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Editorial

"Organoids": Insights from the First Issues

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Organoids are taking the scientific world by storm, revolutionizing the ways in which we study complex biological systems [1]. They serve as valuable experimental tools for both basic and pre-clinical research and could potentially play a key role in reducing the need for animal experimentation. However, that is not all: recent advances have produced even more complex models, such as those exemplified by assembloids [2] and embryoids [3].

Consequently, interest in this research area is growing fast, leading to the decision to dedicate a separate journal to this topic. We now have ample space to reflect on the first year of *Organoids*.

In March 2022, the first article was published online. Since then, the first two editions have showcased diverse aspects of progress in this exciting field, providing a glimpse into the potential applications of these models in areas of developmental biology, drug testing and disease research.

The inaugural Issue was published in September 2022 and contained four review articles and two original research papers. The reviews dealt with topics such as the opportunities and challenges of metabolic studies carried out in organoids [4] or the question of how organoids can improve current organ-on-chip platforms [5]. Moreover, Fuhr and colleagues proposed the establishment of an open data platform to summarize available organoid models and their ethical provenance information in order to ensure the reproducibility and transparency of organoid-based research and facilitate collaborations between different research groups [6]. One of the most pressing issues of the last two years, the SARS-CoV2 pandemic, was addressed in an article by Tran et al. They summarized the knowledge learned from organoid models regarding the COVID-19 virus, which has claimed millions of lives worldwide [7]. The use of organoids in this area of research has enabled scientists to study the disease in a more physiologically relevant context.

In addition to the reviews, the first Issue of *Organoids* also featured two original research papers. Evron-Levy and colleagues demonstrated how organoids from adenomas of familial adenomatous polyposis (FAP) patients can be used to establish personalized therapeutic strategies [8]. Another original article by Schmidt et al. presented a novel human blood vessel organoid model that recapitulates aspects of vasculogenesis, angiogenesis, and blood vessel maturation, has the potential to advance our understanding of vascular biology, and might further lead to the development of new treatments for vascular diseases [9].

The second Issue of *Organoids*, published in December 2022, contained two review articles, two original research papers and a short research communication.

Sara Noorani and colleagues reported on the successful development of pancreatic cancer stem cell lines from 3D organoids. These cells could be expanded long-term and afterwards utilized again to grow organoids. The resulting cell line organoids (CLOs) showed a similar response to chemotherapeutic agents as the organoids they were derived of, making them a valuable tool in drug screening and personalized medicine [10]. In another paper, Li et al. addressed the important issue of mimicking articular joint tissue in vitro [11]. They presented a novel protocol for generating human articular tissue organoids from both mesenchymal and induced pluripotent stem cells, which might serve as a platform for

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investigating the underlying mechanisms of joint diseases and the development of new treatments [12]. In a short research communication, Schäffers et al. provided a single-cell atlas of patient-derived trophoblast organoids from ongoing pregnancies. This study demonstrated that trophoblast organoids recapitulate key aspects of the human placenta, including syncytial fusing and hormone production, making them promising tools for use in personalized placental medicine [13].

In addition, two review articles in this Issue summarized recent developments in organoid research such as strategies for meniscus repair [14] and the use of 3D tumor spheroid and organoid models to understand the tumor microenvironment and develop new cancer immunotherapies [15].

In summary, the first issues of *Organoids* shed light on the exciting and diverse applications of organoid research, covering topics from disease modeling to drug discovery and regenerative medicine. Today, we can confidently say that a successful start has been made and that this third Issue will continue the story of *Organoids*. We have received numerous high-quality submissions from the scientific community and are grateful for the support and contributions of our readers, authors, reviewers, and editors. We are determined to build on this success in the coming years and are excited to see what the future holds for organoid research. We are excited to participate in the upcoming Issues of *Organoids*.

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