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Generation of organized Lacrimal gland cell spheroids by simulated microgravity

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Introduction:

A Rotary Cell Culture System (RCCS) allows the creation of a microgravity environment of low shear force, high-mass transfer and 3-dimensional cell culture of various cell types. Aim of this study was to evaluate the growth pattern and the secretory function of rabbit lacrimal gland acinar cells in a microgravity environment using a RCCS.

Methods:

Lacrimal gland acinar cells from New Zealand White rabbits of both sexes were isolated and cultured in a RCCS up to 28 days. Cells were analysed by light and electron microscopy at day 7, 14, 21 and 28. Secretory function was tested by measuring the s-hexosaminidase activity.

Results:

After seeding to the RCCS, the lacrimal gland cells formed spheroidal aggregates. The acinar cells inside the spheroids retained their histotypic features, but in the center of the spheroids groups of necrotic cells became more abundant during the culture period. The evaluation of the secretory function showed a response to stimulation with carbachol until day 7.

Conclusion:

Acinar lacrimal gland cells can be successfully cultured in a RCCS up to 28 days, with a secretory response to carbachol up to 7 days. A simulated microgravity environment allows to maintain long-term cultures of lacrimal gland acinar cells and promises opportunities for further applications in basic and applied cell research on lacrimal gland cells.