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Organoid culture of bone marrow for expansion of constituent normal and malignant hematopoietic cells

Stanford researchers have developed the first ex vivo bone marrow niche capable of sustaining normal and diseased hematopoietic cells long-term.

Hematopoietic cell cultures can serve as a valuable resource for advancing the understanding and treatment of hematologic cancers, such as leukemia and myeloma. Unfortunately, maintaining these cultures over extended periods has proven challenging, as current reconstitutions of the bone marrow microenvironment fail to capture the full physiological architecture of native tissues. Therefore, there is a need for a model that accurately recapitulates the complex native microenvironment.

The Kuo Lab at Stanford University has built an adult stem cell bone marrow niche organoid culture that supports the long-term growth and expansion of hematopoietic cells. The *in vivo* architecture was retained by culturing native fragments of bone marrow as organoids. Consequently, constituent hematopoietic cells, stromal cells and immune cells are intrinsically positioned for continuous hematopoietic differentiation. The organoid model establishes an optimal niche for the long-term culture of hematopoietic cells and primary leukemic cells. This system provides a physiologically relevant platform for studying disease pathology and evaluating potential therapeutics.

Stage of Development
Preclinical

Applications

- Drug screening

- Disease modeling
- Precision medicine
- Regenerative medicine

Advantages

- Native microenvironment
- Long-term culture
- Reproducible
- Robust

Patents

- Published Application: WO2025080736

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