Placental Stem Cell Production using Milk and Whey Nutrients: Genetic Testing for Multipotency

Boga, Bircan

Akbulut, Merve

Cell culture is challenging due to the use of medium components such as fetal bovine serum and human serum, risk of transmission of microbial disease, allergies, and ethical issues. Thus, identification of a novel serum-free medium is desirable. In this study, we assessed milk and whey, common dietary products, as nutrients in terms of their effects on the proliferation, lipogenic and osteogenic differentiation, and homing of human placental membrane stem cells (hPSC). Furthermore, we also investigated the expression of genes related to stemness and differentiation in response to the materials tested. Proliferative effect of the media was determined by tetrazolium test. Cells were defined by flow cytometry. An acellular human cadaveric skin was used to demonstrate cell homing. mRNA levels of stemness and differentiation markers in hPSCs were analysed by quantitative real-time polymerase chain reaction. Milk and whey nutrients facilitated production of hPSC. Cell proliferation increased with an increasing milk concentration in the culture medium. In contrast, cell proliferation decreased with increasing whey concentration in the medium (maksimum values 48.4% for 10% milk or 43.5% for 1% whey compared to 100% for control). Cells expressed mesenchymal cell markers. Homing was not influenced by culture conditions. A set of genes in hPSCs was found to be regulated by the nutrients tested. This newly developed medium enables culturing of cells using readily available materials, negating the need for components that are difficult to obtain and expensive. This medium will be useful for cell biology and tissue engineering.

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