

## Developing a device for rapid high throughput fabrication of spheroids using interconnected chambers in a dynamic flow

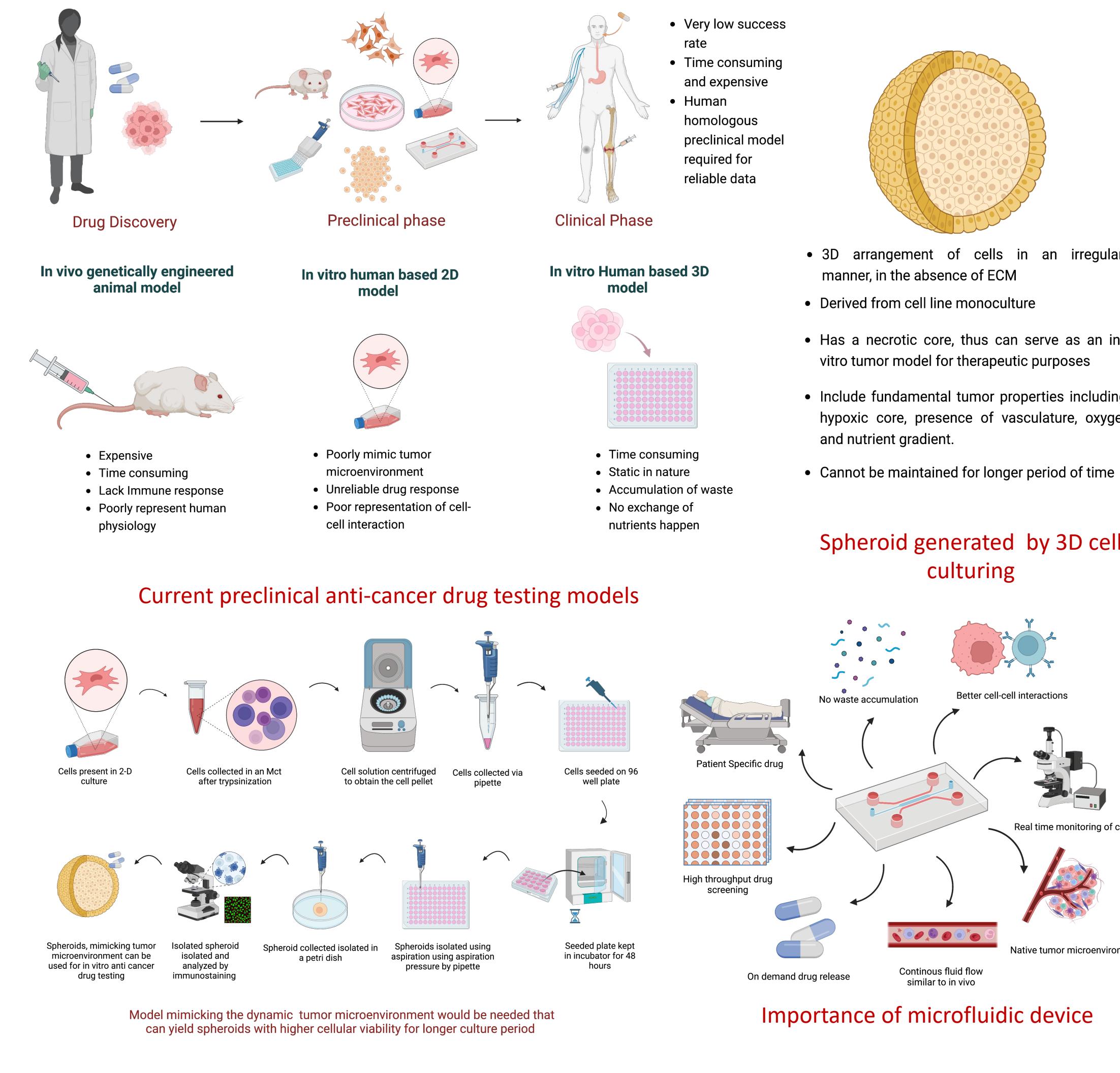
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### Abstract

Cancer is a highly lethal disease with increasing global incidence. Despite extensive research in labs to develop effective, safe, and economically viable anti-tumor drugs, the clinical approval rate for these drugs remains extremely low at 7%. This low success rate can be attributed to the unreliable nature of current preclinical drug testing models, such as animal models, mammalian cell lines, and 3D tumor models, each with their own limitations. Therefore, there is a need to develop a more reliable anti-cancer drug testing platform that better mimics the tumor microenvironment and yields dependable data. In this study, we utilized a combination of 3D printing, microfluidics, and 3D mammalian cell culturing of GFP+MDA-MB-231 and HDF cells as a proof of concept to develop tumor spheroids with higher cellular viability compared to spheroids formed in commercially available 96 well plates. Our innovative model also reduced the manual work required for spheroid generation. To assess cellular viability, Live Dead staining using ethidium homodimer and calcein was employed. Overall, our study presents a promising approach for a more reliable and efficient preclinical drug testing platform for anti-cancer drugs.

### Background and Motivation

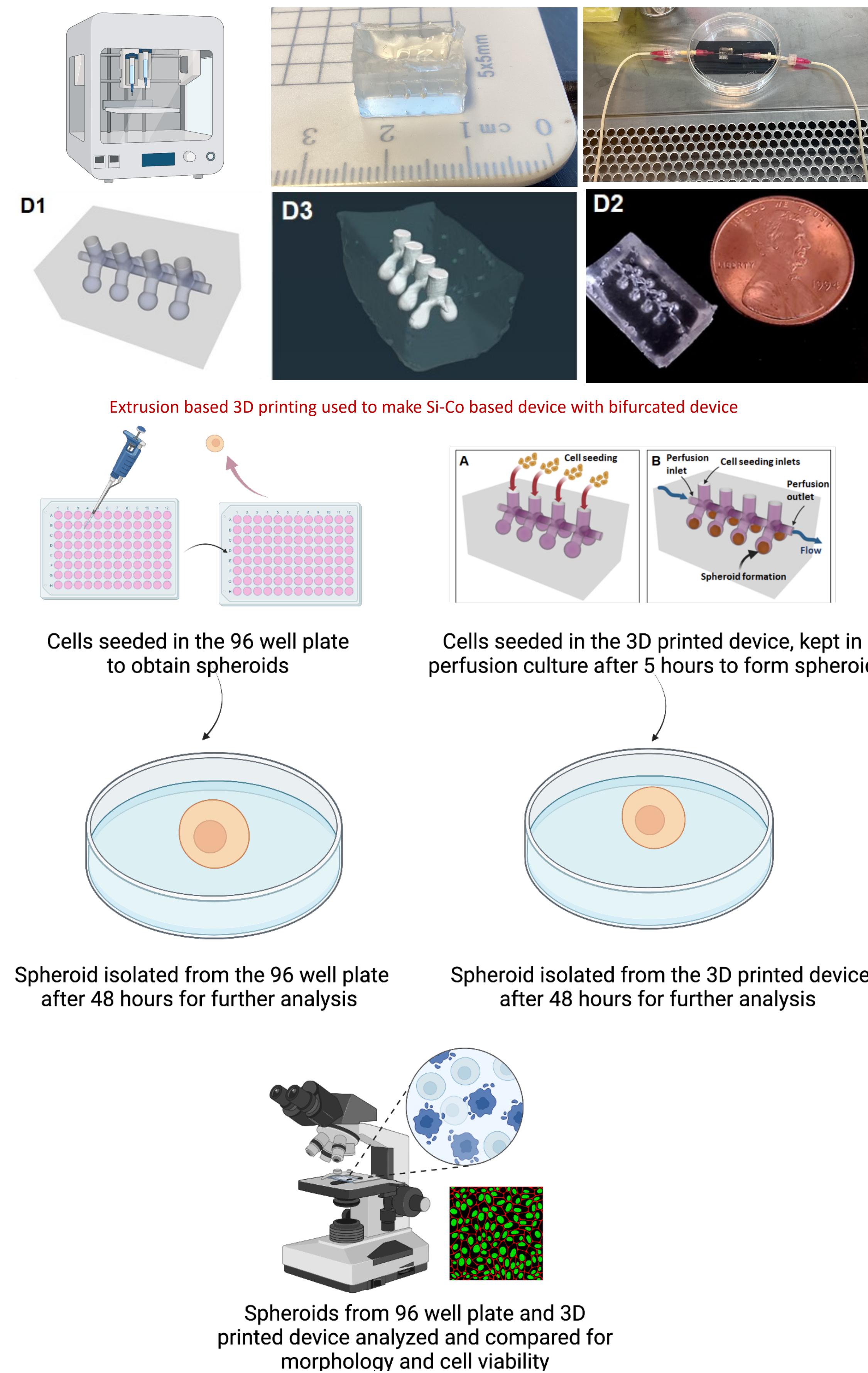


Therefore, it is necessary to develop new techniques to generate spheroids having high cellular viability in high throughput manner.

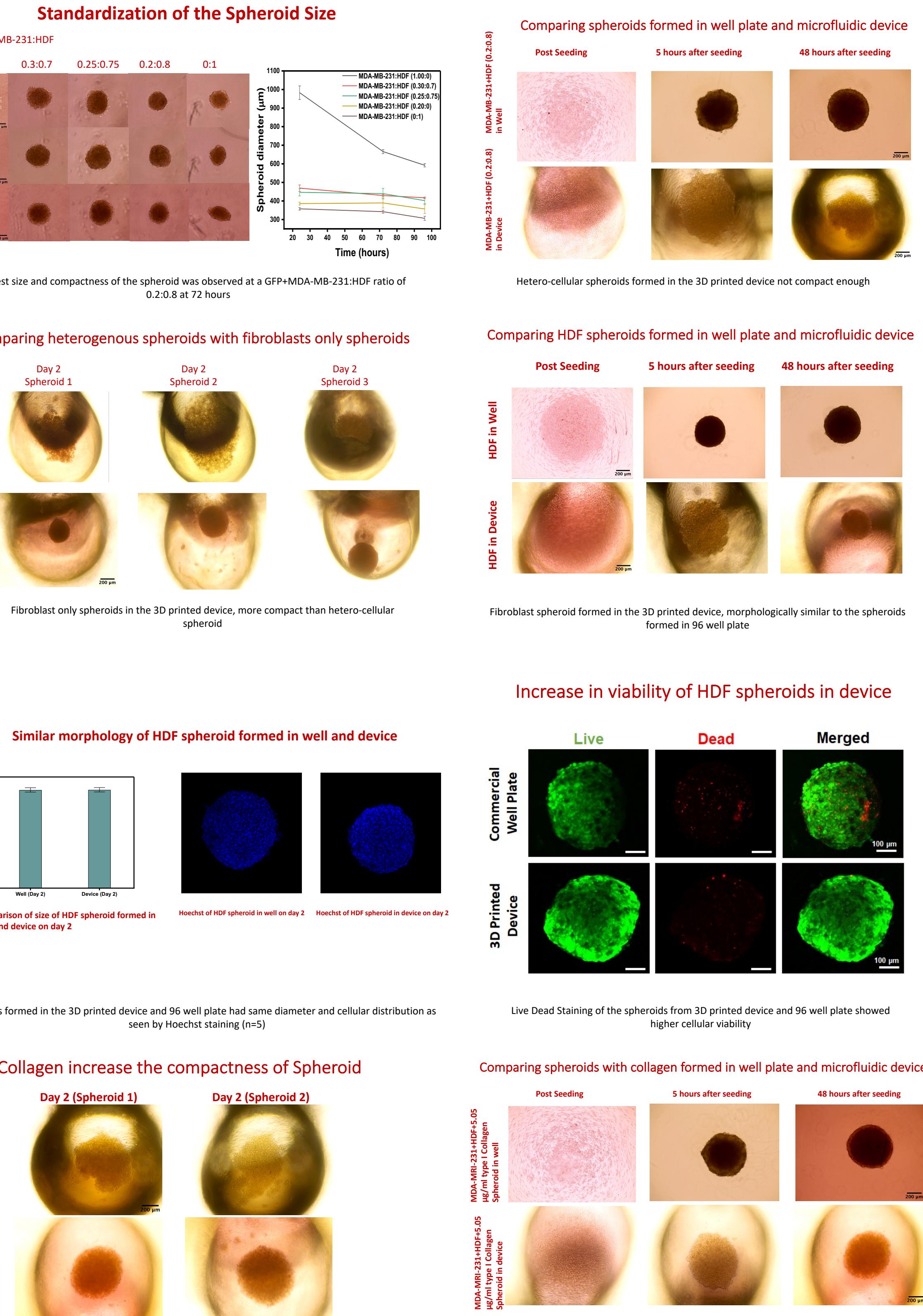
### Objectives

- To develop a 3-D printed microfluidic device
- To optimize the ratio of fibroblast and cancer cell for spheroid formation
- To seed the 3-D printed device with optimized cell ratio
- To check the cellular viability of the isolated spheroids

### Experimental setup



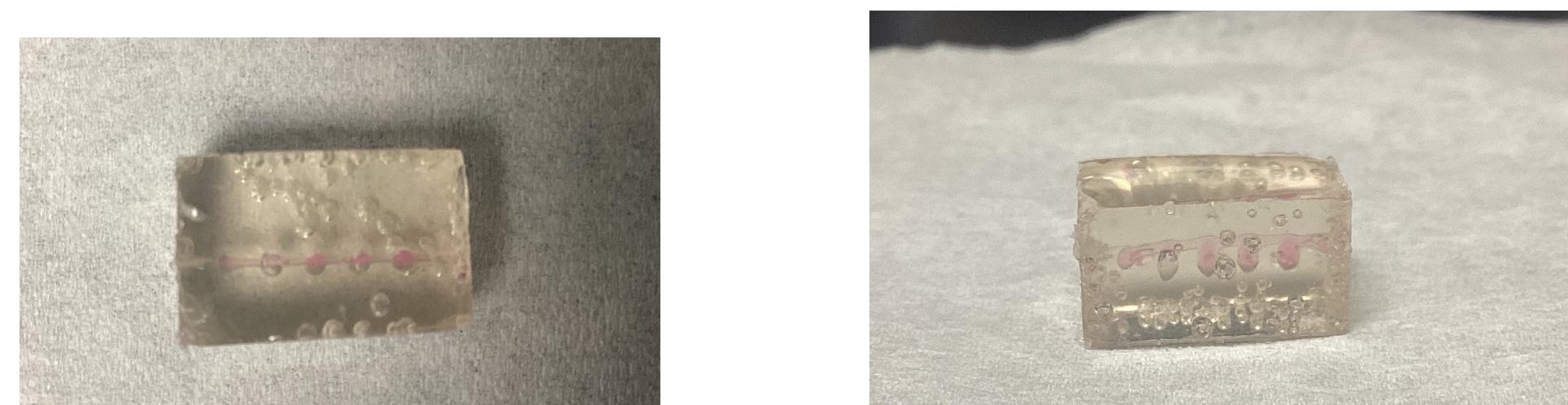
### Results



### Conclusions

The MDA-MB-231 and HDF ratio of 0.2:0.8 was suitable for hetero-cellular spheroid formation. The spheroids formed in the 3-D printed device and 96 well plate was morphologically similar to the spheroids formed in 96 well plate with a significant increase in the cell viability of the spheroids. The heterocellular spheroids formed in the 3-D printed device were not compact enough, but with the use of collagen compact heterocellular spheroids can be formed. These perfusable devices can be used for developing drug testing platforms for cancer therapeutics, spheroid-on-a-chip applications or spheroids can be removed from the devices for further applications including aspiration-assisted bioprinting.

### Future Perspectives



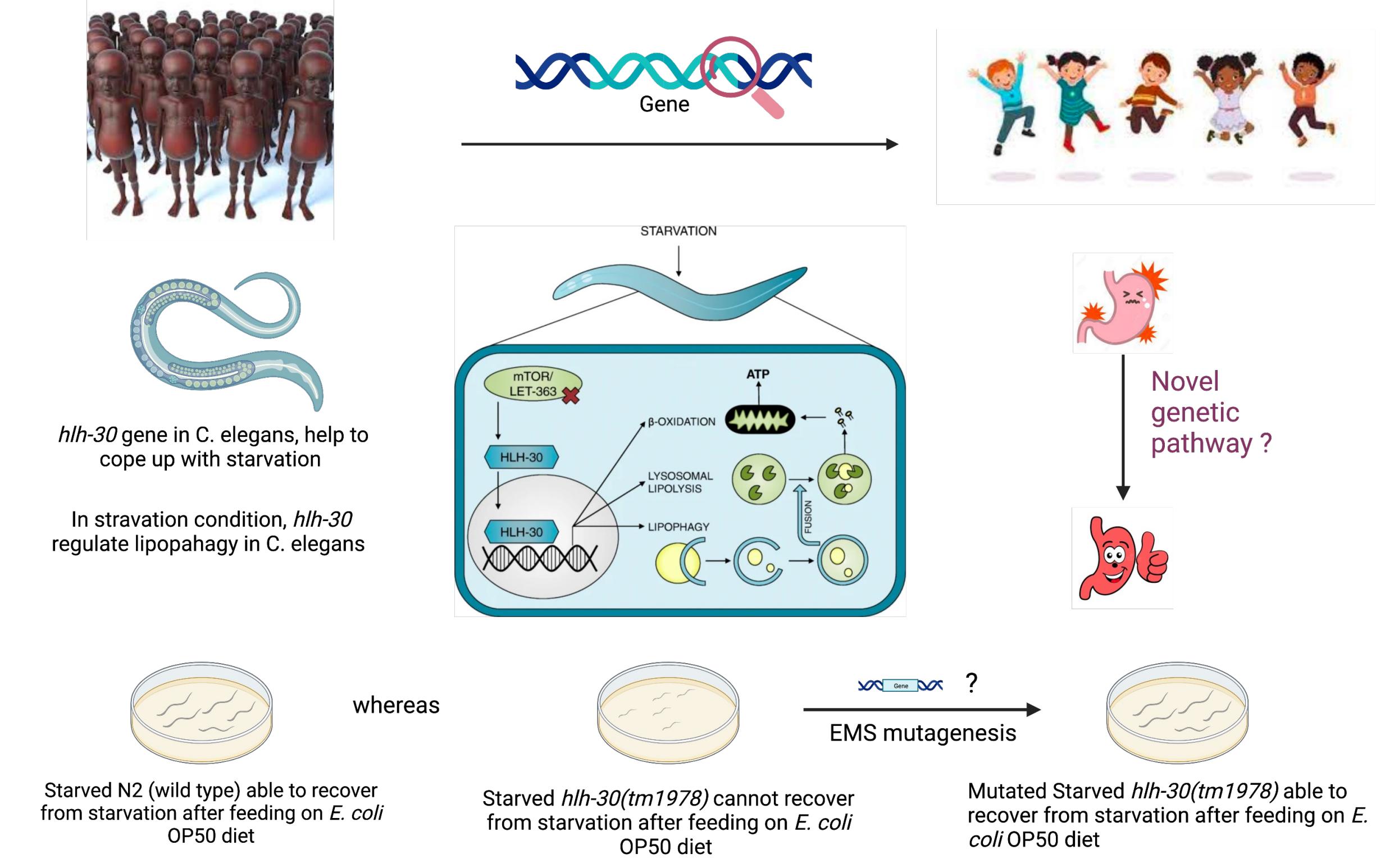
## Deciphering a novel starvation stress response pathway in *C. elegans*

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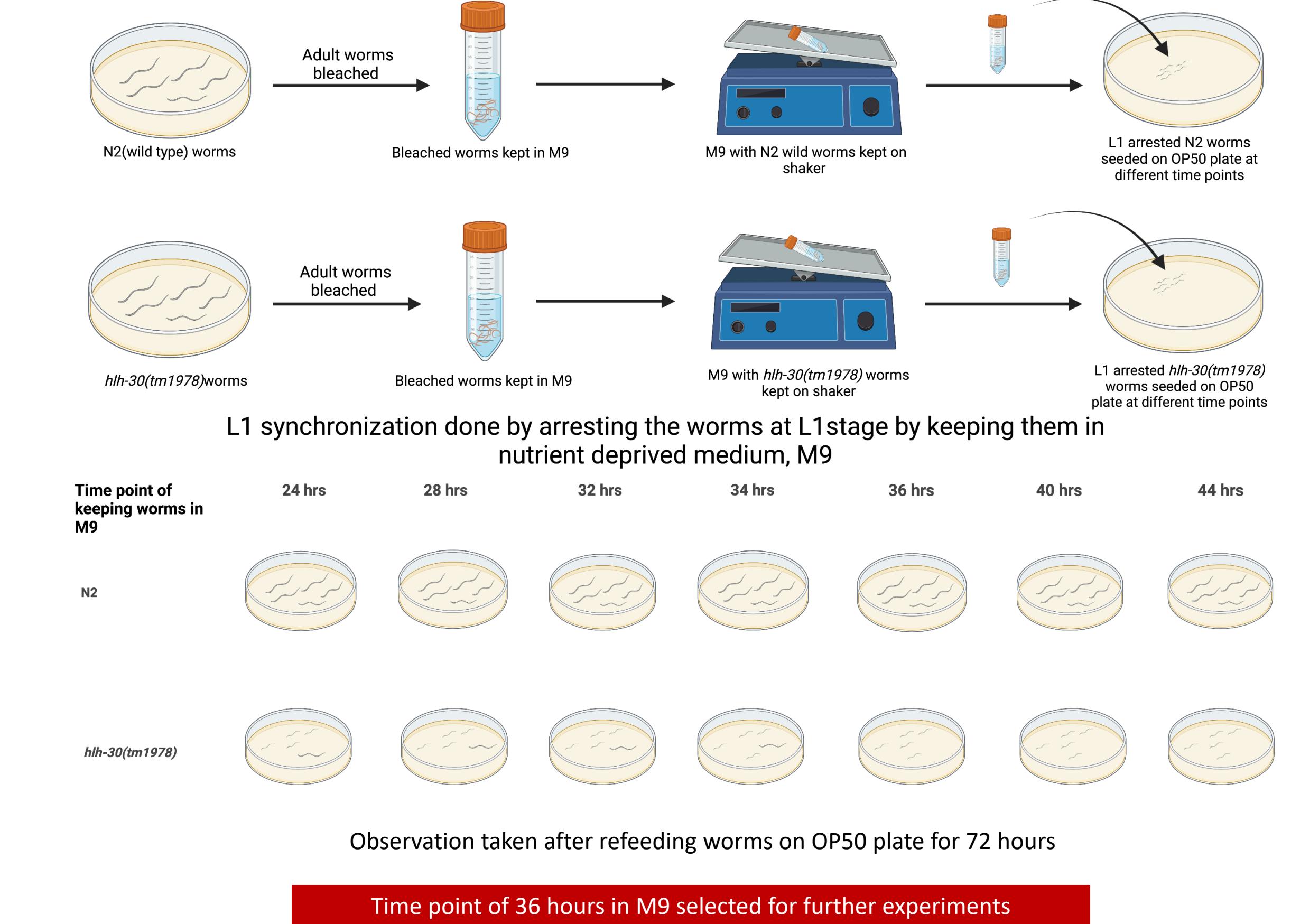
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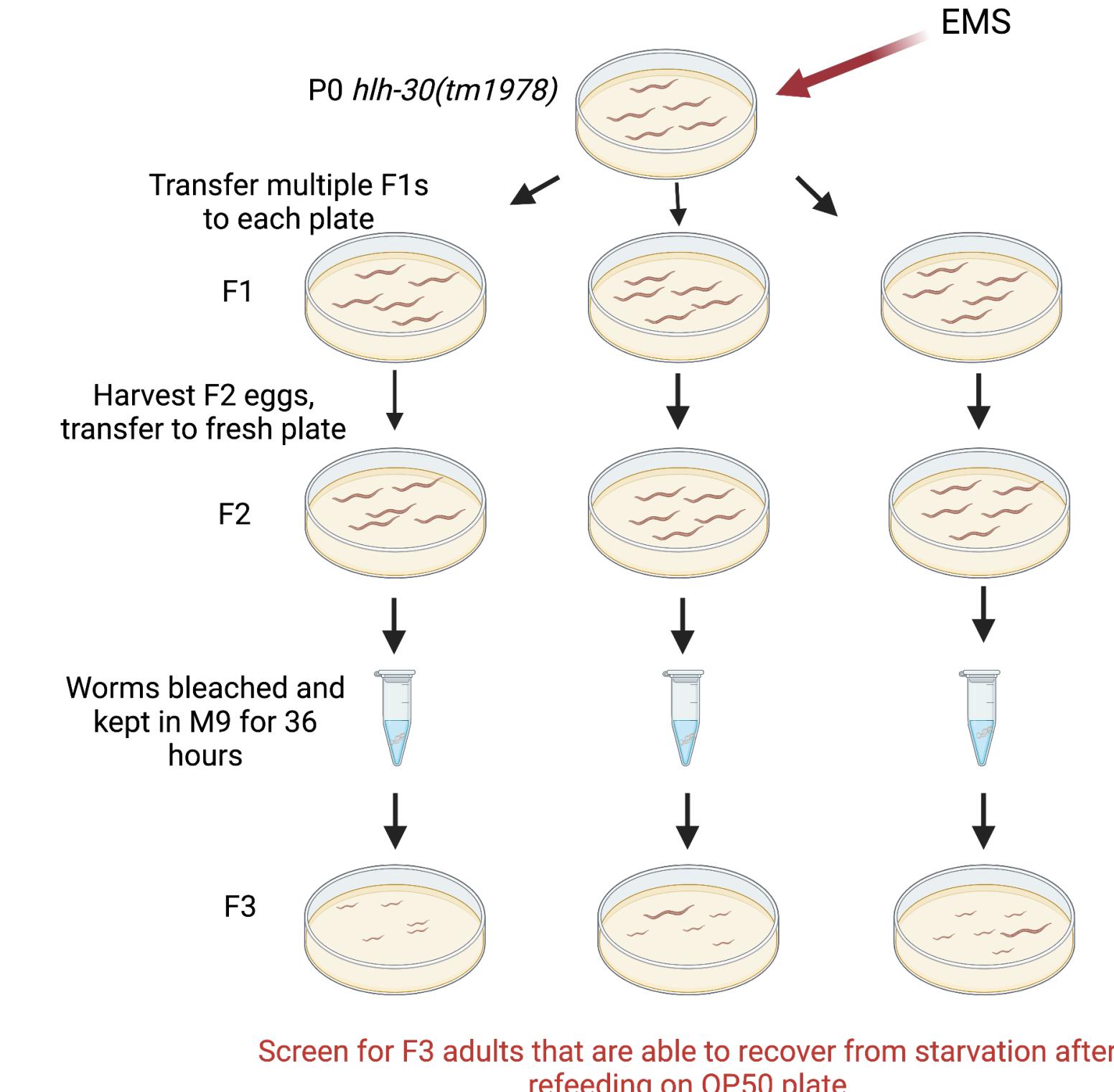
### Background and Motivation



### Experimental setup



### Future Perspectives



After optimization of time period, EMS mutagenesis will be performed to obtain mutants that can recover from starvation after OP50 refeeding. The mutants will be picked and maintained separately. After backcrossing and selfing, to remove any background mutation, the mutants will be sent for whole genome sequencing to find out the gene involved. Further experiments will be done to understand the role of the gene in the starvation recovery pathway.

### References and Acknowledgment

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