

Automated high-throughput endometrial organoid plating in 100% Matrigel® using firefly®

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Introduction

The use of organoids as physiologically relevant biological 3D models has been steadily increasing and triggers the demand for reliable and scalable workflows for their generation and culture. Organoids typically require a supportive matrix for their growth and development. Matrigel, a reconstituted basement membrane preparation derived from the EHS mouse sarcoma, is a popular matrix used for 3D cell culture. We are presenting an efficient and scalable method of seeding 100% Matrigel-embedded endometrial organoids using SPT Labtech firefly® liquid handler.

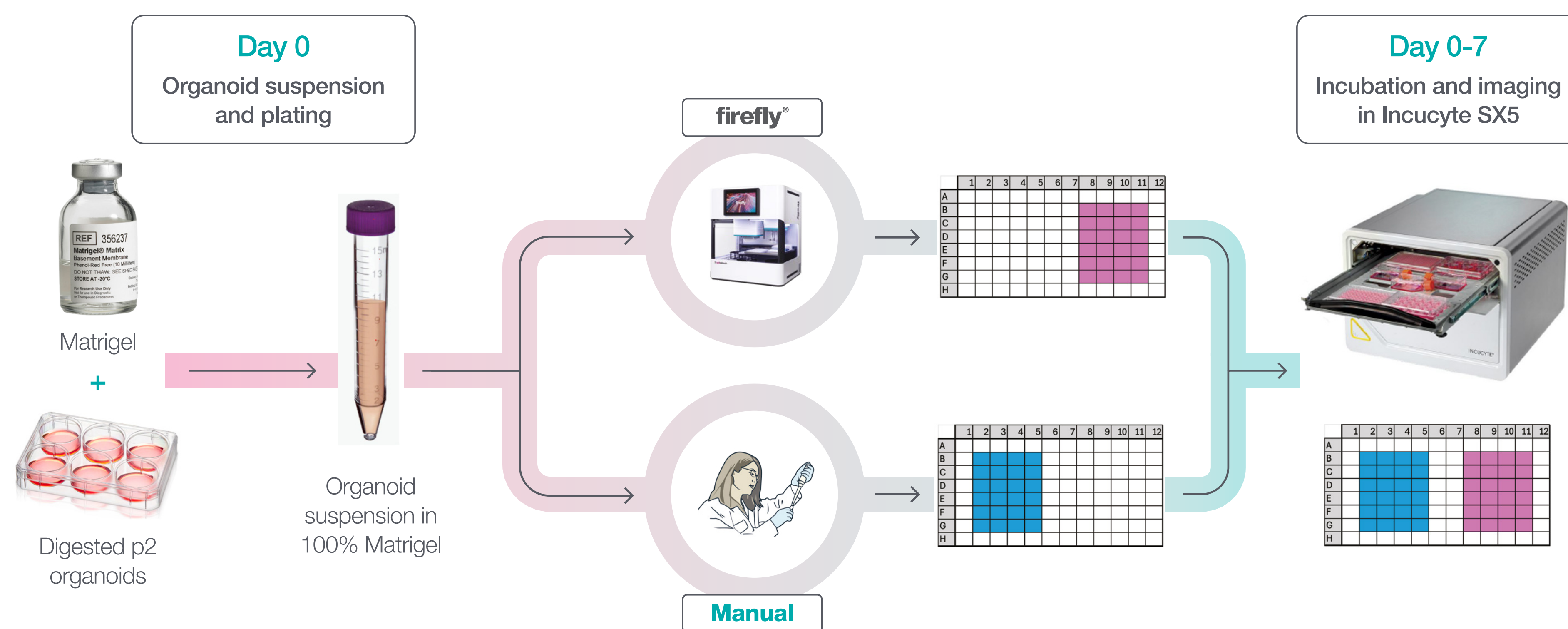


Figure 1. Experimental setup to assess organoid plating in Matrigel on firefly.



Figure 2. firefly®: Compact All-in-One Liquid Handling Solution

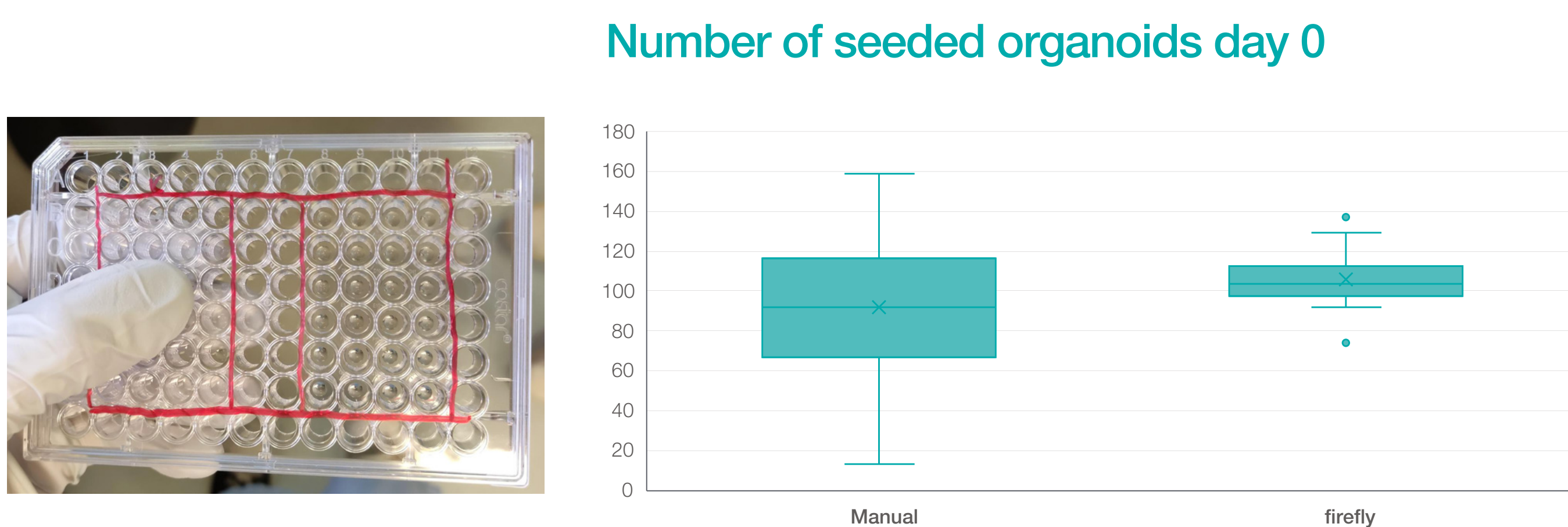


Figure 3. Uniform 5 uL Matrigel domes were dispensed with high accuracy and precise positioning on firefly

Figure 4. The uniformity of organoid numbers seeded by firefly across the wells at the start of the experiment is better than that of manual plating

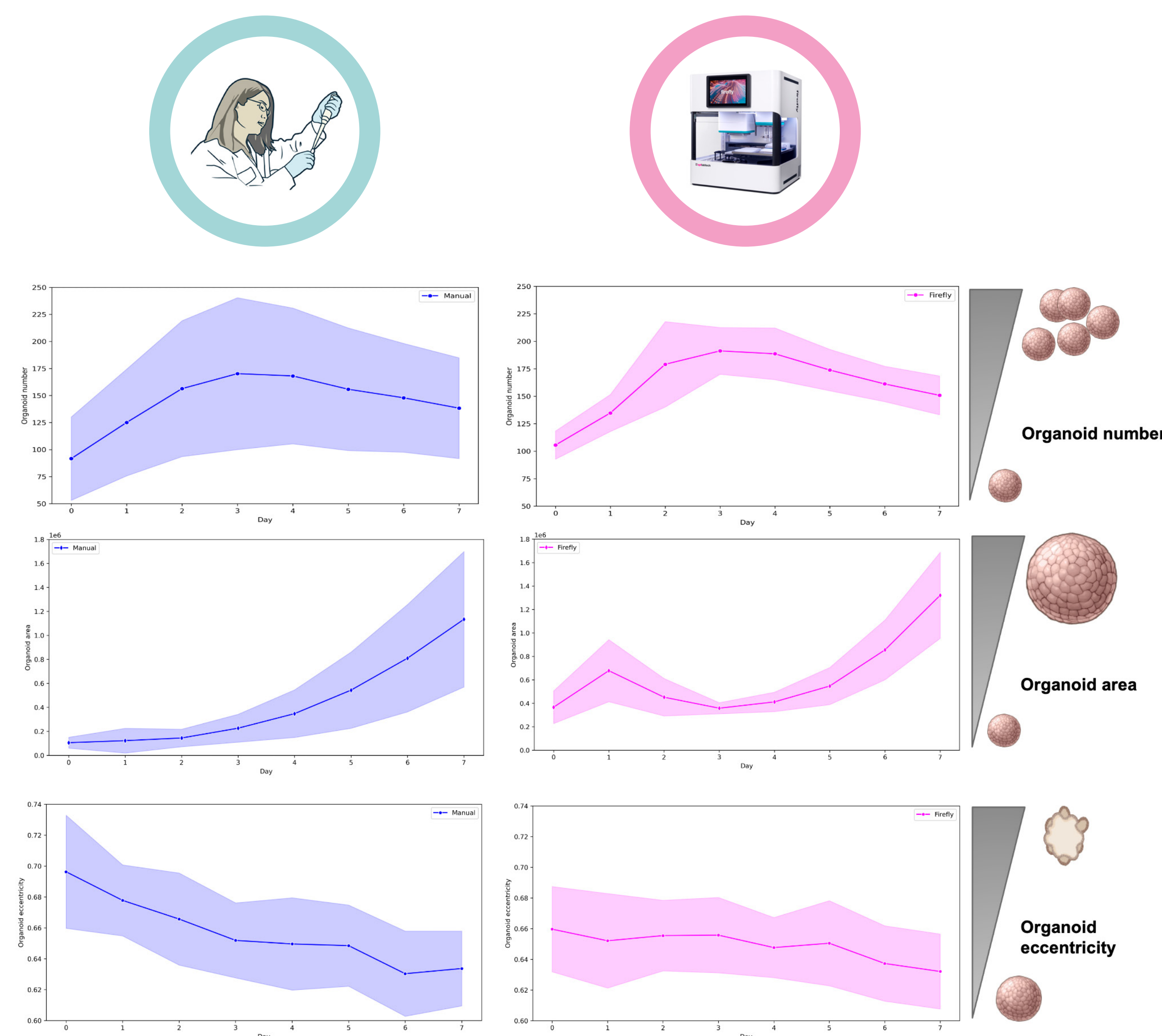


Figure 5. Organoid numbers, area, and eccentricity over seven days of incubation following manual and firefly-automated seeding.

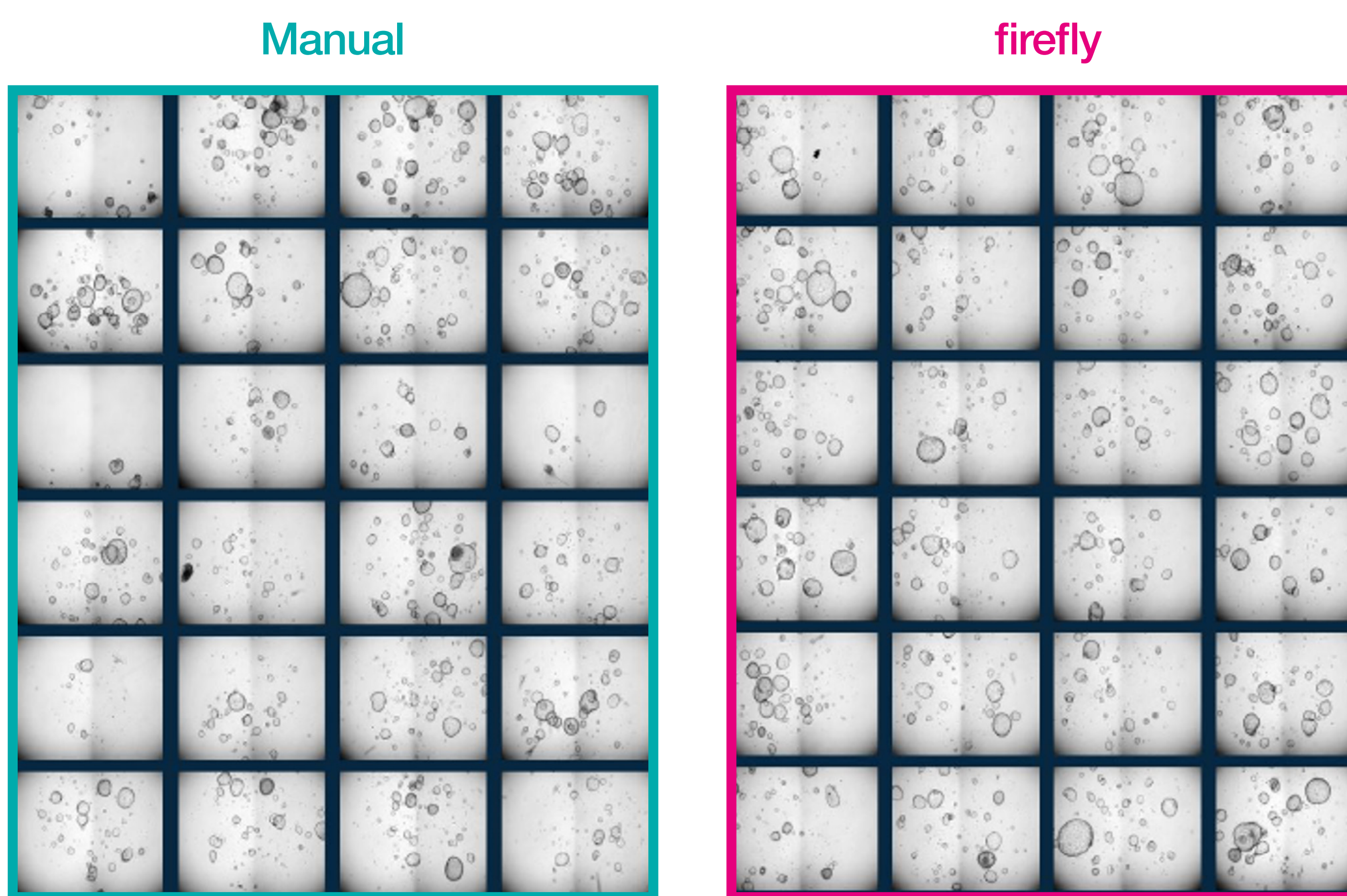


Figure 6. Organoid images of 24 wells seeded manually and on firefly after seven days of growth

Conclusion

firefly offers a more efficient and scalable method of dispensing 100% Matrigel-embedded endometrial organoids compared to manual pipetting. The challenges of handling viscous and temperature-sensitive Matrigel were solved by leveraging firefly's non-contact positive displacement technology and active cooling of reagent reservoirs to achieve precise and accurate dome plating in 96-well format. We demonstrated improved consistency across wells in organoid plating with firefly compared to the manual process, along with comparable organoid growth and morphology over seven days of incubation. Automating organoid plating with firefly is especially advantageous for high-throughput applications, where precise, accurate deposition of small Matrigel volumes into high-density plates is required, and manual processing is too labour-intensive and variable.