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Oral Communications

3D Printing the Future of Nutrition: Unlocking the Potential of Phytonutrients

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The integration of advanced technologies into food science is reshaping how we think about nutrition, health, and sustainability. Among the most promising innovations is 3D food printing, which allows for the design of foods that are not only visually appealing but also functionally tailored to individual nutritional needs. When combined with phytonutrients, bioactive plant compounds such as flavonoids, carotenoids, and polyphenols that play critical roles in promoting health and preventing disease. 3D printing offers unprecedented opportunities for personalised nutrition and functional food development.

Phytonutrients are often difficult to incorporate effectively into the human diet due to their instability, variable bioavailability, and sensitivity to environmental factors such as light, heat, and oxidation. 3D food printing can address these challenges by enabling the precise encapsulation, layering, and controlled release of phytonutrients in food matrices. This opens pathways for developing novel functional foods, from antioxidant-enriched snacks and patient-specific recovery diets to sustainable food products that utilise plant by-products rich in beneficial compounds.

Furthermore, the junction of 3D printing with digital health technologies could foster in a new era of personalised nutrition, where meals are tailored according to age, health conditions, and genetic predispositions. At the same time, embedding phytonutrients into edible packaging materials or “smart foods” could help reduce food waste and improve safety.

This talk will highlight the current progress, challenges, and future directions at the intersection of 3D printing and phytonutrient science. By merging precision manufacturing with plant-based bioactive compounds, we can envision a future where each meal is not only a source of sustenance but also a targeted tool for enhancing human health and well-being.

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