FDA scientists developed an assay that identifies cellular features of mesenchymal stromal cells (MSCs) associated with their immunosuppressive capacity following stimulation by interferon-gamma (IFN-γ). The assay is an important step toward predicting the efficacy of MSCs in treating inflammatory diseases, such as Crohn’s disease and multiple sclerosis.

“Morphological features of IFN-γ-stimulated Mesenchymal Stromal Cells predict overall immunosuppressive capacity”

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Why FDA scientists developed this assay
- Clinical trials are investigating MSCs as potential therapies for many diseases including inflammatory diseases such as Crohn’s disease and multiple sclerosis.
- Sponsors need new tools to reliably predict immunosuppressive capacity of specific batches of MSCs.
- Well-defined predictive markers to identify MSC immunosuppressive capacity would advance MSC-based therapeutics.

How FDA scientists laid the groundwork for this new assay
- Integrated several measurements of T Cell activation at various MSC densities, thus enabling quantification of MSC capacity to suppress T cell activity
  - T Cell surface proteins related to immune activation (e.g., CD25)
  - T Cell-produced cytokines (e.g., TNF-α, IFN-γ)
- Identified morphological features of MSCs that predicted immunosuppressive capacity, as well as the magnitude of IFN-γ-mediated immunosuppression enhancement
- Quantitatively assessed overall immunosuppressive capacity of MSCs, which enabled identification and quantification of differences in immunosuppression that are related to donor and cellular expansion.

This work supports further development of an assay that can 1) identify MSC preparations with a desired immunosuppressive activity; 2) facilitate discovery of optimal conditions for preconditioning MSCs to enhance their immunosuppressive function.

Such an assay could also potentially identify stimulatory MSC preconditioning regimens that are optimal for a specific patient or disease and thus support development of personalized therapies for treatment of some inflammatory diseases.