

Breastmilk stem cells: Latest advances and future prospects

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Breastmilk is the optimal source of nutrition for the human infant early in life. In addition to its nutritional components, breastmilk contains a plethora of immune bioactive factors that confer protection to the infant. While the nutritional and protective function of breastmilk has been previously examined, little is known about the properties and roles of non-immune cells that are present in breastmilk. Recent advances have revealed that among different cell populations breastmilk contains stem cells, some of which express embryonic stem cell genes. Interestingly, these stem cells are able to differentiate into many different cell types in culture, including not only lactocytes that produce milk proteins in the dish, but also cells displaying properties of bone cells, chondrocytes, adipocytes, liver cells, pancreatic beta cells, and brain cells. When we examined the origin of these stem cells, it was found that at least some of them originate from the mammary epithelium of the lactating breast. Ongoing work is examining factors that activate these cells during pregnancy and lactation to remodel the breast into a milk-secreting organ. These recent advances highlight a novel attribute of breastmilk, which contains a unique population of viable stem cells that are normally ingested by the breastfeeding infant every day. Future work will examine developmental and other benefits for the infant that may arise from these cells. At the same time, breastmilk emerges as a non-invasive, ethical and plentiful source of pluripotent stem cells that may be used in regenerative medicine, particularly to treat neonatal diseases. Finally, breastmilk stem cells can be used to improve understanding of the biology of the lactating breast as well as the etiology of lactation difficulties.