AI & NATURAL BIOACTIVES FOR HUMAN & PLANETARY HEALTH

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Bioactive compounds in edible plants and foods are vital for human and planetary health, yet their significance and potential remain underappreciated. These natural bioactives, as part of whole diets, ingredients, or supplements, can modulate multiple aspects of human health, wellness, and performance [1].

Recent advancements in omics, computational biology, and artificial intelligence, combined with the development of personalised [2] and precision nutrition [3], have catalysed the convergence of nutrition and medicine, and facilitated more efficient and affordable healthcare solutions that leverage the power of food for prevention and therapy.

Innovation in this field requires significant changes in our food system, spanning agriculture, production, distribution, and consumption [4]. As we are facing pressing population and planetary health challenges, investing in bioactive-based solutions is an opportunity to improve and sustain our health care systems, protect biodiversity and the health of our soils, waters, and atmosphere, while creating value for consumers, patients, communities, and stakeholders [5].

Translational research and innovation in the field of natural bioactives are currently being developed at two levels, using a systems-oriented approach: first, at biological level, the interplay between these compounds and the human host and microbiome is being elucidated through omics research [6], computational biology [7], and artificial intelligence [8], to accelerate both discovery and validation; second, at ecosystem level, efforts are focused on producing diverse, nutrient-rich, flavourful, and resilient, yet high-yield agricultural crops, and educating consumers to make informed choices that benefit both their health and the planet [4].

Adopting such systems perspective helps: unravel the relationships between bioactives, nutrition, and sustainability outcomes, harnessing the power of nature to promote human health and wellbeing; foster sustainable agriculture and protect the ecosystem [5]. Therefore, interdisciplinary and international collaboration is needed for a new era of science, research, and development of practical food-based solutions for some of the most pressing challenges of humanity in the Anthropocene [9].

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