

New discoveries in human milk (stem cells)

Dr Foteini Hassiotou, Phd student at the Hartmann human lactation research group of University of Western Australia

The mammary gland is a unique organ, undergoing repeated cycles of proliferation, differentiation and apoptosis in response to a specific hormonal network activated during pregnancy and lactation. This lactation-driven remodeling of the gland is fuelled by mammary stem cells, which are not activated in the resting gland, but are stimulated by hormonal signals initiated in gestation. In addition to their physiological role in the mammary gland, increasing evidence is demonstrating that mammary stem cells are targets of malignant transformation in various types of breast cancer. Most of our knowledge on mammary stem cells comes from the resting mammary gland of the mouse. Very little is known about the mammary cellular hierarchy in the human gland, where the phenotype, distribution and properties of stem cells are poorly understood. As the mammary gland fully matures in lactation via activation of its stem cell pool, we reasoned that the lactating gland can offer a more comprehensive view of mammary cellular hierarchy and dynamics than the resting gland. Therefore, we used paraffin-embedded human lactating mammary tissues to examine the phenotype and localization of mammary stem cells during lactation. We identified a cell subpopulation expressing pluripotency-associated embryonic stem cell markers, including Oct-4, Sox-2 and Nanog. To non-invasively access these cells, we used human breastmilk. *In vitro* colony formation experiments demonstrated the self-renewal and multi-lineage differentiation potential of breastmilk-derived mammary stem cells, which were able to differentiate into cells of ectodermal, mesodermal and endodermal origin, including bone, liver and neuronal cells. These findings suggest the existence of a pluripotent cell population in the human lactating gland, which is also found in breastmilk. This opens new avenues for the use of breastmilk as a non-invasive source of pluripotent cells for stem cell therapies. Furthermore, breastmilk-derived stem cells offer unique models to examine what goes wrong in the breast that leads to

Abstract of presentation
"7th International Breastfeeding and Lactation Symposium"
April 20th and 21st Vienna, Austria



malignant transformation and breast cancer, aiming at developing new treatments for these patients. Importantly, since breastmilk live stem cells are consumed by breastfed babies, further research must focus on the role of these cells for the breastfed infant.