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Stem Cell Density-dependent Growth characteristics

Mesenchymal stem cells (MSCs) are increasingly being used in regenerative medicine because of their ability to self-renew, proliferate, and differentiate into multiple cell lineages. Adipose-derived stem cells (ADSCs) and bone marrow-derived stem cells (BMSCs) are among the commonly studied sources. Proliferative capacity is a critical factor influencing the expansion of stem cells for therapeutic applications, as it affects the feasibility of generating sufficient cell numbers for cell-based therapies. Comparing the proliferative properties of ADSCs and BMSCs based on cell density is therefore essential for identifying the most effective and practical stem cell source. There have been many past studies on the growth rate of ADSCs and BMSCs. However, how cell seeding density affects proliferation remains unclear. Our aim is to study cell density-related effects on growth of stem cells. We hypothesize that ADSCs exhibit a higher proliferation rate than BMSCs when cultured under identical *in vitro* conditions.

ADSCs and BMSCs were cultured in tissue culture flasks for two weeks prior to seeding into 96-well plates. Cells were plated at low (1000 cells/well), medium (3000 cells/well), and high (8000 cells/well) densities. Cell proliferation was assessed after 1, 3, and 7 days using the Cell Counting Kit (CCK-8) assay to compare the proliferative capacity of ADSCs and BMSCs across varying seeding densities and time points. From the results, both cells showed relatively the same growth rates. However, high density ADSCs and medium density BMSCs proliferated faster than the rest of the sample. In conclusion, although ADSCs and BMSCs exhibit comparable proliferation rates overall, cell seeding density influences the growth kinetics of both cell types.