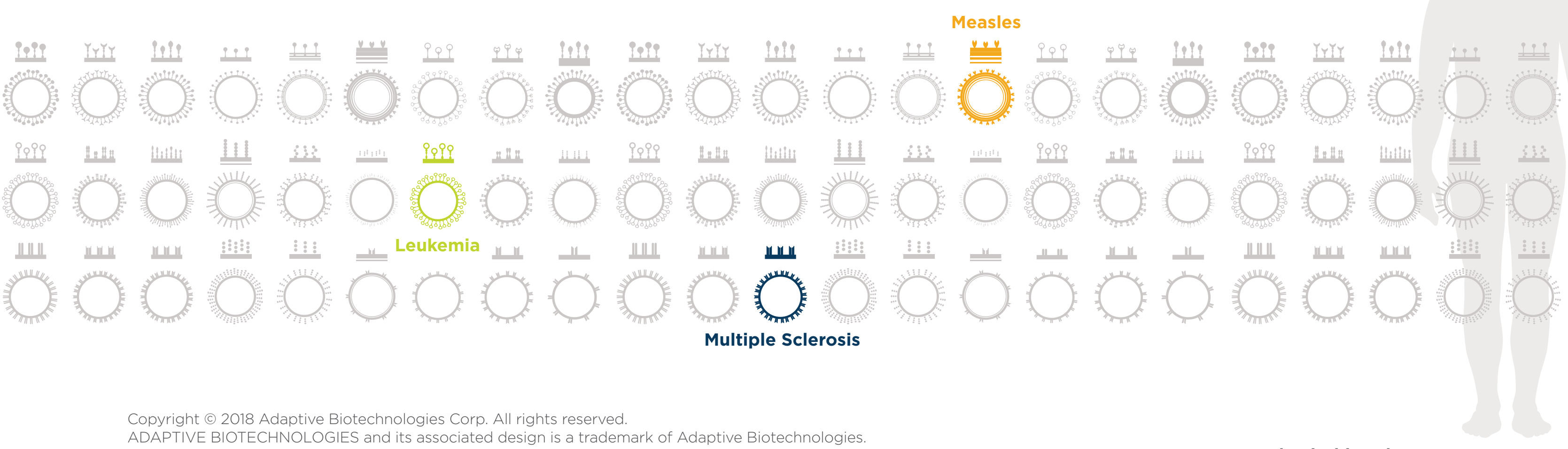


Immunosequencing involves sequencing T- and B-cell receptors at high throughput and allows us to understand the quantity and diversity of the T and B cells in a biologic sample. This can give us great insight into individual and collective immune responses.

POTENTIAL CLINICAL APPLICATIONS OF THIS TECHNOLOGY INCLUDE:

- Discovery of diagnostic and prognostic biomarkers for diseases
- Tracking responses to treatments
- Measurement of disease burden in lymphoid (T cell and B cell) cancers
- Prediction and characterization of responses to therapy

Profiling of the **immune repertoire**, which represents the entire portfolio of T and B cells in the body, can help us to unlock the genetic code of the human body's adaptive immune system to better understand diseases, such as cancer, autoimmune diseases, and infectious diseases. Improving our ability to diagnose and understand these diseases can also lead to improvements in their overall management and treatment.



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