Paper title: Rapid cell separation with minimal manipulation for autologous cell therapies

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Preamble:
The paper concerns separation of viable from non-viable human dental pulp stromal cells (DPSCs) using a new technology called surface acoustic wave-induced dielectrophoresis (SAW-DEP). This technique is a remote, contactless and minimally manipulative technique which exerts forces on cells according to their permittivity with respect to the surrounding fluid. This allows them to be separated into discrete bands of cells experiencing negative DEP and positive DEP, by careful choice of the operating frequency and medium conductivity.

Dataset filename: Yeast cell statistics

The study begins with a proof-of-concept study using yeast cells which are aligned into live/dead regions and then statistically analysed to assess the number of:

- Live cells in dead regions (false negatives)
- Dead cells in live regions (false positives)
- Non-aligned cells

Dataset filename: Flow cytometry of DPSC control in DEP-buffer
Flow cytometry of DPSC control in PBS
Flow cytometry of DPSC control in DEP-buffer exposed to fluidics
Flow cytometry of DPSCs following SAW-DEP separation

The bulk of the study concerns separation of viable / non-viable DPSCs, and the subsequent proof of a) retained viability, and b) retained osteogenic potential. Following separation of DPSCs, the cells were collected and their viability analysed using flow cytometry. Control tests were performed of DPSCs which were not subject to SAW-DEP separation, but were incrementally exposed to other experimental environments to confirm that any changes in viability from the incubated state were not caused by the SAW-DEP separation mechanism itself.

Dataset filename: Flow cytometry statistics

To confirm retained osteogenic potential, and quantitative assay of alkaline phosphatase expression was performed on SAW-DEP-separated DPSCs in comparison with the controls. Further information on bone mineralisation is presented in the main manuscript.