ORAL COMMUNICATIONS

HUMAN ADIPOSE STEM CELLS: IMPACT OF DONORS' AGE ON CELL PROPERTIES AND BEHAVIOUR

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Aging is defined as the accumulation of alterations in cells and tissues that increase the risk of disease. Therefore, the increase in life expectancy in our society is more likely to be accompanied by increased age-related disorders, which are commonly linked to impaired angiogenesis and tissue repair, resulting in prolonged healing times and significant clinical challenges.

In this scenario, mesenchymal stem cells (MSCs) have proven to hold great promise for regenerative medicine applications. Among them, adipose stem cells (ASCs) are commonly used due to their easier accessibility with less invasive procedures. However, as observed for most MSCs, ASC properties may decline with increasing donor's age.

Therefore, in this study, we isolated ASCs from four age-defined donor groups; then, we evaluated, both in the single subjects and the pooled cells, the potential impairment of cell proliferation, oxidative stress, β-galactosidase and telomerase activity. Moreover, via qPCR analysis, optical and immunofluorescence microscopy, we assessed whether donors' age could impact on stemness maintenance during passaging.

We also performed an mRNA analysis on those genes related to metabolism changes and cellular homeostasis maintenance.

The obtained results suggest that, though not being deeply affected by age, ASCs do exhibit slightly lower proliferation rates with age and a higher β-galactosidase activity, while oxidative stress and telomerase activity result unaltered throughout aging.

Noteworthy, ASCs exhibited an altered expression of those genes involved in the epigenetic regulation of gene expression and the glycolytic pathway, hinting at an interesting correlation between aging and a shift in the metabolic profile, for which future metabolomic and transcriptomic studies will be needed.

In conclusion, ASCs isolated from healthy, non-smokers donors, did not exhibit a significant decline in their behaviour throughout aging, suggesting that the donor's health status may play a more relevant role than age in determining stem cell characteristics.