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ENGINEERED HEART MUSCLE FROM 3D PRINTED FIBERS

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Summary: Cardiovascular diseases and myocardial infarction (MI) are, despite significant efforts, the leading cause of death worldwide. Recovery from MI is severely limited as heart muscle is, like neuronal tissue, non-regenerative and pharmacologic treatment may merely milden symptoms while heart transplant remains the sole cure. Engineered human myocardium (EHM) derived from bioreactor-grown human cardiomyocytes (hCM) lends itself to overcome the notorious shortage of donor hearts and in combination with 3D Bioprinting it renders personalize heart repair possible. The institute of pharmacology and toxicology has developed EHM patches that are currently undergoing clinical trials. Next generation of patches shall create well-defined and individualized force patterns to optimally support pumping function of the damaged heart (indiHEART). To achieve this goal, we shift from cast molding to 3D bioprinting using a multi-channel co-axial extrusion system to generate continuous, tubular core-shell fibers by wet-spinning and 3-D bioprinting into a sacrificial support slurry.