Abstract:
Upper body obesity is characterized by an expansion of the visceral adipose tissue and is associated with an increased susceptibility for type 2 diabetes and cardiovascular disease. In order to get a better understanding of the regulation of body fat distribution, the aim of the present study was to compare adipocyte development between the omental and subcutaneous adipose tissue region in obese subjects. Therefore, the proliferation and differentiation capacity in primary cultures of adipose tissue-derived stromal cells were compared between the 2 depots in a group of 29 obese individuals, of which 21 were women. Proliferation of the cells was stimulated using fetal calf serum (FCS) and assessed by counting the cell number in the culture dishes. Differentiation of preadipocytes was assessed in parallel by morphological criteria and determination of glycerol-3-phosphate dehydrogenase (GPDH) after stimulation by standardized adipogenic conditions. Stromal cells from the subcutaneous adipose tissue region proliferated faster (doubling time, 4 +/- 1 days) than those from the omental region (doubling time, 5 +/- 1 days), whereas there was no regional difference in adipose differentiation with any of the adipogenic media. The same findings were observed when men were excluded from the analysis. Interestingly, there were more endothelial cells in the cultures from
the omental tissue as compared to those from the subcutaneous tissue, but there was no correlation between endothelial cell contamination and proliferation capacity, suggesting that the regional difference in proliferation capacity was not due to regional differences in the amount of endothelial cells. In addition, we found a negative correlation between donor age and proliferation of subcutaneous cells but not of omental cells, possibly explaining the greater capacity for adipose tissue growth in the omental as compared to the subcutaneous depot with aging. In conclusion, there may exist regional differences in adipose tissue growth with regard to proliferation capacity, whereas there are apparently no significant differences in in vitro differentiation capacity between subcutaneous and omental preadipocytes.