

ABSTRACT

Human adipose-derived stem cells (hADSCs) are widely used in regenerative medicine, yet verifying their undifferentiated morphology typically relies on molecular assays that may not always be accessible. This study aimed to establish a bioinformatic-related quantitative, image-based method to distinguish hADSCs from chondrocytes and to evaluate whether an experimental hADSC population maintains its expected stem cell morphology. Bright-field images of experimental hADSCs, control hADSCs, and chondrocytes were analyzed using a custom CellProfiler pipeline optimized for single-cell segmentation and morphometric extraction. Key features, including cell area, major and minor axis lengths, solidity, eccentricity, and perimeter, were quantified and compared across groups using descriptive boxplots. The analysis revealed overlapping morphological ranges among the three cell types, with chondrocytes displaying slightly larger and more rounded profiles across several metrics. In contrast, the experimental hADSCs closely resembled the control hADSCs in shape and size, indicating preservation of their characteristic stem cell morphology. These findings demonstrate that CellProfiler-based bright-field morphometric analysis offers a practical, quantitative approach for assessing hADSC identity without relying on molecular assays.

Keywords: hADSC, CellProfiler, morphology, chondrocyte.