

POLLUTION AND THE IMMUNE SYSTEM

REDUCING OUR IMPACT ON THE ENVIRONMENT HELPS PRESERVE OUR IMMUNE SYSTEM AND HEALTH.

POLLUTION

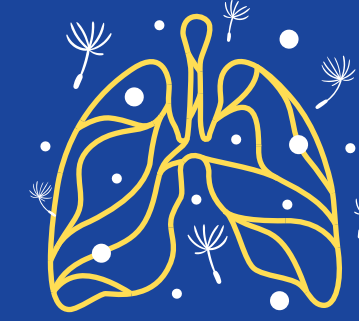
Pollution is a negative alteration of the environment, today largely due to human activity, which impacts air, water and land.

IMMUNE SYSTEM

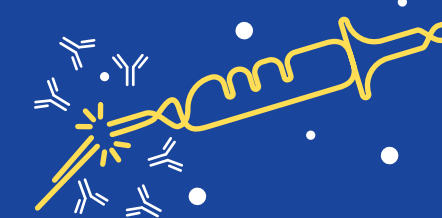
The **Immune System** is composed of organs and cells designed to fight diseases like infections triggered by pathogens or cancers.¹

Air pollution specifically is a major threat. Its sources? Industrial plants, motor vehicles, home-heating devices or forest fires, which produce pollutants like ozone, sulphur oxides, nitrogen oxides, particulate matter, carbon and ultrafine particles².

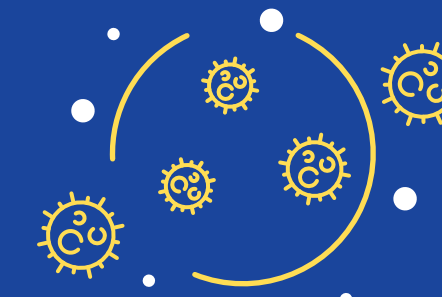
ADVERSE EFFECTS ON OUR IMMUNE SYSTEM CELLS AND ORGANS.



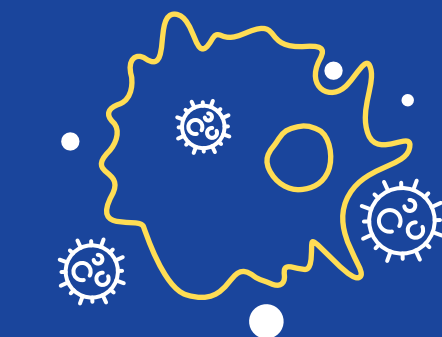
Air pollutants can trigger the **production of cytokines** by our immune cells, that cause **inflammation in the lungs**. They can also **reduce the tolerance** of the immune system, leading it to over-react against harmless agents like pollens^{2,3}.



Vaccination usually triggers the production of antibodies that neutralize pathogens. But its **efficacy can be reduced** by pollutants, for instance with the hepatitis or rubella vaccines⁴.



Air pollutants also **alter antimicrobial and antiviral** pathways of the immune system which **favor the spread of pathogens** in our body^{2,3}.



Some immune cells called **macrophages engulf pathogens** to destroy them by phagocytosis. But **particulate matter** – a specific air pollutant – is also engulfed by our lungs' macrophages, which **impairs pathogens phagocytosis**. Over time, the accumulation of particulate matter in our lymph nodes, one of **the immune organs, disrupts their very structure**⁵.

IMPACT ON HEALTH:

Because of its effect on our immune system, air pollution **increases the risk of airway diseases** like allergies (e.g. to pollens), asthma, acute upper and lower respiratory tract infections (e.g. pneumonia or bronchiolitis)^{2,6}. The whole population is impacted, especially vulnerable people. **In 2016, air pollution was responsible for 4.2 million premature deaths** among which 543,000 children under 5 due to respiratory tract infections⁶.



Did you know **CLIMATE CHANGE** itself can impact the immune system?

It increases the growth rate of plants, creating a higher concentration of airborne pollens, thus worsening allergies^{7,8}.



RESEARCH & INNOVATION

1-NIH Publication No. 03-5423 Sept 2003.; 2-Dondi et al. (2023), doi: 10.3390/ijms24054345.; 3-Glencross et al. (2020), doi:10.1016/j.freeradbiomed.2020.01.179; 4-Franza et al. (2021), doi: 10.3390/ijerph18126330.; 5-Basak et al (2022), doi: 10.1038/s41591-022-02073-x; 6-WHO (2018), WHO/CED/PHE/18.01; 7-Ray et al. (2020), doi:10.3390/ijerph17134814; 8-Wu et al. (2021), doi: 10.3390/children8080708.