Docket #: S19-375

Tissue engineered 3D models for cancer metastasis and drug screening

Stanford researchers have designed a spatially patterned 3D co-culture model of cancer cells and target tissues. This model can be used as an in vitro diagnostic tool to predict the likelihood and aggressiveness of cancer metastasis towards specific target tissue types or as a drug screening platform using patient-specific cells to determine the optimal drug treatment regimen (i.e. personalized treatment).

This tunable 3D scaffold provides higher physiologically relevance than current 2D culture methods and is cheaper and faster than animal models. Additionally, animal models are not suitable for high-throughput drug screening studies. This invention can enable the identification of effective therapeutic targets and facilitate high-throughput drug screening to effectively treat many types of cancers. Studies have been conducted for bone cancer.

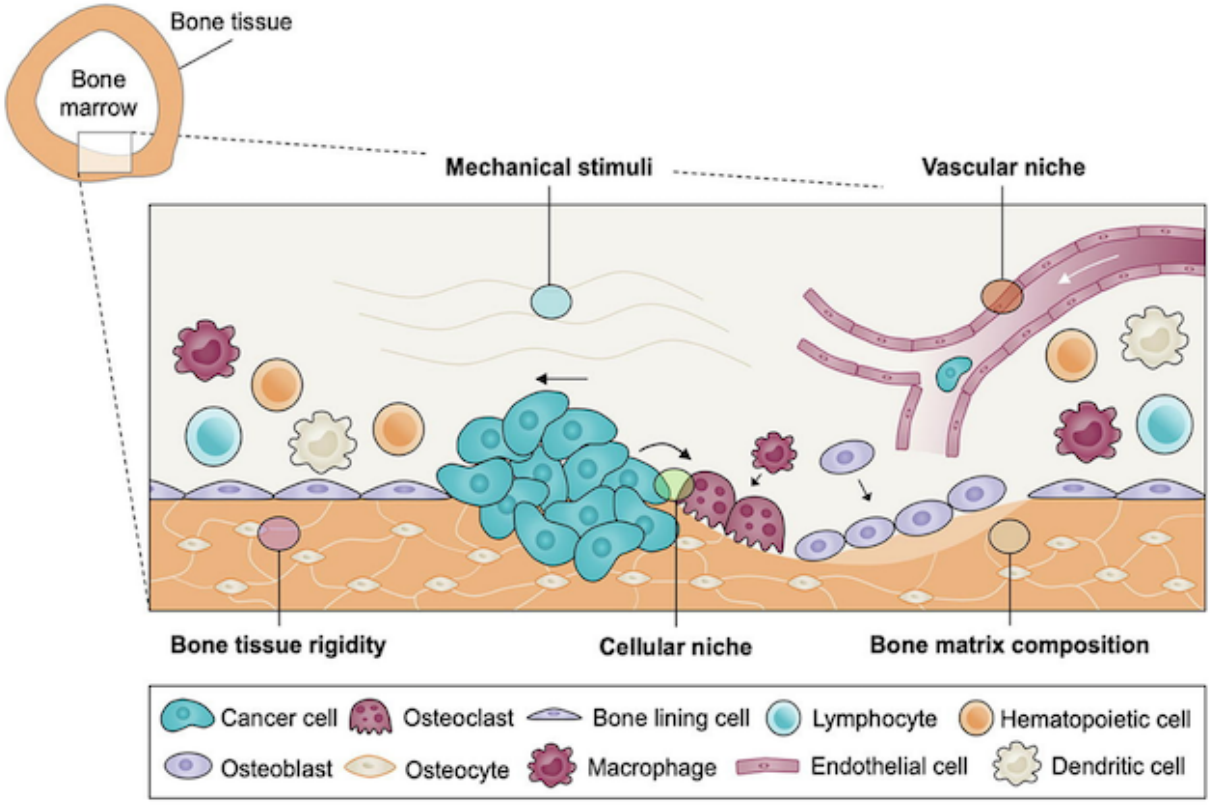

Figure description - Schematic of multifactorial bone cancer niche, highlighting the cell-cell and cell-matrix interactions at the bone marrow/long bone interface

Stage of Development

- Proof-of-concept
- Validated the physiological relevance of this model to mimic drug response in animal models and patients

Applications

- **In Vitro Diagnostic Tool**
- In Vitro Drug Screening Tool
- Experimental Model for cancer metastasis-related mechanistic studies
- **Platform technology** – can be used for many types of cancers

Advantages

- **3D scaffold/extracellular matrix** - provides higher physiologically relevance than 2D culture
- **Lower cost and higher throughput** compared to animal models
- **Highly tunable properties** - provides control over scaffold porosity, biochemical, and biomechanical properties; can give rise to multiple types of engineered tissue which can be spatially patterned.
- **Allows direct cell encapsulation** and provides control over cell distribution, allowing for different cell types to be spatially patterned to mimic various tissue/cancer interfaces
- **Can models bone cancers** whereas others model soft tissues (3D models have focused on mimicking the tissue environment of soft tumors)
- **Personalized Medicine** - uses patient-specific cells

Publications

- Díaz, Eva C. González, Sauradeep Sinha, Raffi S. Avedian, and Fan Yang. "Tissue-engineered 3D models for elucidating primary and metastatic bone cancer progression." *Acta biomaterialia* 99 (2019): 18-32.

Patents

- Published Application: 20220390434

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