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Human Organoid System Accurately Models Adaptive Immune Response to Enable Drug Screening

Stanford researchers have developed a scalable, fully human in vitro system for more accurately modeling human adaptive immune responses.

The majority of inferences made about adaptive immune responses are based on the results of mouse studies. Animal models are a precursor for new vaccine and drug candidates prior to clinical trials. Although mouse models are valuable sources of information they can often be poor predictors of actual human immune responses. This highlights a need for platforms that more accurately assess human immune responses.

To address this, Stanford researchers developed a scalable, fully human in vitro system using spleen tissue. The system incorporates all the components of human immune responses, enabling detailed mechanistic analysis of adaptive immunity. This technology has commercial potential as a tool for drug screening (e.g. toxicity and efficacy) and as an adaptive immunity research tool.

Stage of research
In vitro data

Applications

- Drug screening (test the effects of novel vaccine candidates and/or adjuvants)
- Disease setting modelling (can knock down target genes to develop model of disease)
- Mechanistic studies (including gene editing)

Advantages

- Fully human system
- Donor variety: can utilize donors from different age groups, gender and ethnic distribution (this feature cannot be modeled in inbred mice)
- Contains all key cell components of secondary lymphoid organs (B cells, T cells and myeloid cells including dendritic cells)

Patents

- Published Application: WO2026207385

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