

38. Multicellular platforms from organoids to tissue biology
1 unit, Joo-Hyeon Lee, November 18, 2025

Organoid Technology: From Stem Cells to Mini-Organs

- Concept and development of organoids
- Self-organization and key properties of organoids
- Applications in developmental biology and disease modeling

Engineering the Cellular Microenvironment

- Multicellular organoids (assembloids)
- Biomaterials and synthetic matrices
- Influence of physical and chemical cues on cell behavior
- Advanced hydrogels for 3D cell culture and organoid growth

Bridging Organoids and Complex Tissue Biology

- Single-cell analysis in organoid systems
- Organ-on-a-chip technologies
- Challenges and future directions in creating more complex tissue models

Discussion Paper:

Abilez et al. Gastruloids enable modeling of the earliest stages of human cardiac and hepatic vascularization. *Science*. 2025 Jun 5;388(6751):eadu9375. PMID: 40472086.

Miao et al. Co-development of mesoderm and endoderm enables organotypic vascularization in lung and gut organoids. *Cell*. 2025 Aug 7;188(16):4295-4313.e27. PMID: 40592324.

Review Paper:

Onesto MM, Kim JI, Pasca SP. Assembloid models of cell-cell interaction to study tissue and disease biology. *Cell Stem Cell*. 2024 Nov 7;31(11):1563-1573. PMID: 39454582