Using Fluorescence Imaging to Investigate the Organisation of Human Brain Organoids

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The challenges to study the function of the brain, one of the most complex organs in the human body, have strengthened the need of a new model system. The most promising technology uses human brain organoids. These 3D structures, derived from pluripotent stem cells, mimic an embryonic human brain and open up an impressive amount of possibilities for research in the future. This paper focuses on two different methods to prepare the organoids for immunofluorescent staining and imaging. The aim was to test a new method, so called clearing, and compare it to the commonly used method based on sectioning. The conventional method requires thin sections of the organoids, which are stained afterwards. The new method clears the whole organoids, which makes them transparent. The experiments show that both methods allow the identification of different cell types, whereas the clearing rendered a better view of the whole organization and allowed imaging of organoids in 3D. This study shows that clearing is a new method to assess the quality of organoids, which will help to improve this new model system for further applications, such as drug testing, personal medicine and the reduction of the amount of animal experiments in the future.

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