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Poster Presentations

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Expression of mesenchymal, pluripotent and germ cell markers on the cortical, medullar and hilar cells of adult human ovary

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Background: The paradox of stem cells in human adult ovary is still an open question with a lot of debates. Recent evidences claim the existence of different types of stem cells within the adult ovary from granulosa precursor stem cells, thecal precursor cells and very small embryonic-like cells to ovarian surface epithelial stem cells and female germline (oogonial) stem cells.

Objective: Up to now, the majority of studies have focused on ovarian surface epithelium and ovarian cortical cells, and extend to the medulla less than other parts. No study is on ovarian hilum and medulla cells, in fact. The aim of the present study is to characterize the mesenchymal, pluripotent, and germ cell markers in human ovarian cortex, medulla, and hilum cells.

Materials and Methods: After ethical approval, a segment of human ovarian tissue was collected. Following enzymatic digestion, ovarian cortex, medulla and hilum cells were harvested and cultured. The cells morphology was evaluated. Also, their mesenchymal characteristic was evaluated by flowcytometric analysis of mesenchymal markers (CD29, CD34, CD44, CD105, and CD117) and bone and adipose tissue differentiation markers. The cells karyotyping was assessed on lower and higher passage and the expression of some pluripotent (OCT4, SSEA4) and germ cells markers (DAZL, DDX4, and GCNA) and GDF9 were evaluated by immunocytochemistry.

Results: Three kinds of cells were detected in ovarian cortex. The small cells with morphology of embryonic stem cells, called very small embryonic like stem cells, larger cells or ovarian stem cells and the stromal cells of the ovary. The medulla expressed two kinds of cells: large spindle shape cells and small polygonal cells. The majority of hilum cells demonstrated spindle form, with low number of cells and almost round morphology. The cells of cortex showed spontaneous differentiation into oocyte like cells. Also, the cells of all three parts of the ovary had differentiation abilities toward bone and adipose tissues. The cells of ovarian hilum have greater proliferation capacity than medulla and cortex. They expressed the mesenchymal markers including CD44, CD117, CD29 and CD105, but they were negative for CD34. The cells showed normal karyotyping even after several passages. Although not with the same percentages, the cells of all parts of the ovary expressed OCT4, SSEA4, GCNA and GDF9 and co-localization of DAZL (as male germ cells marker) and DDX4 (as female germ cells marker).

Conclusion: We concluded that adult human ovary has cells with stemness characteristics. Also, despite the most theories that ovarian stem cells are localized in ovarian cortex, our results showed that the cells in medulla and hilum also expressed the stem cells markers, even more than that of the cortex. We propose that human ovarian medulla and hilum cells are as important as cortex and surface epithelium in presentation of stemness ability.

Key words: Ovarian stem cells, Germ cells markers, Pluripotent markers, Mesenchymal markers.