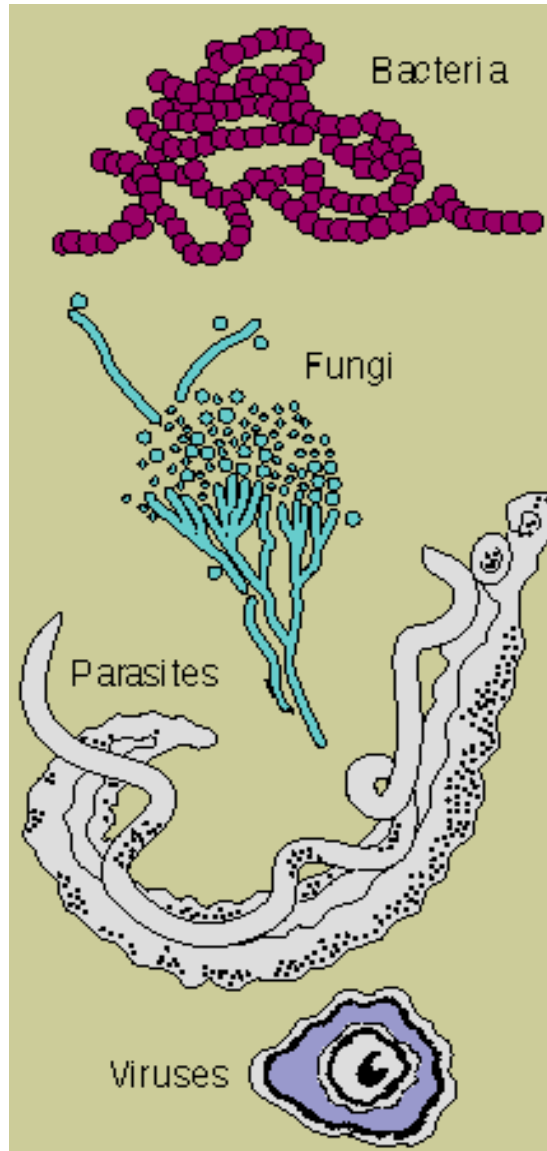


The ageing immune system: Emerging challenges for an ageing population

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What is Immunity?

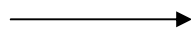


Immunity (derived from *immunitas*: Latin for exemption from civic duties and prosecution) means protection from disease and especially infectious disease.

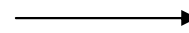
Cells and molecules involved in such protection constitute the **immune system** and the response to introduction of a foreign agent is known as the **immune response**.

Our immune system is important throughout life

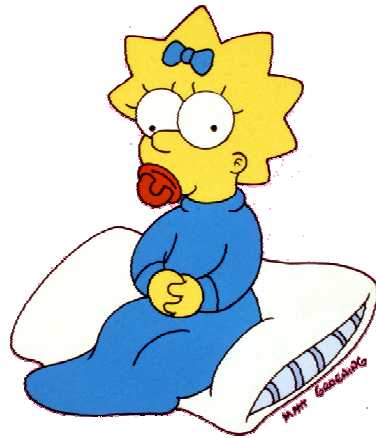
Baby



Child



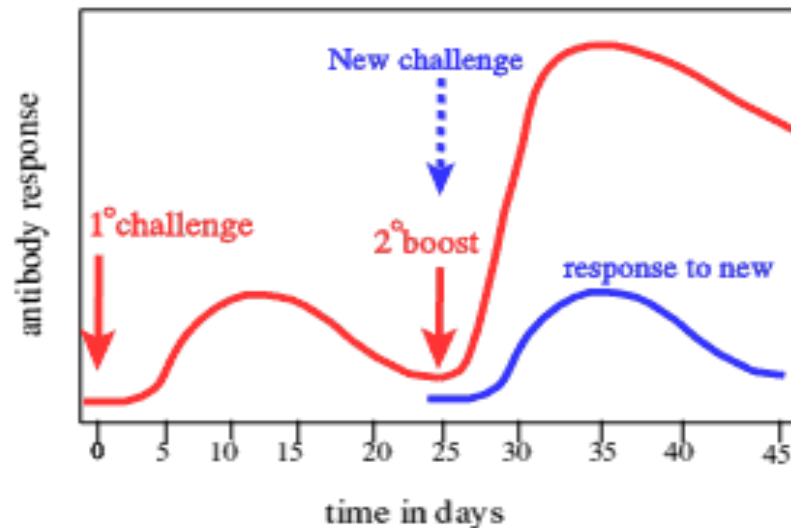
adult



Your immune system is necessary throughout life and the failure to make an immune response, in many cases, is detrimental.

The immune systems provides life-long protection against infectious agents

Specific memory is the hallmark of the adaptive immune response



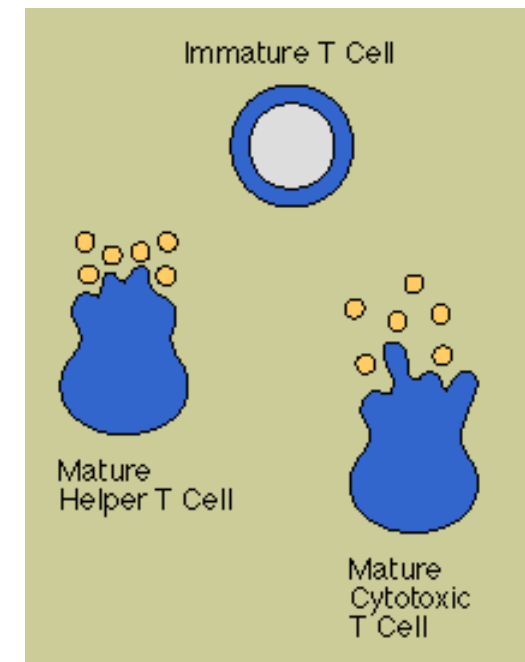
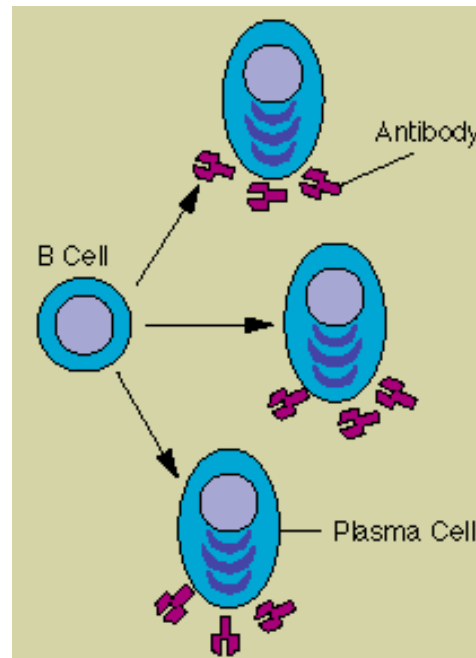
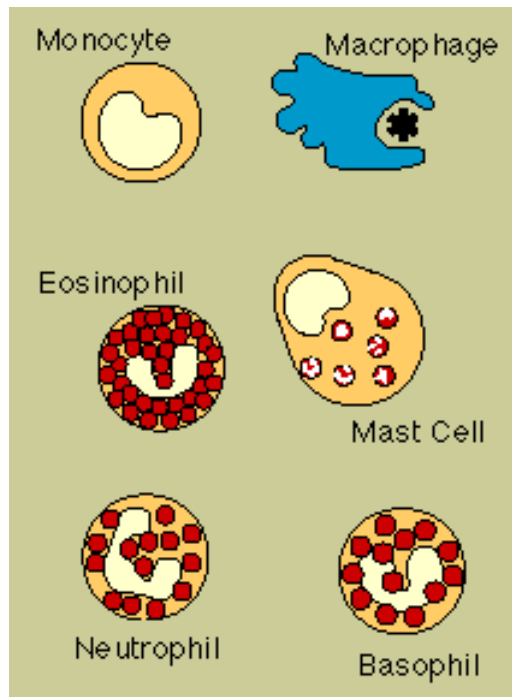
The first encounter with an antigen is known as the **primary response**. Re-encounter with the same antigen causes a **secondary response** that is more rapid and powerful.

Vaccination: The eradication of smallpox

- Highly infectious virus and fatal
- Known to have killed millions of people worldwide
- In 1967 World Health Organisation began a vaccination campaign to remove smallpox from the planet
- This programme, known as the Global Intensified Eradication Programme, was highly successful, and led in 1980 to the WHO declaration of the official eradication of smallpox

Cells of the immune system

The immune system is like the police service/army, their mission is to protect and like the police/army the immune system have many different methods to do this job.



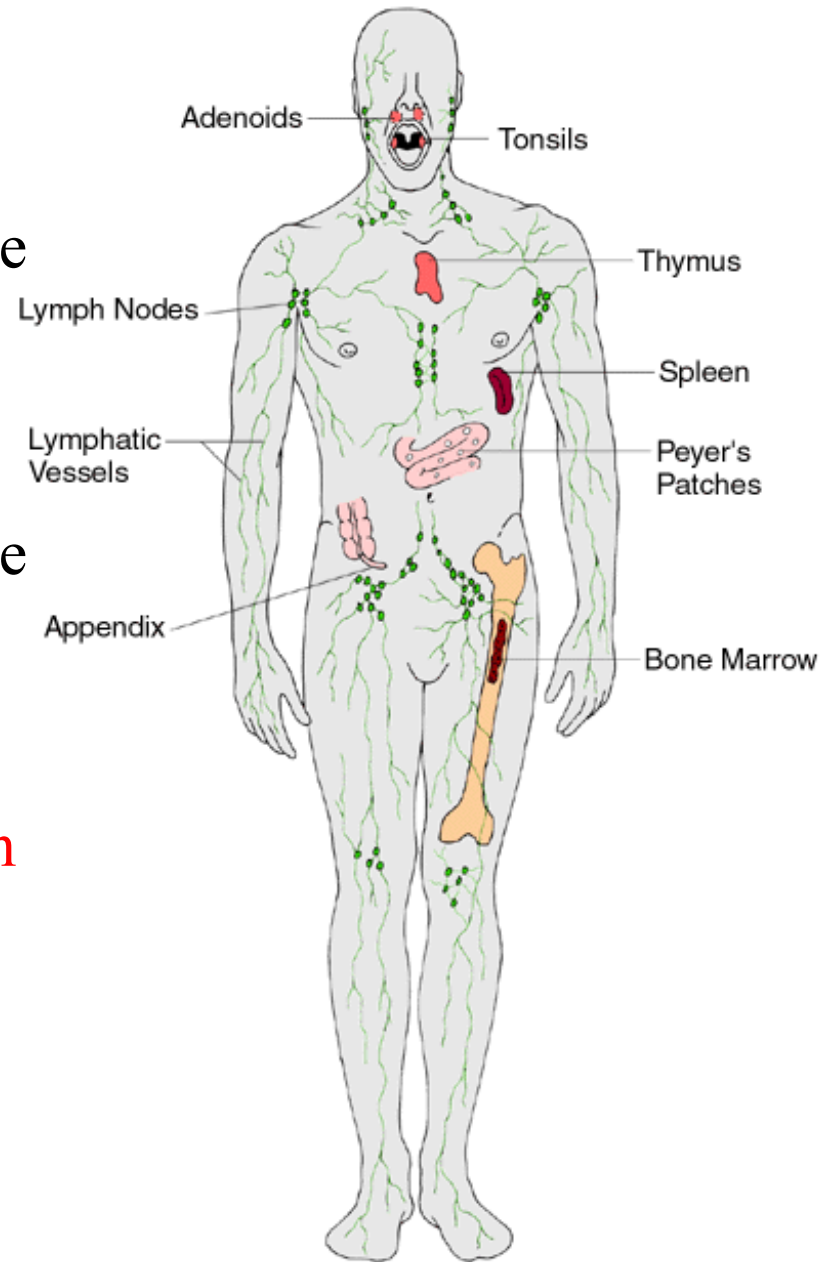
Scavengers-hunt and destroy Antibody- destroy

Killers & Helpers

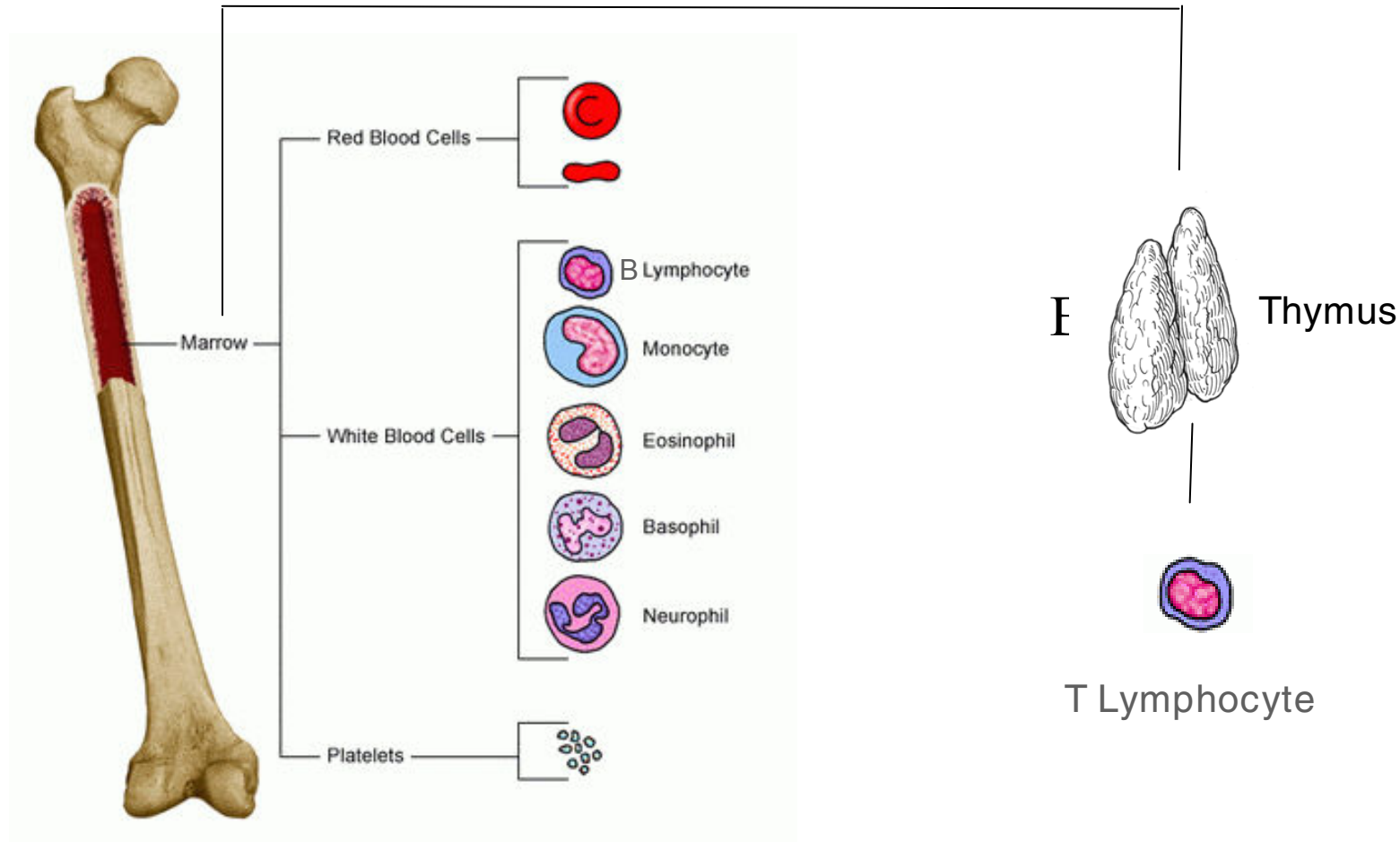
The Immune System

The organs involved with the immune system are called the **lymphoid organs**, which affect growth, development, and the release of white blood cells necessary to remove foreign agents.

- **Lymph nodes:** Lymph nodes contain billions of white cells, multiplying rapidly to fight the invading germs.
- **Bone marrow:** Site where all blood borne cells are produced..



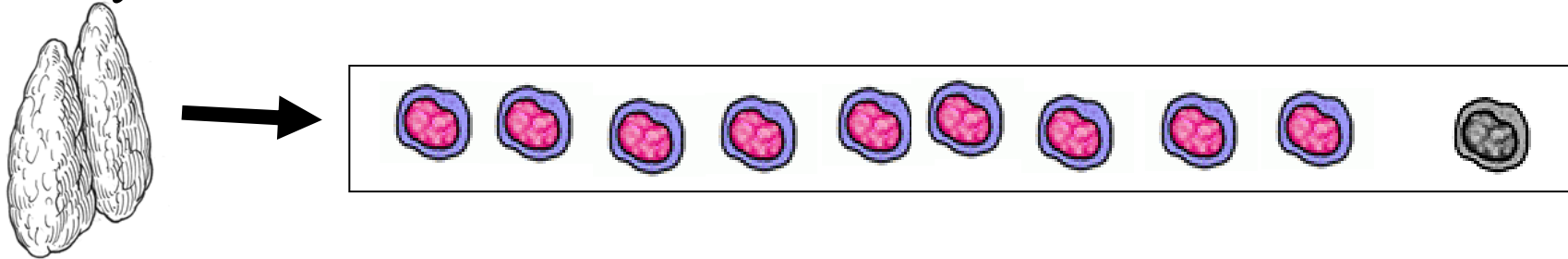
Cells of the immune system



All cells of the immune system is made from stem cells in the **bone marrow** except T cells. T cells are made in the **thymus**.

The changes of the immune system with age

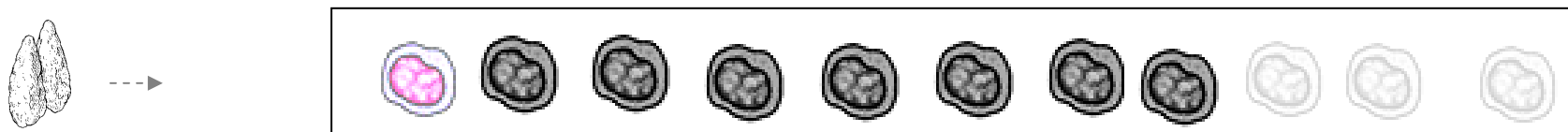
Thymus



Young: High T cell output. T cells are fresh and raring to go (naïve)



Middle age: low/moderate T cell output. Some T cells are still fresh, but many have acquired experience (memory)



Old age: Very little T cell output. Most of the cells have in the body have an 'experience' look, but now present are some 'defective' ones

**Scientists have now identified many
of the age-associated changes in
the immune system:**

IMMUNOSENESCENCE

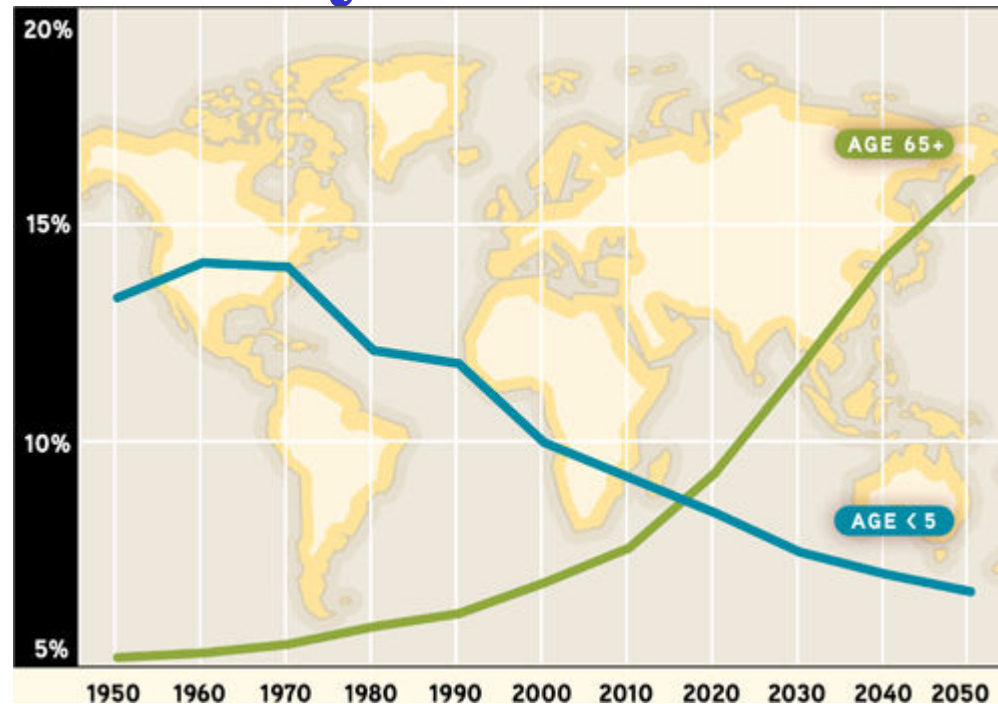
Many of the diseases amongst the elderly are associated with a poor immune system

- Poor response to vaccination
- Reduce ability to fight infections
- Increase in inflammatory diseases- arthritis, diabetes, autoimmunity

HEALTH PROBLEMS, BY AGE: 2002 (Percent ever having)

	55-64	65-74	75-84	85+
Hypertension	44.9	55	61.1	59.7
Diabetes	15	18.9	18.7	12.1
Cancer	8.9	14.9	19.4	20.3
Lung	8	11.2	11.2	10
Heart	15.5	25.1	36.5	42.6
Arthritis	49.3	63.7	67.6	72.1
Stroke	3.8	5.8	9.9	15
Psychiatric/Emotional	17	13.4	13.7	13

Why be concern?



TREND: AN AGING POPULATION

Since the beginning of recorded human history, young children have outnumbered older people. Very soon this will change. For the first time in history, people age 65 and over will outnumber children under age 5. This trend is emerging around the globe. Today almost 500 million people are age 65 and over, accounting for 8 percent of the world's population.

The government as identified that one of the biggest threats are infectious diseases

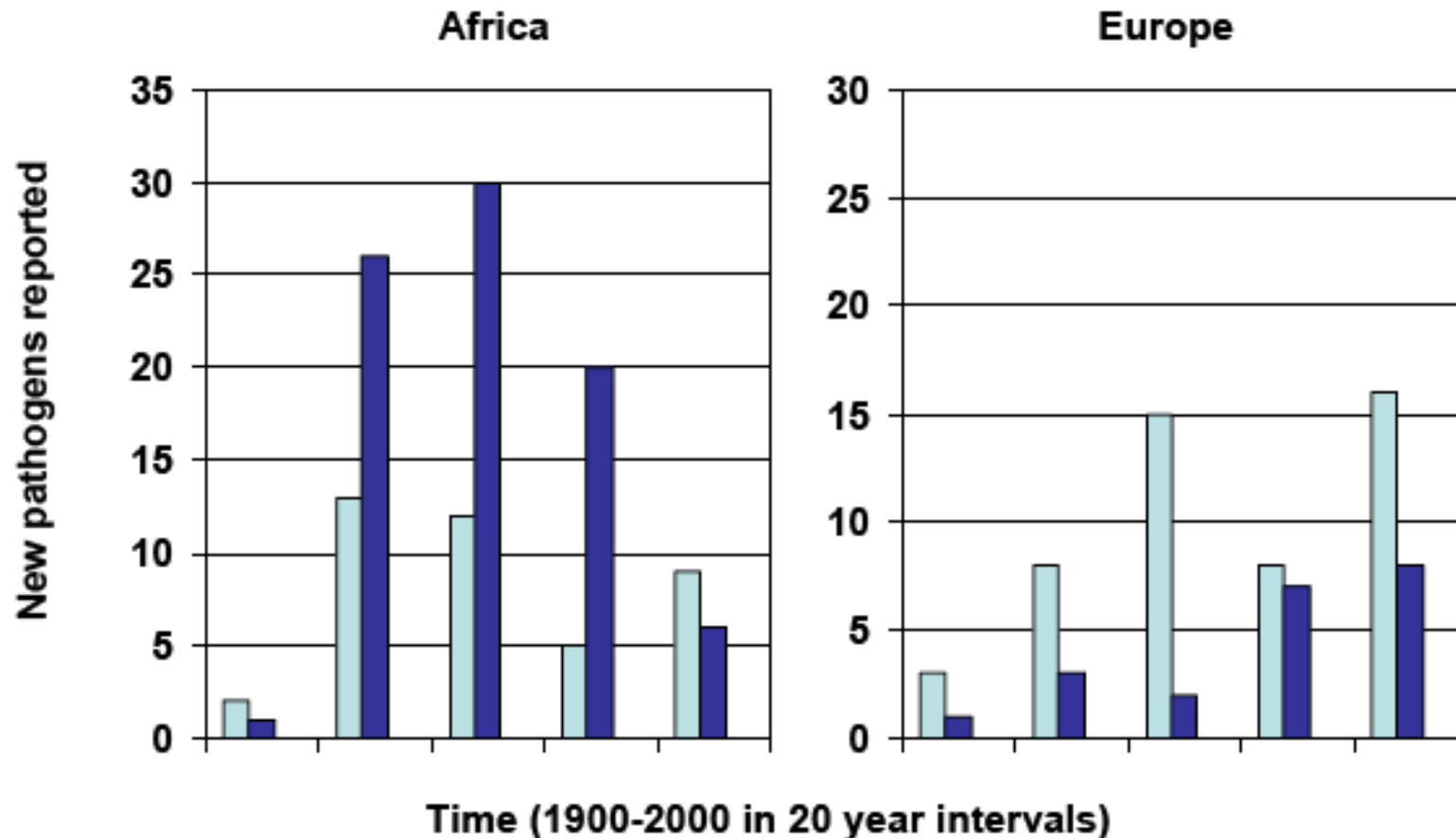
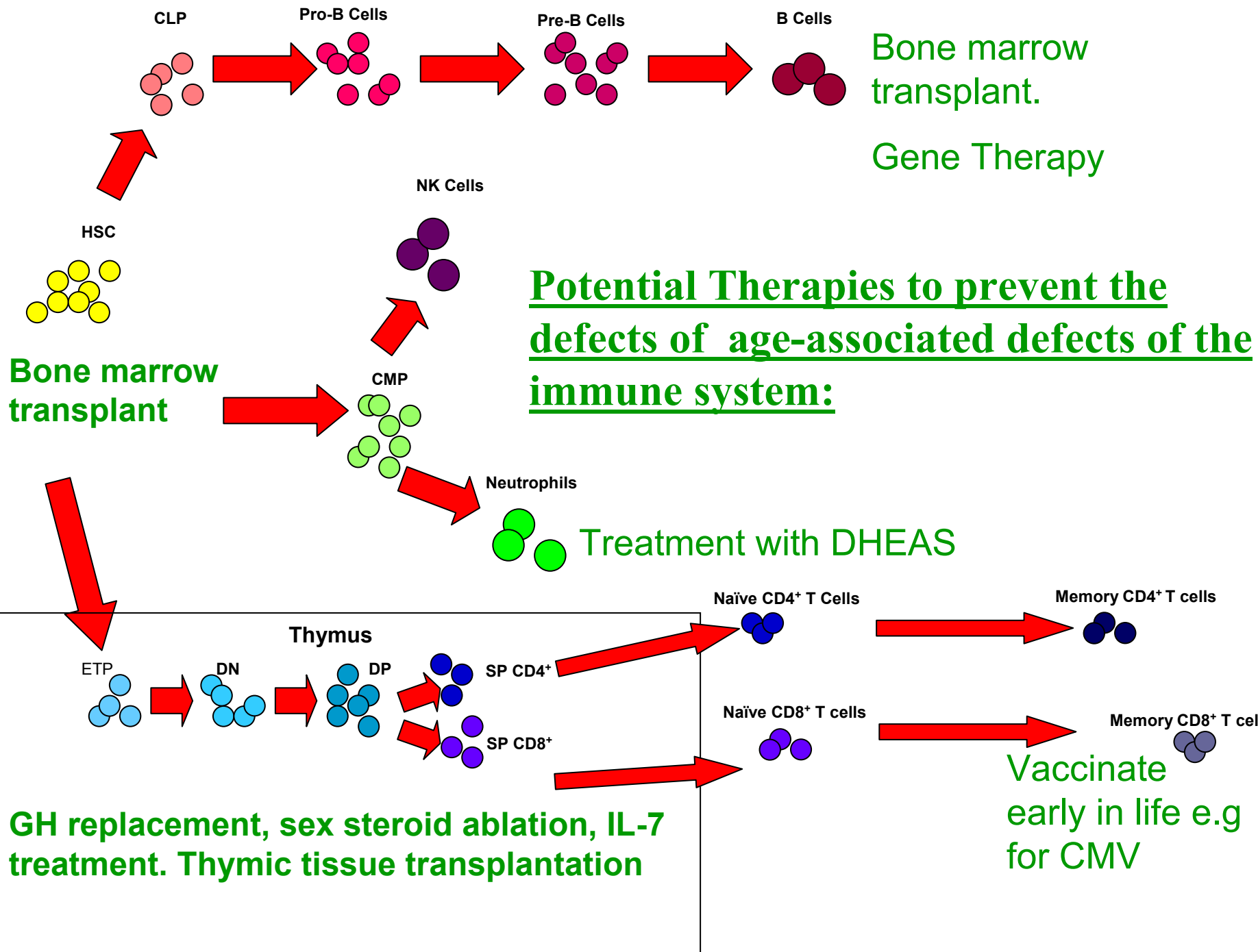


Figure 4. New disease reports from likely New World (light) and Old World (dark) regions of origins, for sub-Saharan Africa and Europe.



Summary

- Immune system vital for living
- Immune function decrease with age
- Scientist have are beginning to understand why this happens
- Major impact on society

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