



## Hirotohi Miyoshi

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### Theme

- Development of bioartificial organs from viewpoints of biomedical engineering and tissue engineering.

**Keyword** Hematopoietic stem cells, ex vivo expansion, 3D culture, bioartificial organs

### Highlight

#### Major Scientific Interests of the Group

- 1) Development of bioartificial organs by using tissue engineering approach.
- 2) Establishment of novel 3D culture methods mimicking in vivo microenvironment.

#### Projects for Regular Students in Doctoral or Master's Programs

- 1) Development of ex vivo expansion system of hematopoietic stem cells
- 2) Development of bioartificial livers
- 3) Establishment of novel bioreactor systems applicable to bioartificial organs

#### Study Programs for Short Stay Students (one week – one trimester)

- 1) 3D culture techniques including preparation of 3D scaffolds, cell seeding into the scaffolds, cryopreservation of 3D culture cells, and assays of the cells.



Fig. A packed-bed type bioartificial liver system.

### Applications and Prospects

- The goal of our present research is establishing an efficient and practical ex vivo expansion system of hematopoietic stem cells derived from umbilical cord blood. This system is expected to contribute wider application of umbilical cord blood transplantation.

### Literature, intellectual property, work

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- Miyoshi H, Shimizu Y, Yasui Y, Sugiyama S. Expansion of mouse primitive hematopoietic cells in three-dimensional cultures on chemically fixed stromal cell layers. *Cytotechnology*, 72: 741-750, 2020.
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