

Technology Offer

Mammary organoids derived from primary human breast epithelial cells

Reference Number 01-00940

Challenge

Organoids are cell-derived *in vitro* 3D organ models that represent a powerful new enabling approach for drug discovery, toxicity and efficacy testing, disease modelling and research applications to study biological and developmental processes. For these and other applications, organoid cultures constitute highly informative complementary approaches to existing 2D-culture methodologies and animal models by mimicking the endogenous cell organization and organ structure. Organoids can be generated from a limited supply of starting material (e.g. biopsies) or from patient/donor derived iPS cells. Thus, they also offer important implications for clinical applications such as autologous or allogeneic cell therapy and the replacement of damaged or diseased tissue with organoid-propagated tissue. Accordingly, the list of organoid culture systems and techniques for their experimental exploitation is continuously growing. Nevertheless, there are still limited options to generate mammary organoids that could be used for the development of individualized therapies for breast-associated diseases and for studying breast function.

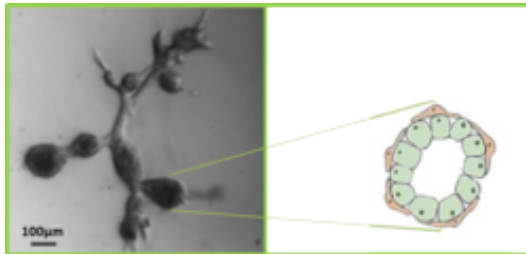


Fig. Mammary organoids obtained from human breast milk cells.

Branched structures resembling terminal ductal-lobular units (TDLUs) with an outer layer of basal cells and inner layer of luminal cells.

Technology

For the generation of mammary organoids human mammary epithelial cells are either obtained from human breast milk or from reduction mammoplasty. Particularly, the procedure of collecting cells from breast milk is simple and cells can be stored frozen until further processing. Mammary epithelial cells are cultured in adherent or floating collagen gels for 10 to 12 days under culturing conditions that facilitate the formation of multicellular organoid units which can form complex branched structures (CD49fhi/EpCAM⁺ population). They resemble terminal ductal lobular units (TDLUs), the functional units of the human mammary gland, and can be passaged and kept in culture for several weeks. Mammary organoids derived from primary mammary epithelial cells provide a suitable tool for drug screening and validation approaches and are offering a wealth of research applications for studying regulation of normal mammary cell fate and function as well as breast disease development.

Commercial Opportunity

The technology is available for in-licensing or further co-development.

Patent Situation

WO/2016/174604 (Means and methods for generation of breast stem cells). National phases were entered in EP, US and CA.

Further Reading

Linnemann, J., Meixner, L.K., Miura, H., Scheel, C. (2017); An organotypic 3D assay for primary human mammary epithelial cells that recapitulates branching morphogenesis. *Methods Mol. Biol.* 1612, p. 125-137.
Linnemann, J., Miura H., Meixner, L.K., Irmier, M., Kloos, U. J., Hirschi, B., Bartsch, H.S., Sass, S., Beckers, J., Theis, F.J., Gabka, C., Sotlar, K., Scheel, C. H. (2015); Quantification of regenerative potential in primary human mammary epithelial cells. *Development* 142, p. 3239-3251. doi:10.1242/dev.123554