Macrophages are found throughout the body, both in health and in disease. These cells are “big eaters”. They internalise (or eat) bacteria, killing these harmful pathogens, then process and present antigen from them, signalling to other cells to teach them how to respond. Macrophages also eat and remove dead cells and are important in repairing damaged tissues.

Natural Killer cells are part of the innate immune system that can recognise infected and unhealthy cells without antigen presentation from other cells of the immune system. Natural Killer cells can distinguish between healthy cells and cells that are a threat. They use cellular signalling to highlight the danger and kill both virus-infected cells and also tumour cells, that are becoming a cancer, in order to protect the body from danger.

Neutrophils are the emergency response team that arrive quickly at sites of infection or injury. Neutrophils rapidly internalise (or eat) infecting bacteria. They are very effective at killing all the harmful pathogens they internalise and can also kill others by releasing their granule contents. They send messages, signalling danger to other cells and lastly, release sticky nets to catch and kill more bacteria by extracellular trapping.

Eosinophils are important for pathogen killing, particularly in protection against parasite infections, functioning through the release of their varied granule contents and also through cell signalling. Eosinophils also have the ability to stimulate Mast cell activity, which can be protective, but can also promote allergic reactions.

Mast cells release granule contents and signals that help kill pathogens and increase blood flow and inflammation, but they also have a harmful role in allergies. Certain antibodies stick to Mast cells. When two of these bind an allergen they recognise, the Mast cells release their granules full of histamine, and other cell signals, starting an allergic response.

Dendritic cells are important guardians in our bodies. They constantly internalise samples from their surroundings. When they encounter a threat, Dendritic cells become activated and signal to other cells. They sample cells and pathogens, then process and present antigen from these, to teach other cells how to make a specific protective response.

T-helper cells are made with lots of small variations, and become activated when they meet an antigen presenting cell, which is presenting the antigen for which that T cell is the perfect match. The activated T cell then divides to make a clone army that signals to help other cells. The T cells can assist in attack, defence and repair, or in causing allergies, and go on to form a long lasting immune memory to protect the body.

Cytotoxic T cells are made with lots of small variations and become activated when they meet an antigen presenting cell, which is presenting the antigen for which that T cell is the perfect match. The activated T cell then divides to make a clone army that sends signals to other cells. These Cytotoxic T cells become powerful killers; killing pathogens, harmful and infected cells and go on to form a long lasting immune memory to protect the body.

B cells are made with lots of small variations, each perfectly shaped to recognise a different threat. They can internalise and then process the antigen they’ve taken up and present it to a perfectly matched T-helper cell, who then helps to activate the B cell. This B cell divides, making a clone army, producing antibodies to help destroy harmful infections, signalling to other cells and establishing a long lasting immune memory, to fight future infections.