ENGINEERING NOVEL MICROBEAD ENCAPSULATED THREE-DIMENSIONAL TUMOR AND STEM CELL MODELS FOR REGENERATIVE MEDICINE

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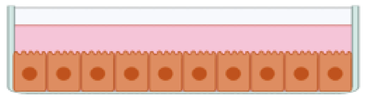
MOTIVATION

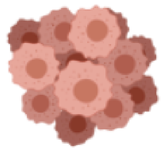
Adhesion of cells on flat solid surfaces



Monolayer of cells

TWO-DIMENSIONAL CELL CULTURE

Prevention of cell adhesion



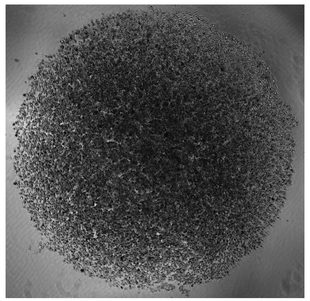
Multicellular aggregate (*spheroid*)

THREE-DIMENSIONAL CELL CULTURE

✓ Mimics the in vivo cellular behavior

SPHEROID GENERATION

Cell culture plate coated with Amikagel

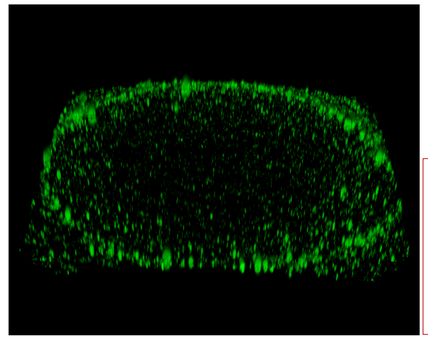


Human mesenchymal stem cell (hMSC) spheroid on Amikagel

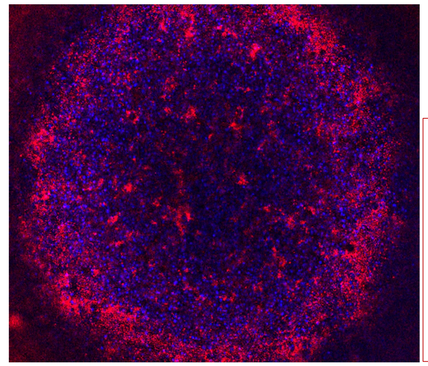
AMIKAGEL [1]

- Spheroid support
- Low cost
- Low complexity
- Size homogeneity
- ~100% yield
- AH (monomer) : PEGDE (cross-linker) can be changed

CHARACTERIZATION



Human Mesenchymal Stem Cell Spheroid + **Fluorescein-** conjugated Amikabeads



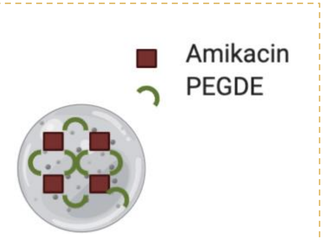
Hoechst 33342- stained Human Mesenchymal Stem Cell Spheroid + **Rhodamine-** conjugated Amikabeads

AIM

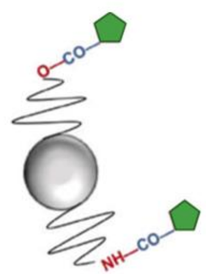
Generation of tumor and stem cell spheroids on **Amikagel**

Encapsulation of spheroids in **Amikabeads** for regenerative medicine applications

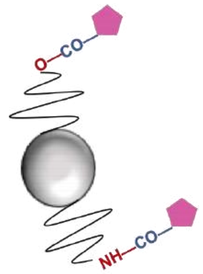
SPHEROID ENCAPSULATION



Hydrogel Microbead – **Amikabead** [2]

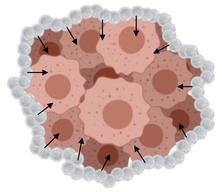


Rhodamine-B-conjugated Amikabead

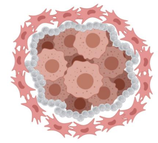


Fluorescein-conjugated Amikabead

FUTURE DIRECTIONS



Proximal delivery of drugs/dyes/bioactive compounds



Multicellular constructs

REFERENCES
[1] Grandhi TS, et al. *ACS Appl Mater Interfaces*. 2014;6(21):18577–18589.
[2] Grandhi TS, et al. *Biomaterials*. 2017;142: 171–185.

ACKNOWLEDGEMENTS
We sincerely thank NIH, NSF, MORE, and GPSA-GRSP awards for funding this research. These experiments were conducted in collaboration with Mr. Rajeshwar Nitiyanandan and Amikabeads were prepared and conjugated by Mr. Subhadeep Dutta, doctoral candidates, Rege Bioengineering Laboratory. Image data was collected using Leica SP5 and SP8 Confocal Microscope Systems, and EVOS Core Cell Imaging System, all housed in the Regenerative Medicine and Bioimaging Facility at ASU under the guidance of Ms. Page Baluch.

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