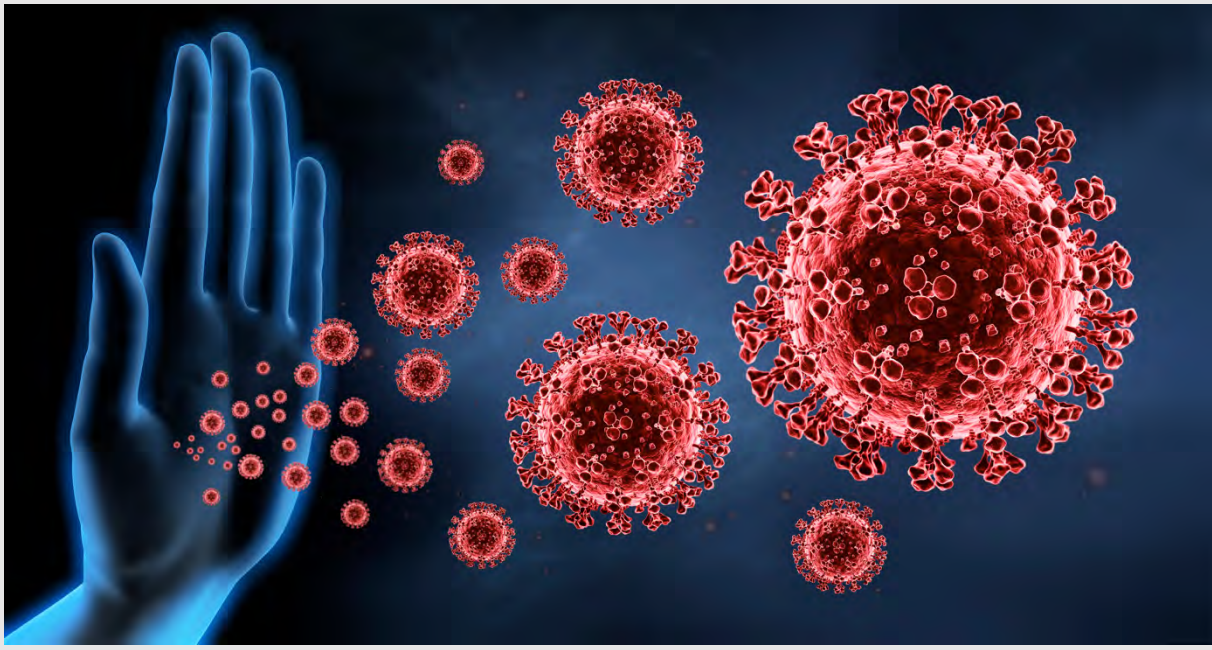
The Scientific Osteopathic Approach To The Immune System



Luc Peeters, MSc.Ost.

The same author also published books on:

- Cranial Nerve Disorders and the Scientific Osteopathic Approach
- Fascial Chains
- Nutrition and Physical Complaints
- Posturology and its Scientific Osteopathic Approach
- Scientific Osteopathic Approach to Patients with Abdominal Complaints
- Scientific Osteopathic Approach to Patients with Cervical Pain
- Scientific Osteopathic Approach to Patients with Headache
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- Scientific Osteopathic Approach to Patients with Shoulder, Elbow, Wrist or Hand Pain
- Scientific Osteopathic Approach to the Immune System
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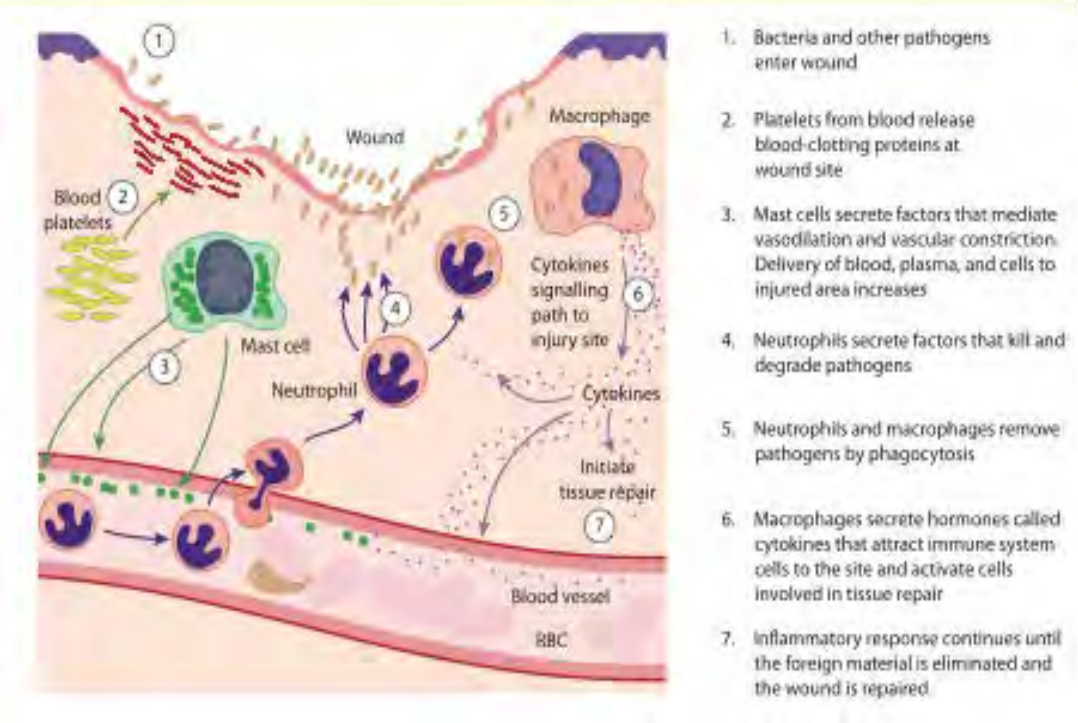

Figure 2 - The inflammatory response

The human immune system is the body's defense to disease-causing organisms and infectious agents against malfunctioning cells or abnormal cells such as cancer cells and against foreign cells or particles.

Basic immunity depends on the ability of the immune system to distinguish between self (not foreign) and non-self (foreign or antigens) molecules.

This important role can be strong or weak, depending on several causes. It can even turn against the body and provoke autoimmune reactions in which immune system components start seeing normal cells as enemies.

It is our immune system that keeps us healthy or not.

Everybody's immune system is different (constitution, genetic, mother's health, type of birth) with birth and it becomes stronger during adulthood because the exposition to more pathogens develops more immunity.

Therefore, teens and adults tend to get sick less than children.

Figure 3 - Different immune levels

Once an antigen has been produced, a copy remains in the body (sort of memory) so that when the same antigen appears, it can be dealt with faster and stronger.

General characteristic of immunity:

- Recognition of self versus non-self.
- Specific response.
- Memory allowing an accelerated second response.
- Can respond to many different invaders.
- Involves lymphocytes and antibodies.

We can differentiate three types of immunity:

- **Innate (non-specific) immunity:** we are all born with a certain level of immunity to invaders. Components of innate immunity include skin, stomach acid, enzymes found in tears and skin oils, mucus, lung lining and the cough reflex. There are also chemical components of innate immunity, including substances called interferon (glycoproteins, part of the cytokines) and interleukin-1 (group of cytokines). Innate immunity is never specific. The innate immune system directs the subsequent development of the adaptive immune responses. Innate immunity depends on recognition of conserved molecular patterns found in many microorganisms. Anti-microbial peptides are important effectors of innate immunity. Phagocytic cells and several types of innate-like lymphocytes are key cell types in mediating innate immunity. Some defects in the innate immune system are associated with a predisposition to infection or to autoimmune disease.
  Innate immunity can also be divided in:
  - **Species immunity:** seen in all members of the same species: F.E. birds are immune to tetanus.
  - **Racial immunity:** various races are immune against different infectious disease.
  - **Individual immunity:** very specific for every individual despite same race and exposure.
- **Adaptive or acquired immunity:** develops during life with exposition to different pathogens or vaccinations. Exposure to a disease organism triggers the immune system to produce antibodies to that disease. Exposure to the disease organism can occur through infection with the actual disease (resulting in natural immunity), or by introduction of a killed or weakened form of the disease organism through vaccination (vaccine-induced immunity). Either way, if an immune person comes into contact with that disease in the future, their immune system will recognize it and immediately produce the antibodies needed to fight it. Vaccines are safe. They are tested extensively, and their quality, effectiveness and safety are watched over by governmental bodies. Mild side-effects are always possible, such as low-grade fever, pain or redness at the injection site. These possible side-effects are rare and don't take long. They disappear by themselves. To find all possible side-effects: visit: WHO: https://www.who.int/vaccine_safety/initiative/tech_support/Part-2.pdf
- **Passive immunity:** is borrowed from another source but this doesn't last for very long. F.E.: baby receive antibodies from the mother through the placenta before birth and in breast milk following birth. The protection coming through the placenta (IgG) only stays for a short while after birth. The protection coming from the breast milk (and colostrum which is very rich in antibodies) (IgA & IgG) can last longer (4 to 6 months).

Innate immune system	Adaptive immune system
Non-specific response	Pathogen and antigen specific response
Exposure = immediate response	Exposure = some time before max. response
Cell mediated and humoral components	Cell mediated and humoral components
No immunological memory (is discussed)	Immunological memory after exposure
Present is all forms of life	Only in vertebrates (is discussed)

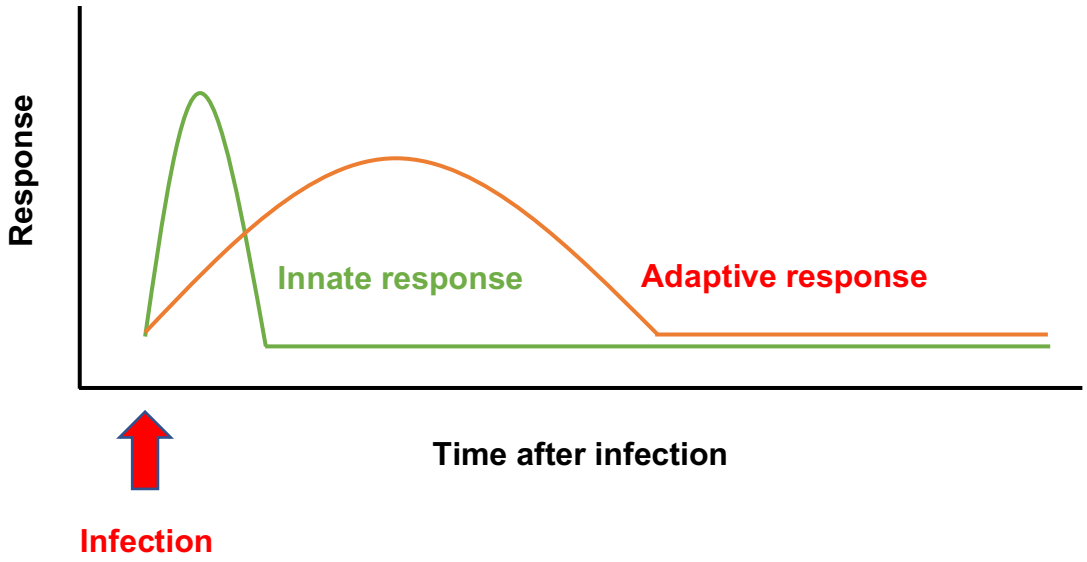

Figure 4 - Immune response timing

Cytokines:

Cytokines are low molecular weight proteins that mediate and regulate immune responses. They play a similar role as hormones. Where hormones usually act as communicators at distance, cytokines mostly act locally. Cytokines initiate the synthesis of new proteins.

They can activate many cells in different ways (this is called pleiotropism) and different cytokines may have the same effect.

A variety of cells can make cytokines, often leucocytes.

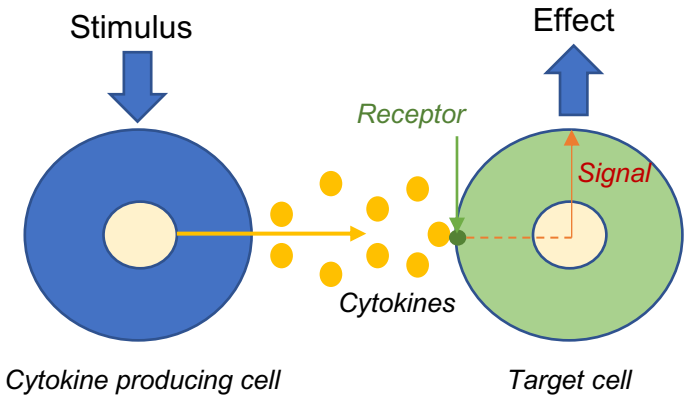

Figure 5 - Cytokine action

Cytokine storm (or cytokine release syndrome):

It is a life-threatening immune response in which the cytokines signal to make abnormally large number of antibodies to fight an infection. Medical conditions like acute pancreatitis are typically marked by cytokine storm. Such a cytokine storm can be deadly.

Symptoms include fever, fatigue, loss of appetite, muscle and joint pain, nausea, vomiting, diarrhea, rashes, fast breathing, rapid heartbeat, low blood pressure, seizures, headache, confusion, delirium, hallucinations, tremor, and loss of coordination.

The cause is that the immune system overreacts. It can also be caused by certain medication (F.E. cancer medication).

The affection is graded from 1 to 5, 1 is having mild symptoms and 5 is death.

Vaccines:

There are 7 different types of vaccines:

1. **Live, attenuated vaccines:** a version of living microbes that has been weakened. Examples are vaccines for measles, mumps, chickenpox, tuberculosis, rotavirus, yellow fever.
2. **Inactivated vaccines:** disease causing microbes are killed chemically, by heat or by radiation. They are more stable. Examples: vaccines against influenza, polio, hepatitis A and rabies.
3. **Subunit vaccines:** antigens that best stimulate the immune system are injected. Examples: vaccines against plague, hepatitis B, pneumococcal.

4. **Toxoid vaccines:** for bacteria that secrete toxins. Inactivated toxins are injected. Examples: vaccines against rattle snake bites, tetanus, diphtheria.
5. **Conjugate vaccines:** for bacteria that possess an outer coating of sugar molecules. Polysaccharide coating disguises a bacterium's antigen so that the immature immune system of young children can't recognize or respond to them. Example: vaccine against Hemophilus influenza type B.
6. **DNA vaccines:** are still in the experimental stage. They work with the genetic material of the microbe.
7. **Recombinant vaccines:** these are also experimental vector vaccines (vector refers to the carrier (virus or bacteria)).
8. **Saporins:** are vaccine adjuvants. These substances are added to the vaccine to increase the body's immune response to the vaccine.

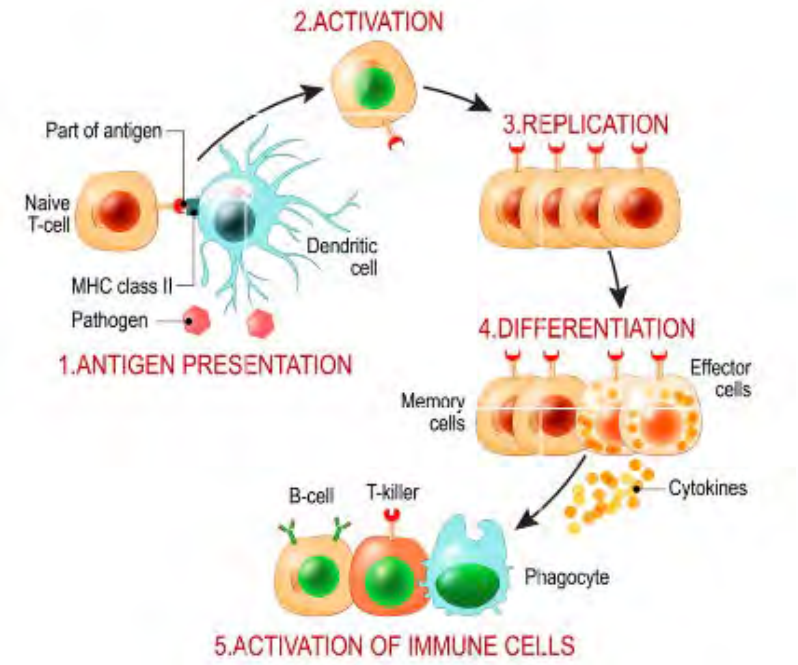

Figure 6 - Adaptive immune system

Immunization means that antigens are introduced in a weak form so that the person doesn't get sick but still produces antibodies. There is passive immunization (maternal, vaccination) and active immunization (contact with bacteria, viruses…).

WHO-citation: 'immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations. It has clearly defined target groups; it can be delivered effectively through outreach activities; and vaccination does not require any major lifestyle change.'

General procedure in fighting infection:

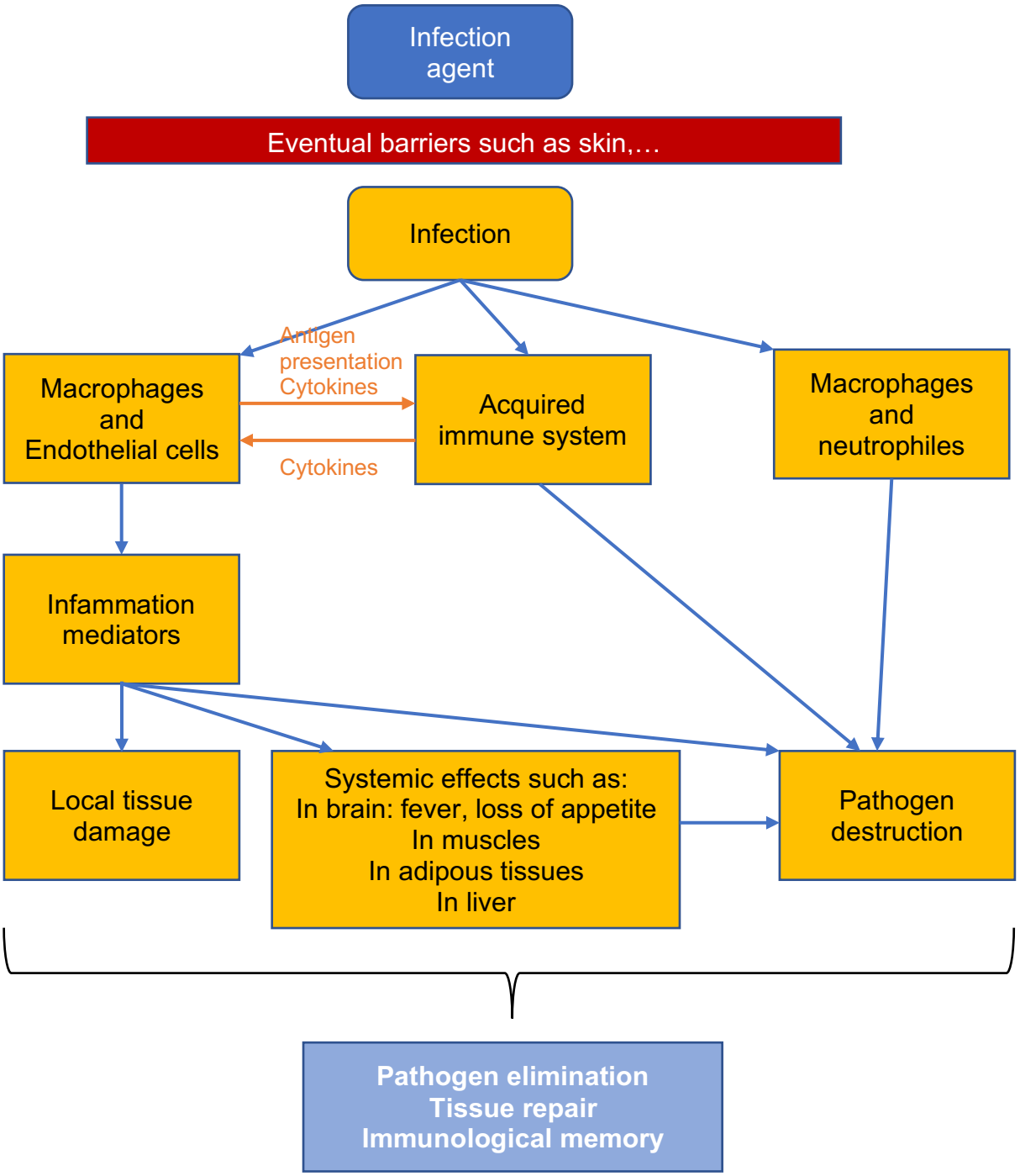

Figure 8 - General procedure in fighting infection

2. Location of the Immune System

All immune cells in the body come from precursors in the bone marrow. They develop into mature cells through a series of changes, occurring in different body parts.

Locations of immune cells (also called white blood cells)

Bone marrow:

- Contains stem cells that can develop into a variety of cell types.
- The variety of cell types (innate immune cells):
    - Neutrophils.
    - Eosinophils.
    - Basophils.
    - Mast cells.
    - Monocytes.
    - Dendritic cells.
    - Macrophages.
    - They are important first-line responders to infection.
    - Common lymphoid progenitor stem cells (early descendants of stem cells that can differentiate to form one or more kinds of cells, but cannot divide and reproduce indefinitely) develop into a variety of adaptive immune cells:
        - B cells (responsible for mounting responses to specific microbes based on previous encounters (immunological memory)).
        - T cells (responsible for mounting responses to specific microbes based on previous encounters (immunological memory)).
        - Natural Killer cells (NK) (provide immediate defenses like innate cells but also may be retained as memory cells like adaptive cells).
        - These cells (B, T, NK) are called lymphocytes.

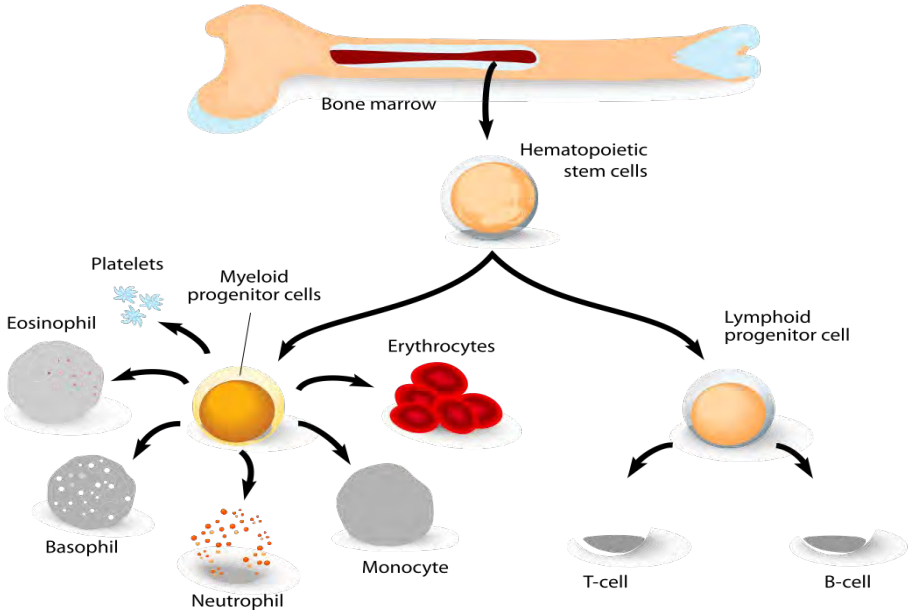

Figure 9 - Bone marrow

Skin:

- This is the first line of defense.
- It is a mechanical defense barrier as well as a chemical barrier.
- Produces and secretes antimicrobial proteins and macrophages.
- Immune cells are found in the different layers of the skin (epidermis, stratum basal, stratum spinosum, stratum granulosum, stratum lucidum, stratum corneum, dermis, papillary layer, reticular layer, hypodermis).

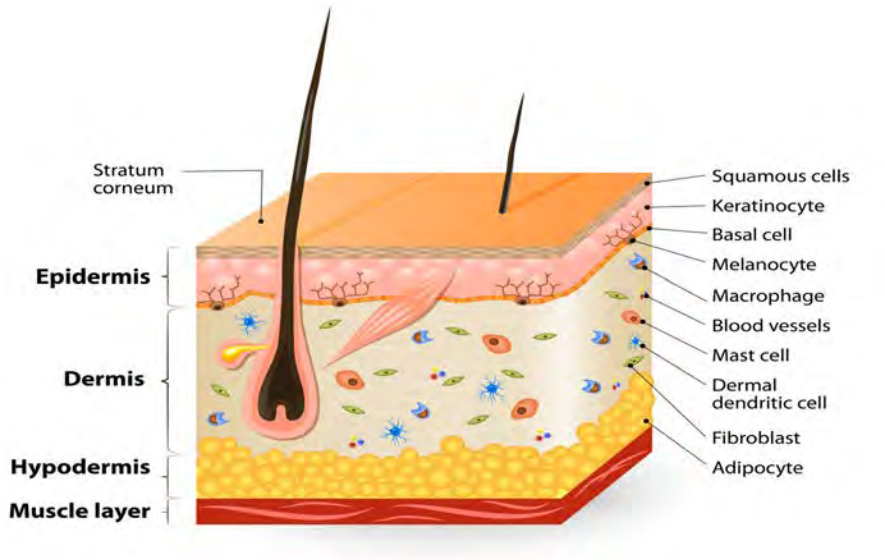

Figure 10 - Skin

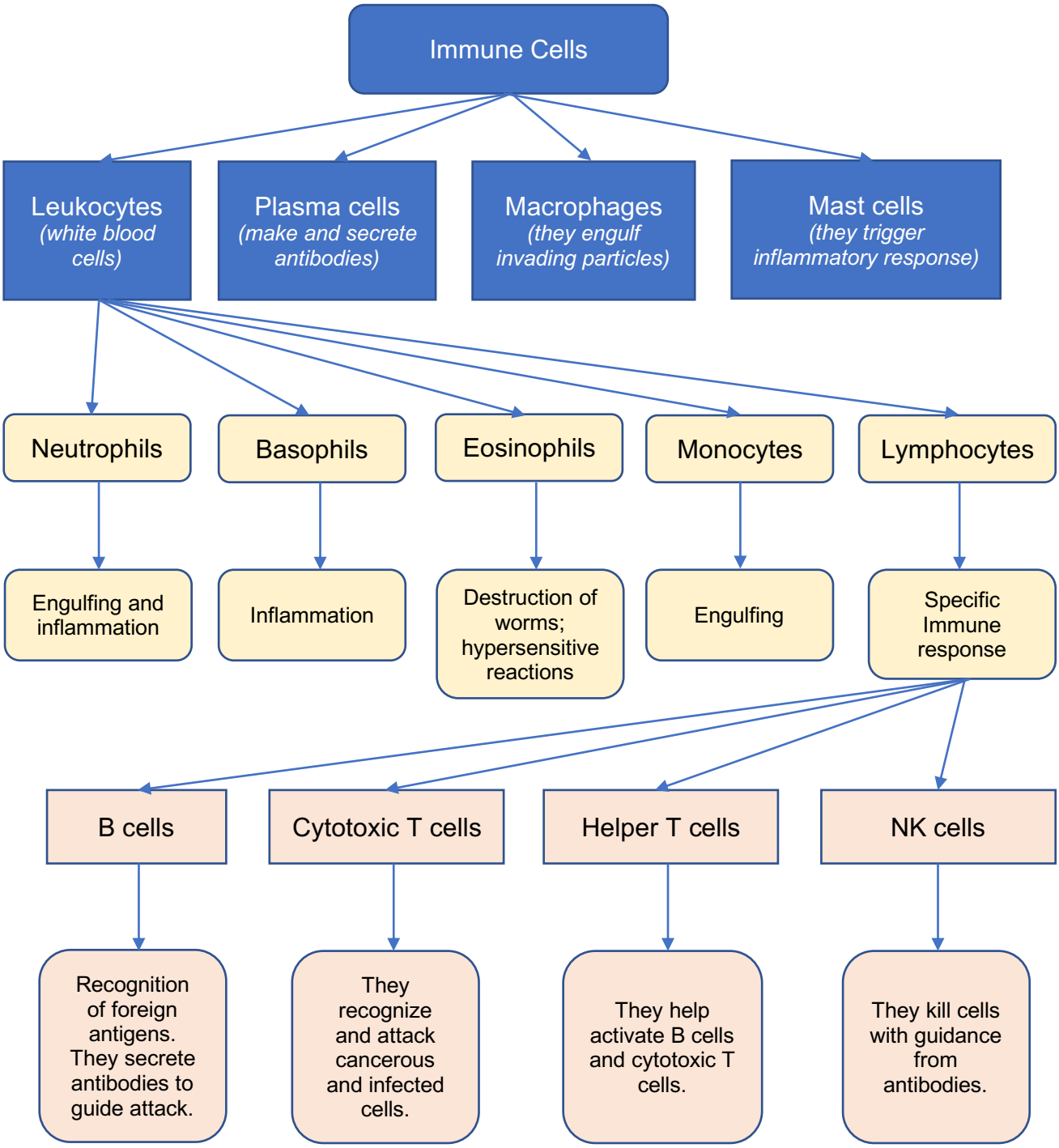

Figure 16 - Different immune cells

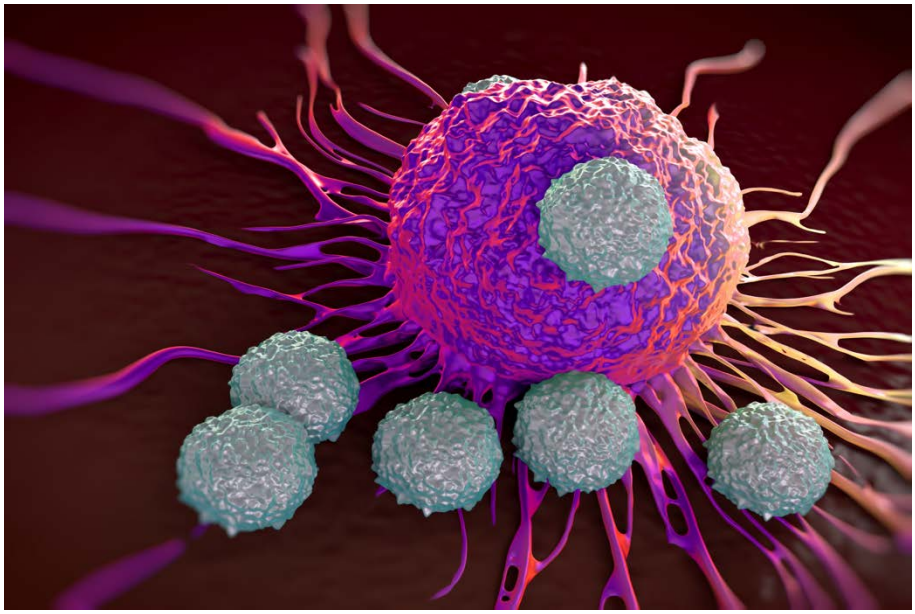

Figure 17 - T-cells attack cancer cells (microscopic photo)

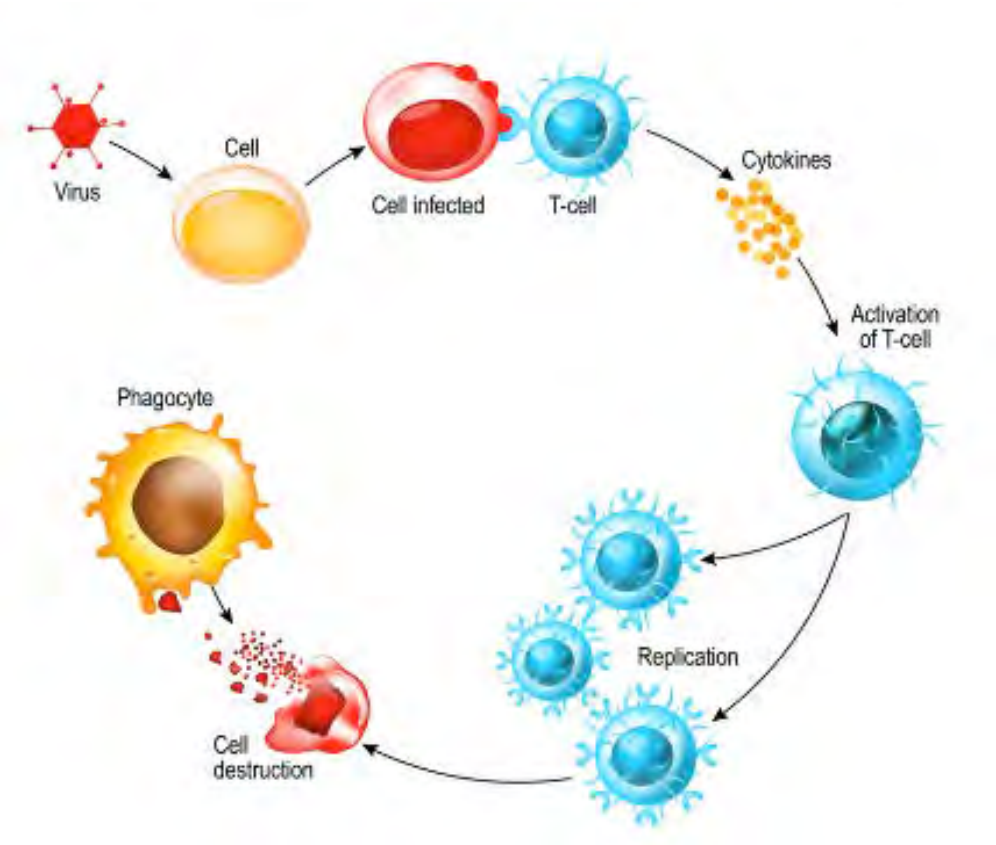

Figure 18 - T Cell activation

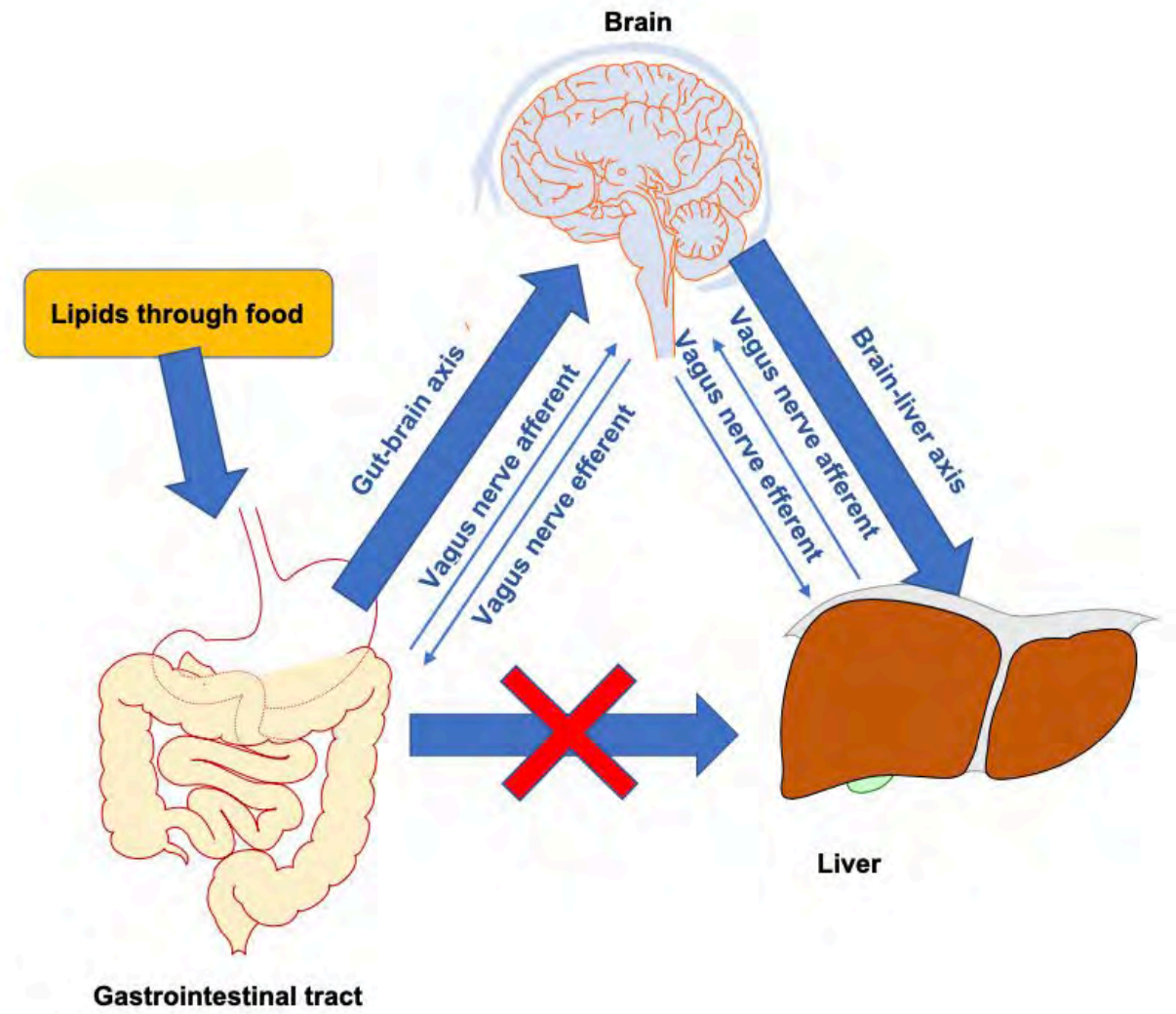

Figure 22 - The gut-brain-liver axis: the glucose production in the liver is modulated by upper intestine lipid absorption through the gut-brain-liver axis, not by the gut-liver direct interplay.

Gut-lung axis:

The lungs are not sterile or free from bacteria. They harbor a distinct microbiome whose composition is driven by different ecological rules than for the gastrointestinal tract.

The gut-lung axis can be causing respiratory disease, where the gut microbiota influences both asthma, Chronic Obstructive Pulmonary Disease - COPD, pneumonia and even the development of cancer.

The prevalence of respiratory disease is higher in persons with diabetes especially type 1.

This condition of chronic inflammation can even be worse when there are other conditions such as cancer, autoimmune disease, degenerative disease or other factors that diminish the ability to fight inflammation.

3.3. The Lungs

Pulmonary immunity includes physical barriers including the mucocilary escalator, alveolar epithelium and capillary endothelium.

The innate immune system in the lungs includes lung leukocytes and also epithelial cells lining the alveolar surface and the conducting airways.

The innate immune system drives adaptive immunity in the lungs and has important interactions with other systems, including apoptosis (programmed cell death) pathways and signaling pathways induced by mechanical stretch.

Human diversity in innate immune responses could explain some of the variability seen in the responses of patients to bacterial, fungal, and viral infections in the lungs.

The lungs capture many airborne foreign particles daily.

The autoimmune cells in the lungs have to decide whether to act or not.

Large particles are deposited in the nasopharynx and tonsillar regions and cleared by inertial forces (coughing and sneezing).

Deeper in the respiratory tract, foreign particles are captured on the mucociliary surface and propelled back to the upper airways from where they are expelled.

Different antimicrobial compounds also exist within this mucous layers.

In the alveoli (here we see the most gaseous exchange), there are little immune cells and they are mostly macrophages.

The macrophages in the alveoli secrete a plethora of anti-microbials including oxygen metabolites**,** lysozyme**,** antimicrobial peptides and proteases**.**

They also phagocytose and kill microbes.

Alveolar macrophages are important for the recruitment of other immune cells when the threat is great by secretion of cytokines.

They can also process and present antigens to helper and cytotoxic T cells.

The epithelium in the lungs represents a physical barrier to the external environment acting as the first line of defense against potentially harmful environmental stimuli including microbes and allergens.

Also, lung epithelial cells are recognized as active effectors of microbial defense, contributing to both innate and adaptive immune function in the lower respiratory tract.

The interaction between the microbiota in the lungs and the airway epithelium is key to understand how stable immune homeostasis is maintained in the lungs. Loss of epithelial integrity following exposure to infection can result in the onset of inflammation in susceptible individuals and may culminate in lung disease.

The immune cells in the lungs have a memory of their prior experiences and that memory influences how they will respond to any subsequent challenges like later infections.

Gut-lung axis

Although it concerns two different systems, there are ways of communication between gut and lungs.

The gut-lung axis can shape immune responses and interfere with the course of respiratory diseases.

The gut-lung axis results from complex interactions between the different microbial components of both the gut and lung microbiotas combined with local and long-reaching immune effects. All these interactions strongly suggest a major role for the gut-lung axis in respiratory diseases.

The perturbation in microbial composition and function (dysbiosis), disrupts tissue and immune homeostasis and is associated with diverse inflammatory diseases within as well as outside the gastrointestinal tract. For example, disruption of gut-lung cross-talk is linked to increased susceptibility to airway diseases and infections, including allergies.

The importance of the gut–lung axis is exemplified in patients with chronic gastrointestinal diseases, such as irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD), who have a higher prevalence of pulmonary diseases.

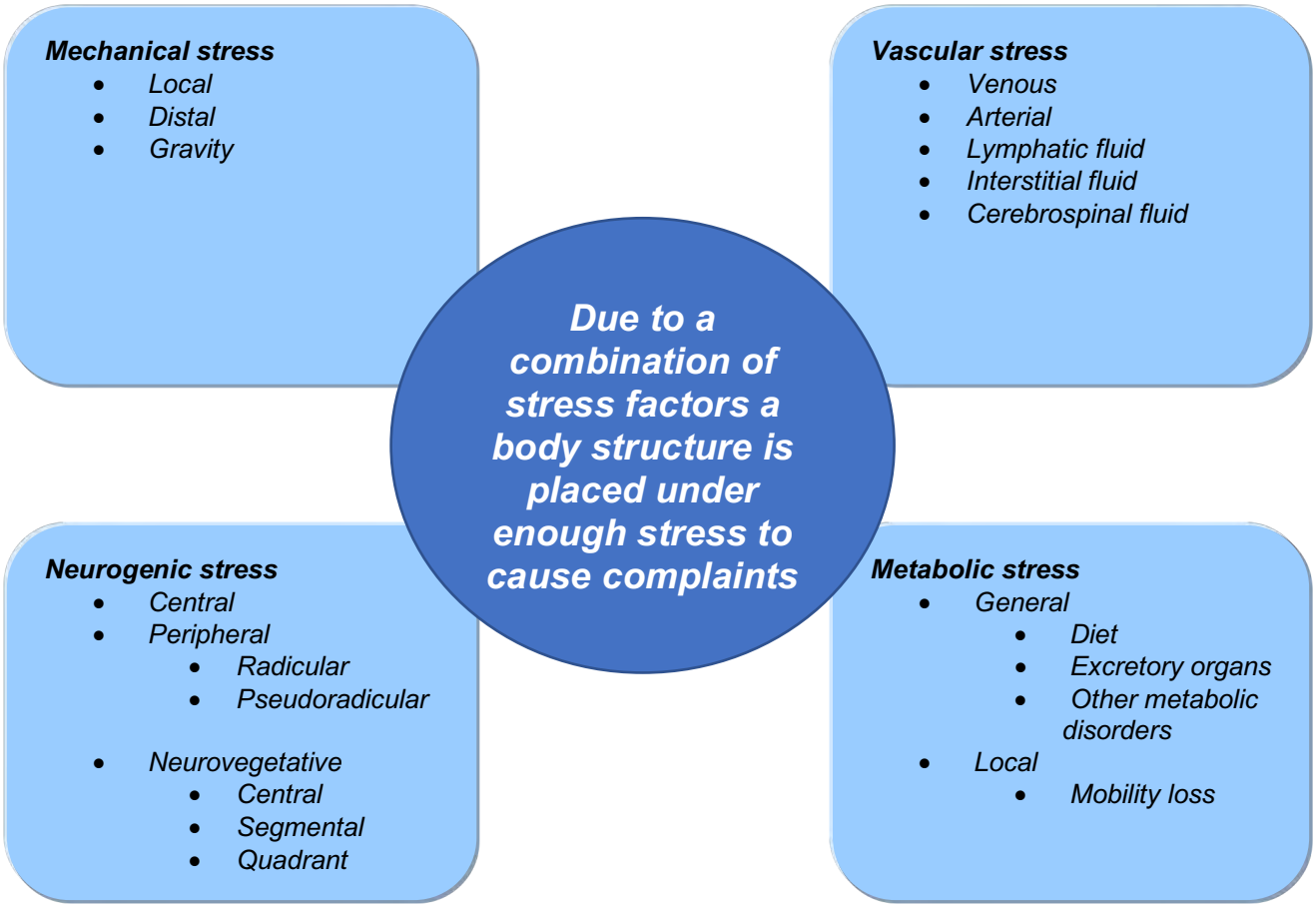

Figure 28 - General osteopathic approach

Concerning the improvement of the functioning of the metabolic elements it is important to get a good overview of the health of the patient.

Beside the general case history, it is also important to observe the skin and nails very carefully. This observation can give indications on eventual diseases.

Beside questions on the complaint area, it is also important to ask questions about the general health.

You can make up a paper questionnaire or even better an electronic questionnaire on tablet that you can give or send to your patients in advance of the consultation.

This saves time and gives a very professional impression.

You can find an example of such a questionnaire in the annex of this book and you are welcome to use and personalize it.

7.3. Treatment

Osteopaths work with the Evidence Based Practice model.

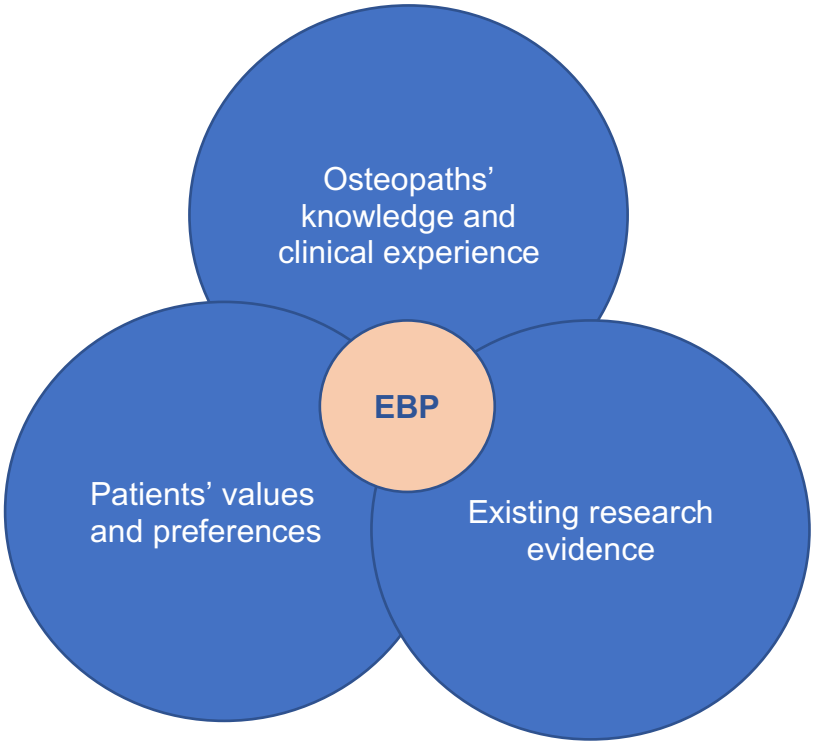

Figure 29 - Evidence Based Practice Model

EBP is the integration of clinical expertise, patient values, and the best research evidence into the decision-making process for patient care.

Clinical expertise refers to the clinician's cumulated experience, education and clinical skills.

The patient brings to the encounter his or her own personal preferences and unique concerns, expectations, and values.

The best research evidence is usually found in clinically relevant research that has been conducted using sound methodology.

Depending on the findings, the osteopath sets up an individualized treatment plan with clear treatment goals.

Because of the individualization, it is difficult to describe here all possibilities.

Therefore, I advise to read my other detailed books.

SYSTEMIC QUESTIONNAIRE BEFORE OSTEOPATHIC TREATMENT

Name		M or F		
Age		Date		
System	Question			Specify
Lungs	Are there known lung complaints/diseases?	Yes	No	Which ones?
	Do you take medication for your lungs?	Yes	No	Which ones?
	Are you short of breath when climbing stairs?	Yes	No	
	Do you have respirational problems, lung, nose, bronchi infections regularly?	Yes	No	
	Is there hay fever, allergies, asthma?	Yes	No	Which ones?
	Is there pain during deep in- our exhalation?	Yes	No	
Gut, liver, pancreas	Do you have regular stool? (min 3 x per week)	Yes	No	
	Is the stool hard, too soft, floating in the toilet, normal color? (means too much fat in the diet).	Yes	No	Which ones?
	Do you have known gut, liver, pancreas disease or complaints?	Yes	No	Which ones?
	Do you take medication for gut, liver, pancreas?	Yes	No	Which ones?
	Is there gastroesophageal reflux?	Yes	No	
	Is there diabetes?	Yes	No	Type I or II? Insulin?
	Are there food allergies or intolerances?	Yes	No	Which ones?
	Estimate the percentage food you take per day	Fat: Carbohydrates: Proteins:		

Luc Peeters

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Luc Peeters is an osteopath since 1985. He was the Joint-Principal of the largest Academy of Osteopathy in Europe from 1987 till 2020.

This book gives a practical overview on how our immune system works and how osteopaths can improve the immune functions.

The theory and procedures in this book are checked on their scientific background and esotericism is avoided.

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