

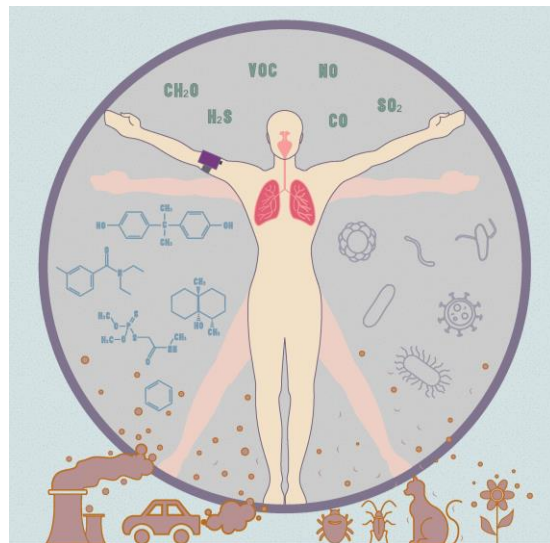
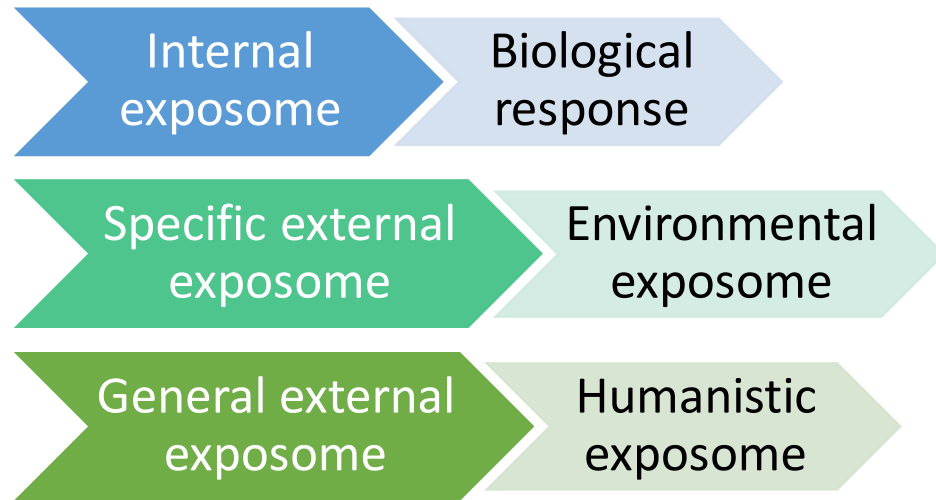
Charting the landscape of the environmental exposome

Xin Wei, Zinuo Huang[#], Liuyiqi Jiang[#], Yueer Li, Xinyue Zhang, Yuxin Leng, Chao Jiang^{*}

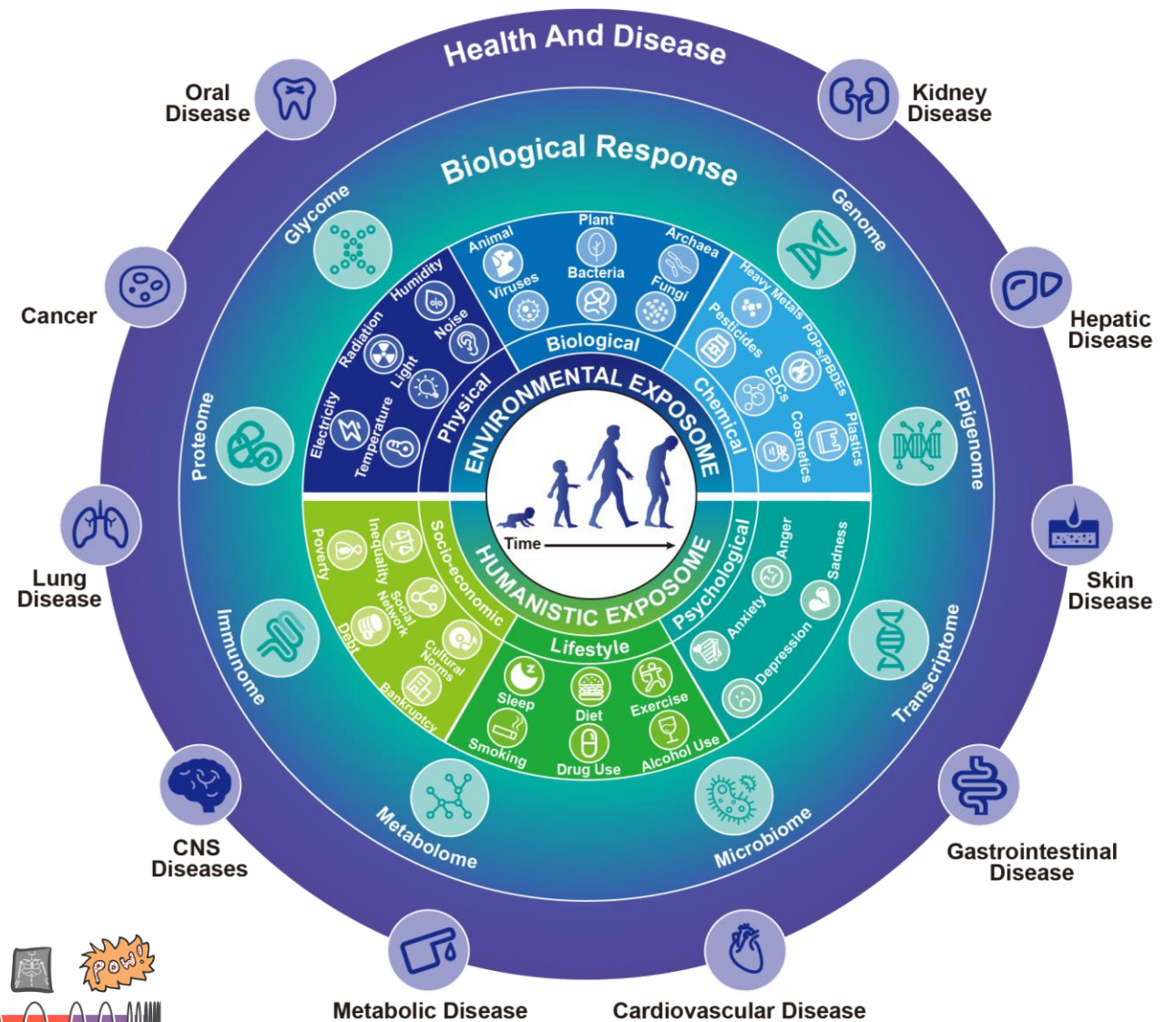
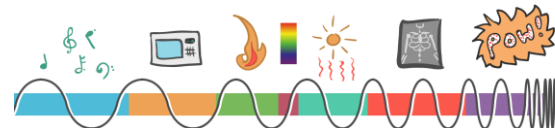
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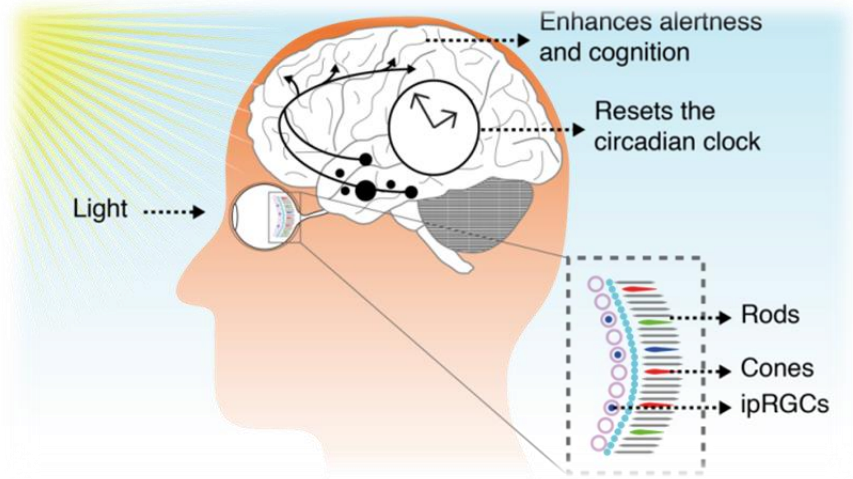
Exposome – Total environmental exposures



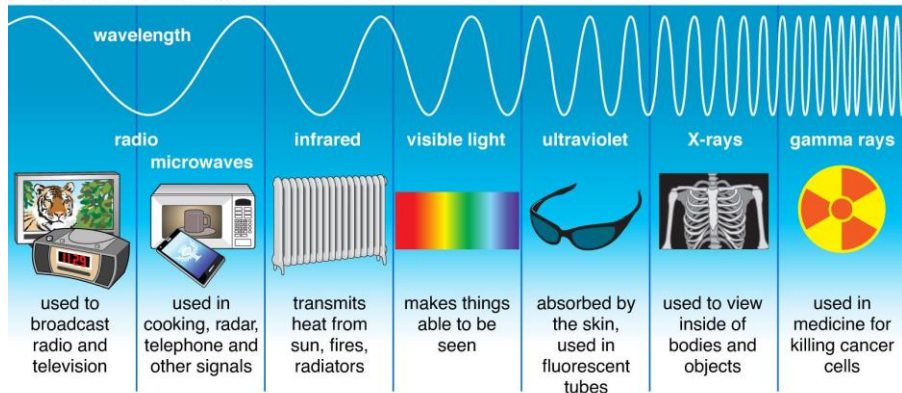
Biological
Chemical
Physical



An atlas of the environmental physical exposome



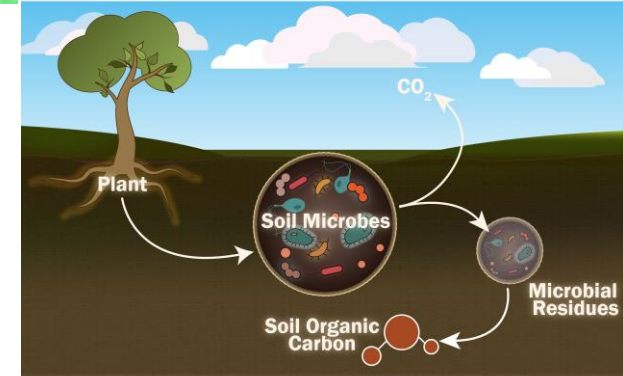
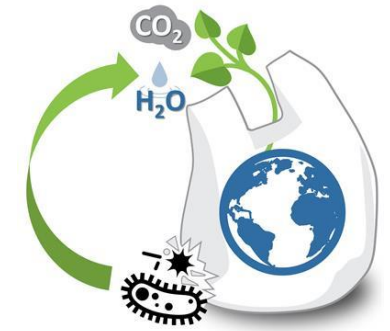
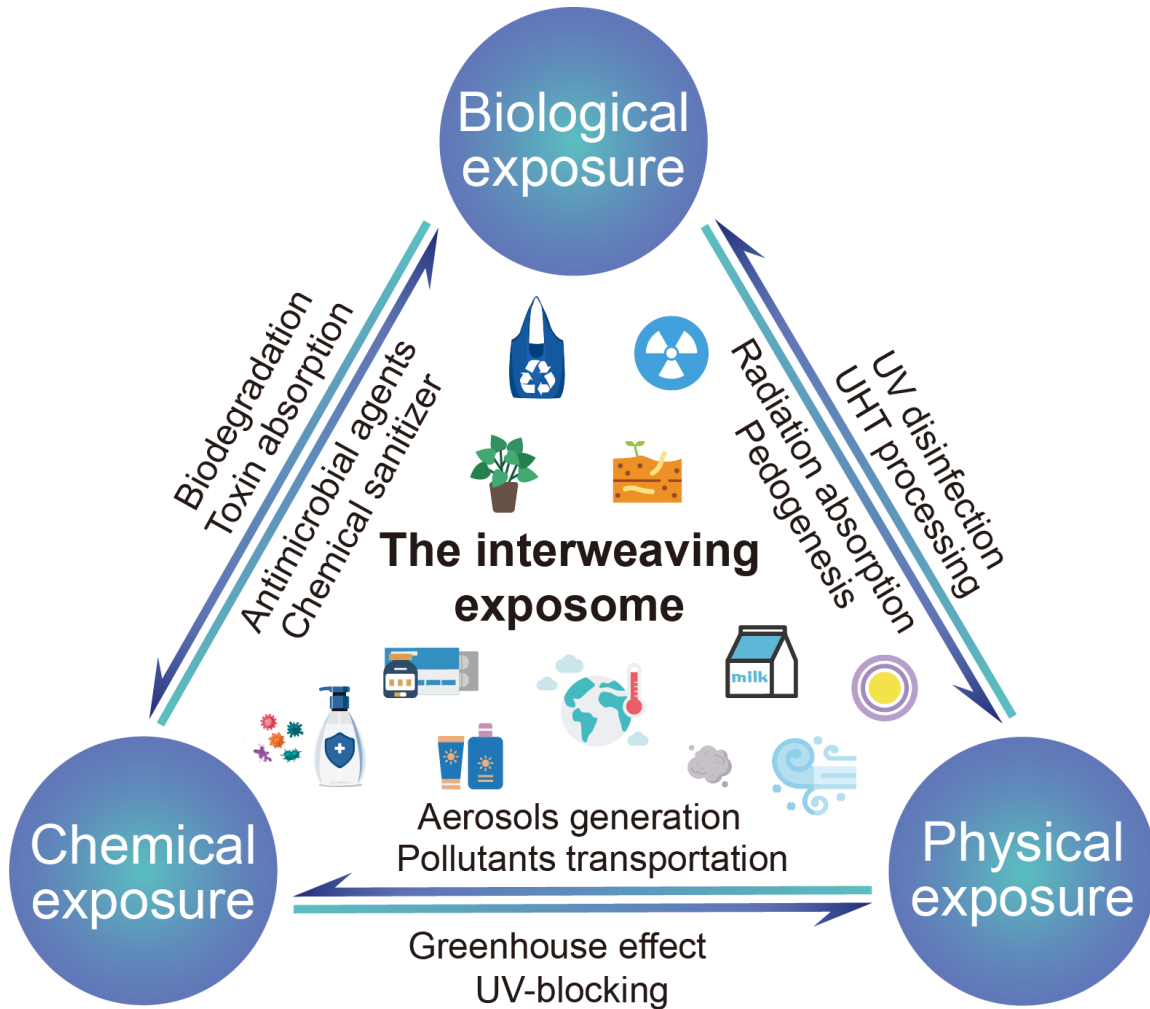
Types of Electromagnetic Radiation



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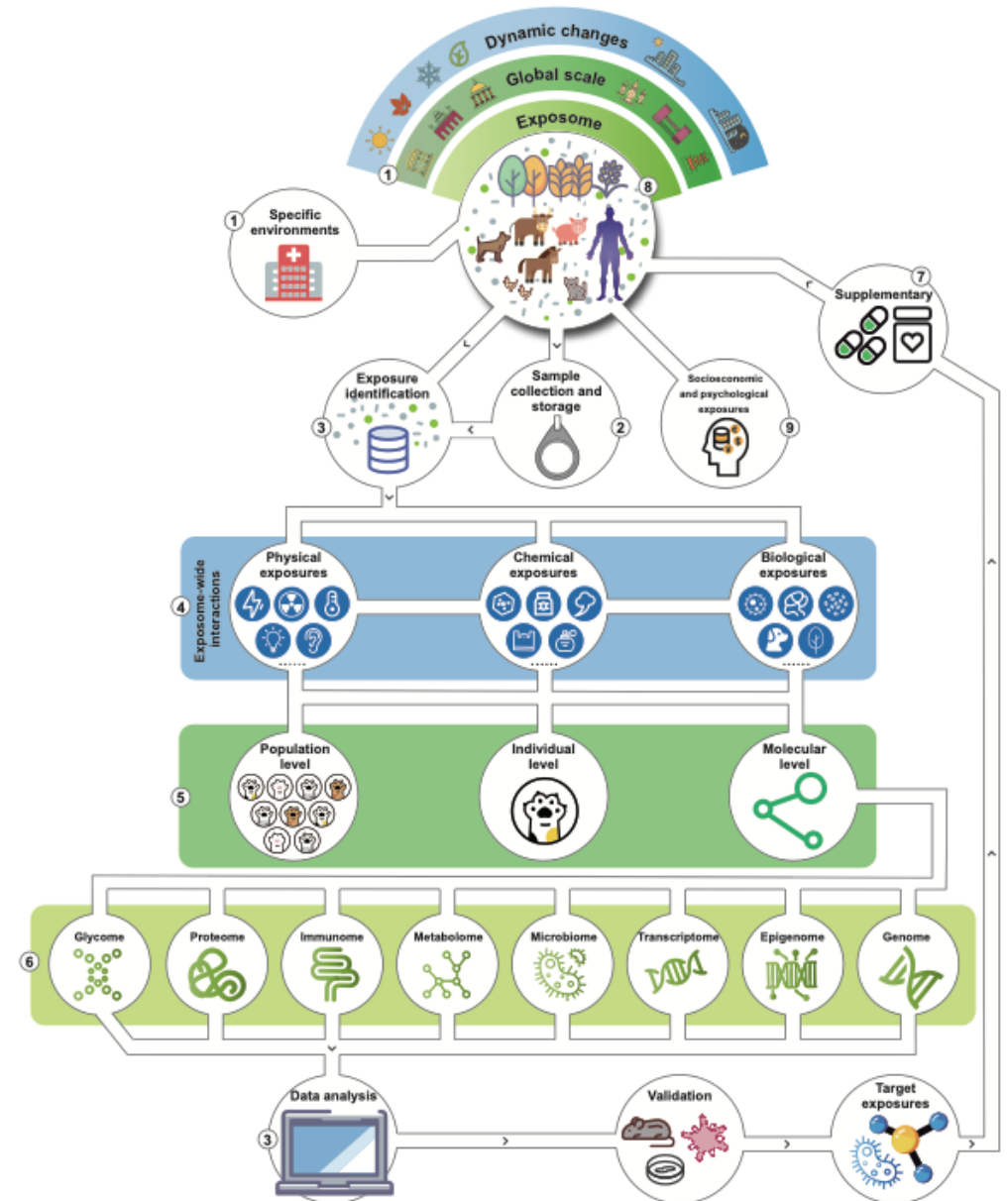


The interweaving biological, chemical, and physical exposomes

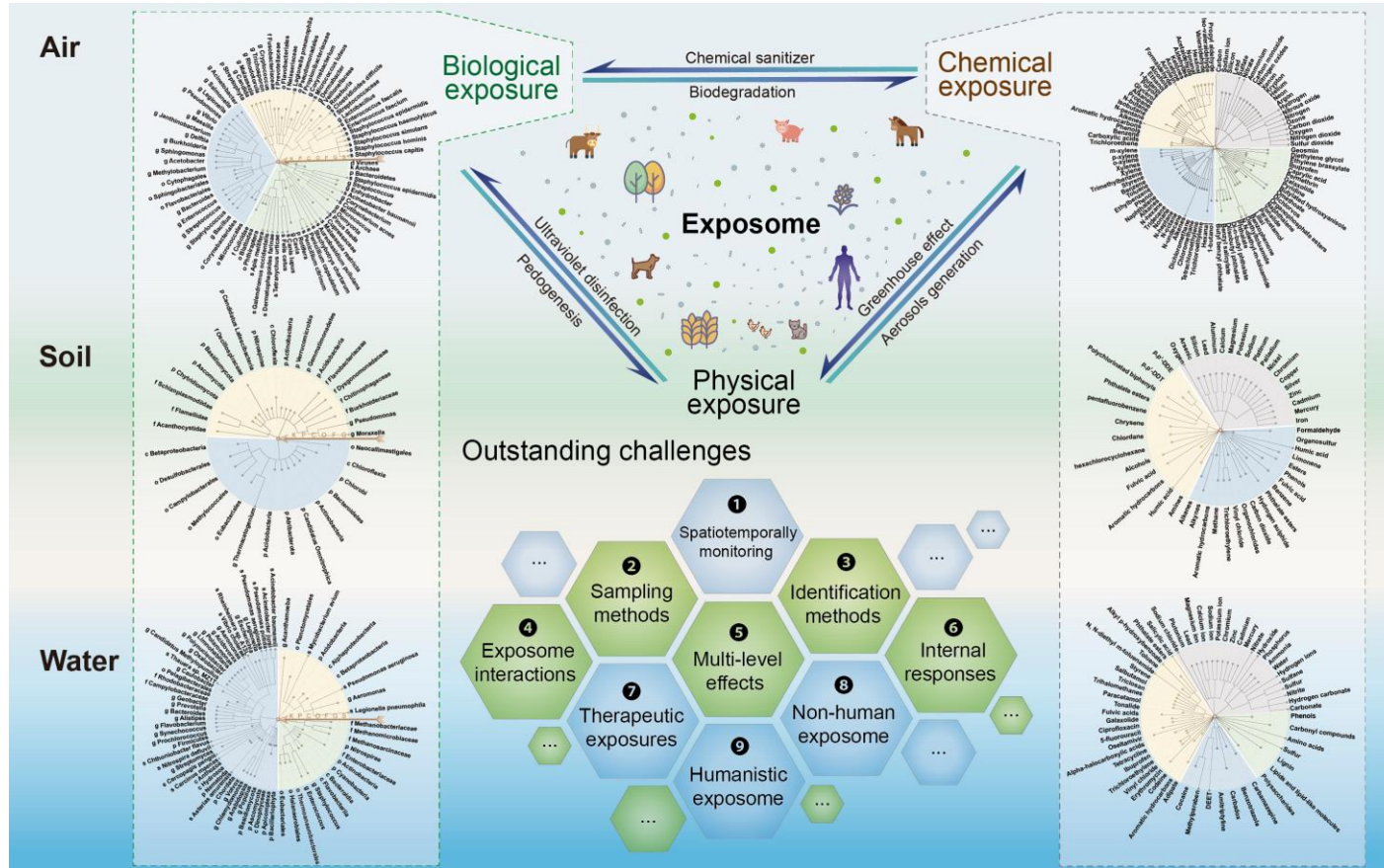


Outstanding challenges

1. There is a distinct lack of exposome monitoring efforts at the systematic level.
2. Exposome sampling methods need further development.
3. Experimental and computational methods to monitor and identify exposures need further development.
4. Detailed interactions of exposures are understudied.
5. Effects of various environmental exposures at the population, individual, and molecular levels need to be evaluated.
6. A multidimensional and interdisciplinary approach is needed to investigate how external environmental exposures are translated into internal exposures and responses.
7. A greater focus on beneficial exposures can provide valuable insights into designing new supplementary therapeutic strategies.
8. The impact of exposomes on other organisms, such as crop plants, stock animals, and pets, should be investigated.
9. The humanistic exposome is relatively understudied.



Summary



- The biological and chemical exposures in air, soil, and water were summarized and united under the exposome framework.
- Biological, chemical, and physical exposures are dynamically interweaved.
- A list of outstanding challenges was proposed to be tackled to push the field forward

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