P6-10

Organoids in Clinical Dental Research

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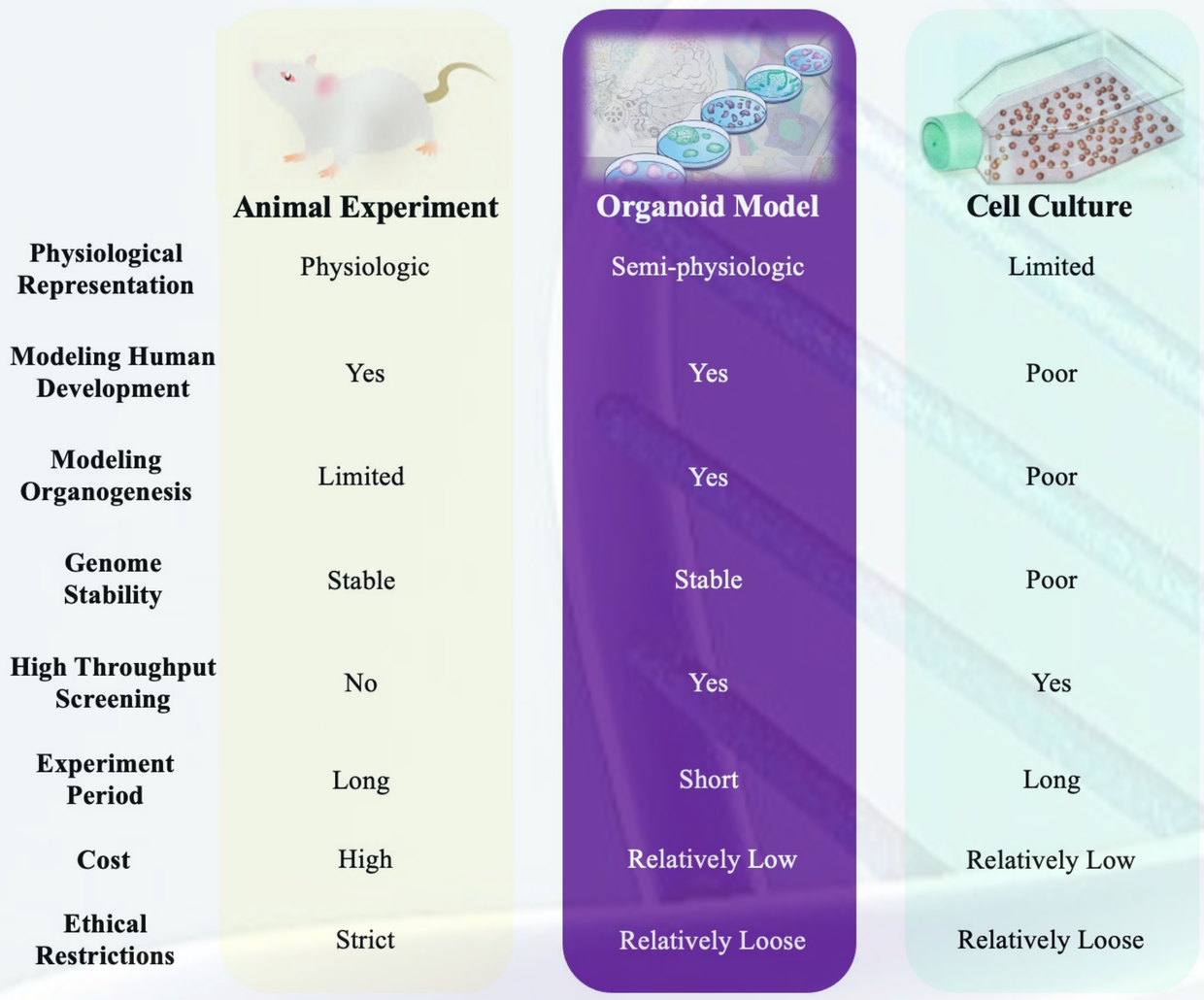
Introduction

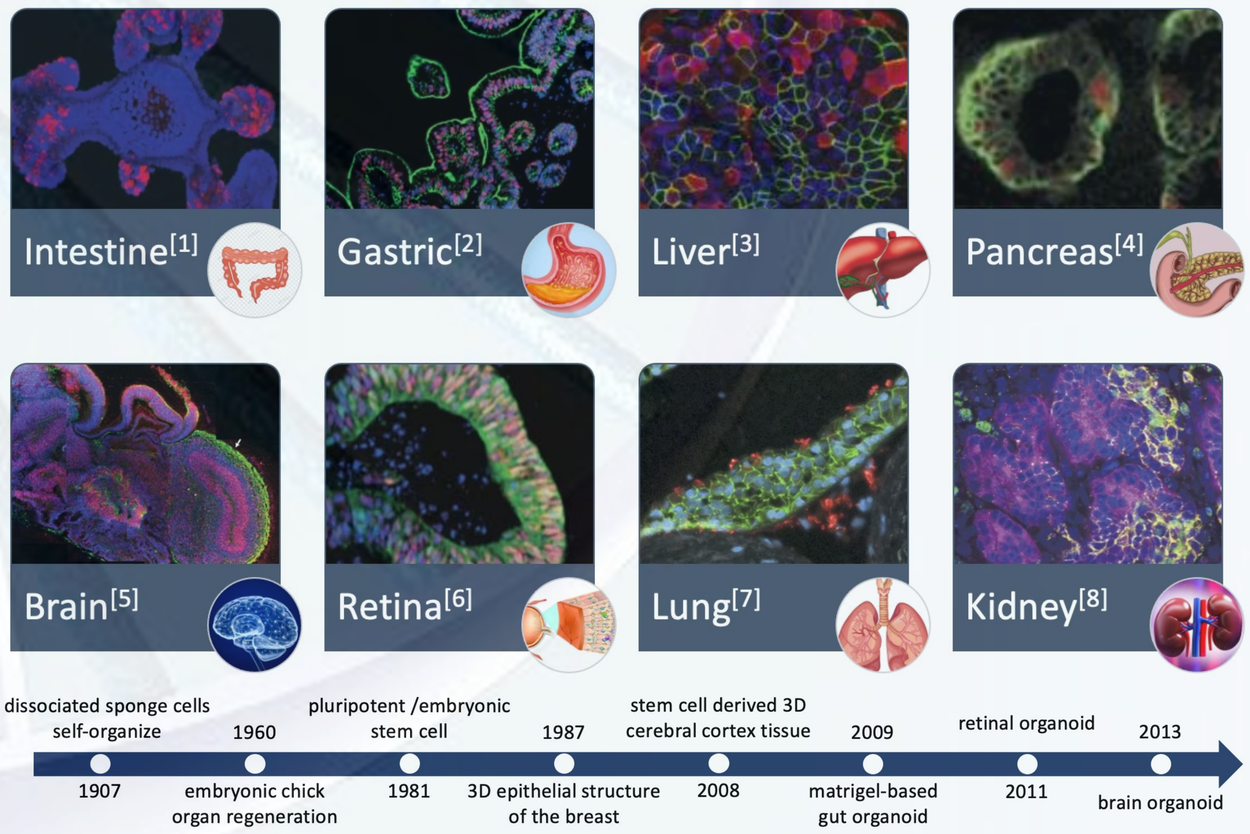
Organoids refer to stem cell-derived 3D multicellular in vitro models which are capable of resembling the morphology and basic tissue level physiological functions of their corresponding organs. The advantage of organoid models are featured by both the convenience of two-dimensional cell lines and the comprehensiveness of experimental animal models. The capability to prod somatic cells into organoid models makes for a promising approach to study human biology. As a consequence, the organoid model was entitled as ***method of the year*** in 2017 by Nature Publishing Group.



	Animal Experiment	Organoid Model	Cell Culture
Physiological Representation	Physiologic	Semi-physiologic	Limited
Modeling Human Development	Yes	Yes	Poor
Modeling Organogenesis	Limited	Yes	Poor
Genome Stability	Stable	Stable	Poor
High Throughput Screening	No	Yes	Yes
Experiment Period	Long	Short	Long
Cost	High	Relatively Low	Relatively Low
Ethical Restrictions	Strict	Relatively Loose	Relatively Loose

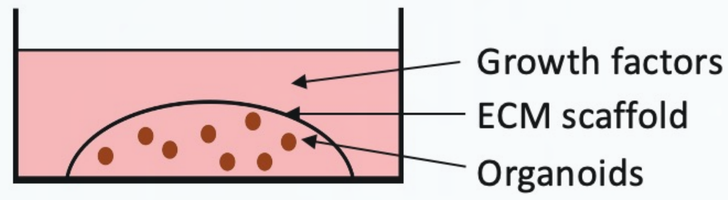
Research Actuality

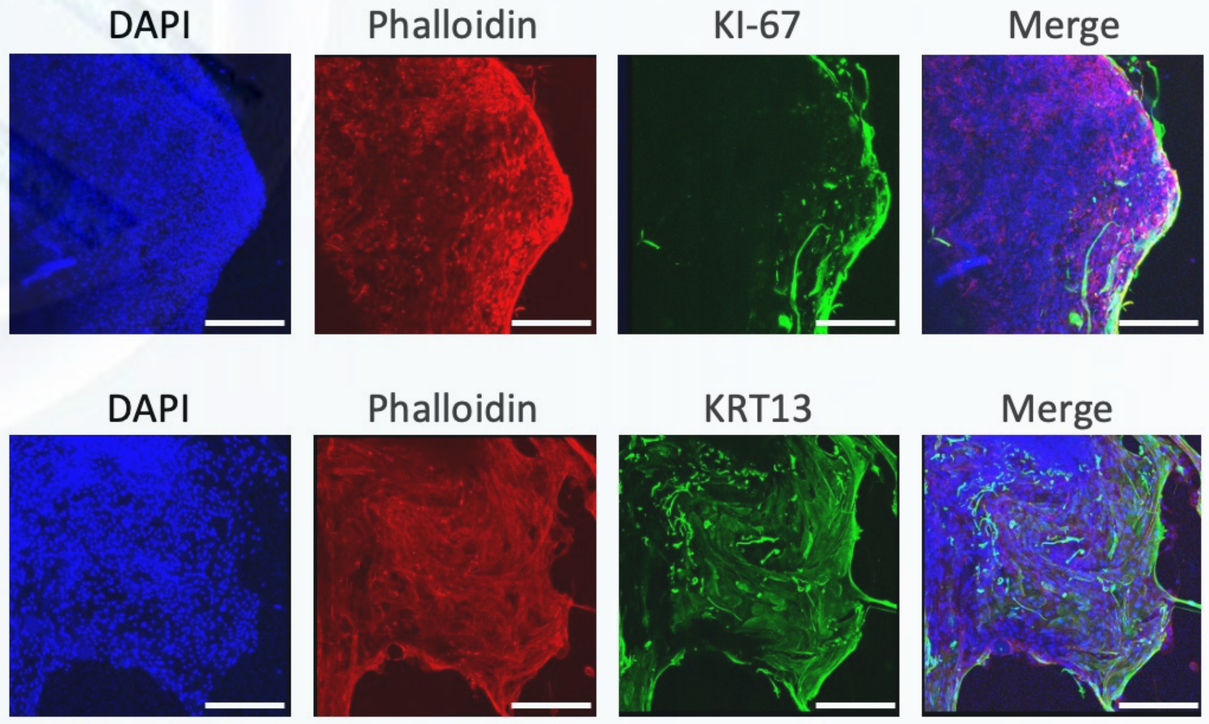
Since Wilson constructed the first model of 3-dimensional cell culturing of sponge cells in the early 1900s, scientists have put forward diverse techniques. However, it was not until 2009 that the first organoid was constructed by Clever's research team. Since then, several novel organoid models have been developed. Up to now, organoids derived from the intestine, gastrin, liver, pancreas, brain, retina, lung, and kidney have been successfully constructed.



Application in Dental Research

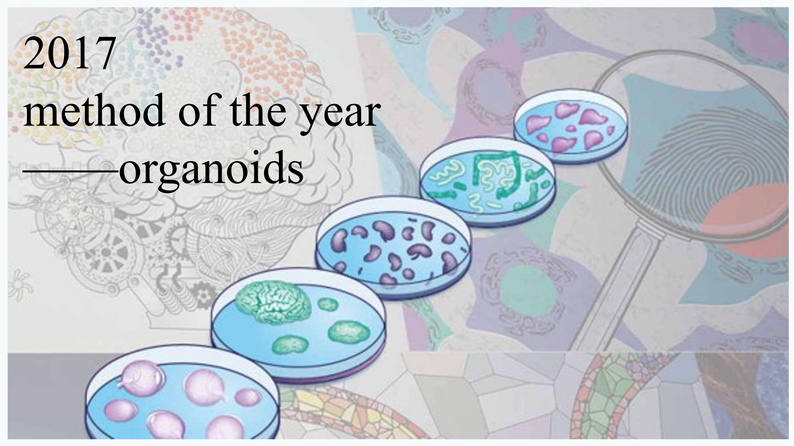
With regards to research in stomatology, organoid models of lingual papilla and squamous-cell carcinoma have been established. The former serves as an ideal platform for personalized drug therapy screening, while the latter provides a potential platform for drug toxicity tests as well as host-pathogen interaction. The construction of oral organoids resemble that of other tissues. Stem cells obtained from patients are resuspended in matrigel, which is an artificial ECM scaffold. Afterwards, specifc growth factors are required for the outgrowth of organoids.





Conclusion

By far, oral organoids are mainly derived from adult stem cells. Induced pluripotent stem cells may promise a wider range of application. Besides, it would be fascinating if oral organoids can be applied in the modeling of organogenesis, as well as in tissue engineering. Last but not least, the combination of the oral organoid model with cutting edge techniques, such as single cell RNA sequencing, may bring about major discoveries.
As an emerging method, the organoid model possesses a promising future in the field of stomatology. Therefore, it is legitimate that we attach greater significance to organoids in teaching and scientific research.



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