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3-D Bio Printing the Artificial Cellular Meat Product

Abstract: Safe and quality food is not available to a quarter of the world population due to inability of the traditional agriculture to meet the growing demand. Cultured meat obtained by growing a large mass of animal cells in laboratory conditions is a promising alternative method of animal products production. This work aims to develop a method of biofabrication of a cultured meat product using 3-D bioprinting from the rabbit cells, sodium alginate and sunflower protein. The objects of this study, i.e. the stem cells from the greater omentum of rabbit, which had undergone lipogenic and myogenic differentiation, and rabbit dermal fibroblasts, were placed in a hydrogel of sodium alginate and sunflower protein for biofabrication of tissue constructs using 3-D bioprinting, followed by cultivation for 72 hours, after which a morphofunctional assessment of the state of cells in the constructs was carried out using the confocal and transmission electron microscopy. The proposed method of biofabrication using 3-D bioprinting of a cultured meat product from rabbit cells, sodium alginate and sunflower protein made it possible to obtain the tissue constructs with dimensions of 30*40*3 mm. The confocal microscopy data shows that the cells in the construct remain viable for at least 72 hours. The transmission electron microscopy data shows that the cells in the construct form the tight junctions with each other and are metabolically active for at least 72 hours: fibroblasts excrete procollagen, lipoblasts excrete lipid droplets. The obtained constructs are suitable for consumption as a meat product. Our work demonstrates the feasibility of creating the cultured meat from the rabbit cells and the applicability of biofabrication for production of a texture similar to traditional meat. The use of such components as alginate and sunflower protein allows reducing the cost of the final product and adjust its nutritional properties and sensory qualities.