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3D BIOPRINTABLE DYSTROGEL FAITHFULLY RECAPITULATES THE CHARACTERISTICS OF THE DYSTROPHIC CARDIAC EXTRACELLULAR ENVIRONMENT

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Recent advances in understanding the pathological mechanisms underlying various genetic diseases have underscored the fundamental role of the molecular composition of the extracellular matrix (ECM). This necessitates the recapitulation of intercellular relationships in an environment that faithfully mimics the physicochemical characteristics of the physiological ECM. While many biomaterials developed in recent years have facilitated the *in vitro* biofabrication of pathophysiological environments, they do not fully represent the disease-specific characteristics of the ECM. Alongside biomaterials, bioprintable hydrogels derived from decellularized organ ECMs are increasingly being developed and represent an ideal substrate to recapitulate the physiological system of interest in three dimensions, ensuring a high reproducibility of the results. Extending the concept from physiological to pathological systems, we have, for the first time, generated a hydrogel (DystroGel) derived from the cardiac ECM of a porcine Duchenne muscular dystrophy model. We have demonstrated that the composition of the dystrophic matrix exhibits a distinct protein profile compared to the control, which influences the genesis of processes occurring within it. This study underscores the necessity of utilizing a three-dimensional substrate that recapitulates the intercellular dynamics occurring within a defined pathological system to advance our understanding of genetic disorders.

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