**Enabling Personalized Tablet Manufacturing: A Targeted Review of Pharmaceutical Applications Using REGENHU 3D Printing Systems**

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**Background and aims.** Personalized medicine requires adaptable manufacturing strategies capable of producing individualized dosages, combining multiple active pharmaceutical ingredients (APIs), and tuning drug release profiles. Conventional tablet manufacturing struggles to meet these needs, particularly for elderly populations or patients requiring complex regimens. Additive manufacturing offers new approaches to overcome these limitations. This work presents a targeted review of published studies that utilize REGENHU’s 3D bioprinting platforms for pharmaceutical tablet fabrication, focusing on applications enabled by specific platform features.

**Methods.** We reviewed selected peer-reviewed studies where REGENHU printers were employed in pharmaceutical research. Key enabling features included pneumatic extrusion for processing high-viscosity pastes, a high-temperature workzone facilitating pre-curing of materials, multiple material printing for spatial compartmentalization, and intuitive software allowing precise geometrical design. These capabilities were assessed for their relevance to personalized pharmaceutical manufacturing.

**Results.** The reviewed studies illustrate the versatility of REGENHU’s platform in supporting diverse pharmaceutical use-cases. Examples include polypills containing five APIs with separated compartments to control individual release profiles [1], tablets with architecturally controlled geometries enabling delayed or sustained drug release without requiring additional coatings [2,3], and porous tablets capable of ultra-rapid disintegration [4]. Direct powder printing has also been demonstrated, bypassing traditional formulation steps to accelerate tablet production [4]. Across these applications, dosage uniformity remained within ±5%, with feature fidelity below 300 µm, highlighting the platform’s suitability for precision medicine.

**Conclusion/Discussion.** REGENHU’s versatile printing platforms support advanced pharmaceutical development by combining multiple bioprinting technologies, such as pneumatic and thermal extrusion, multiple material printing, and intuitive geometry-driven software into a single configurable platform. Their ability to process pastes, powders, and multiple APIs within complex geometries makes them suitable for point-of-care or small-batch personalized tablet production. These studies highlight the role such platforms can play in transitioning personalized pharmaceuticals from concept to practice.

**References:**

(1) Khaled, S.A. et al. (2015) J. Controlled Release 217:308–314

(2) Khaled, S.A. et al. (2018a) *AAPS PharmSciTech* 19:3403–3413

(3) Khaled, S.A. et al. (2018b) *Int. J. Pharm.* 538:223–230

(4) Fanous, M. et al. (2020) *Int. J. Pharm.* 578:119124