

**Bone & Joint
PROGRAM**

Fibre-based 3D Implants from Regenerated Silk Fibroin for Intervertebral Disc Regeneration

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INTRODUCTION

- Intervertebral discs (IVD) allow for six Degree-of-Freedom motion. However, they only have a very limited ability to self-repair in the event of degeneration or trauma.^{1,2,3}
- A promising approach to solve this problem could be the application of silk fibroin derived from the silk worm *Bombyx mori*.
- In the past, numerous studies have shown the remarkable biocompatibility and bio-mechanical properties of silk.^{4,5}

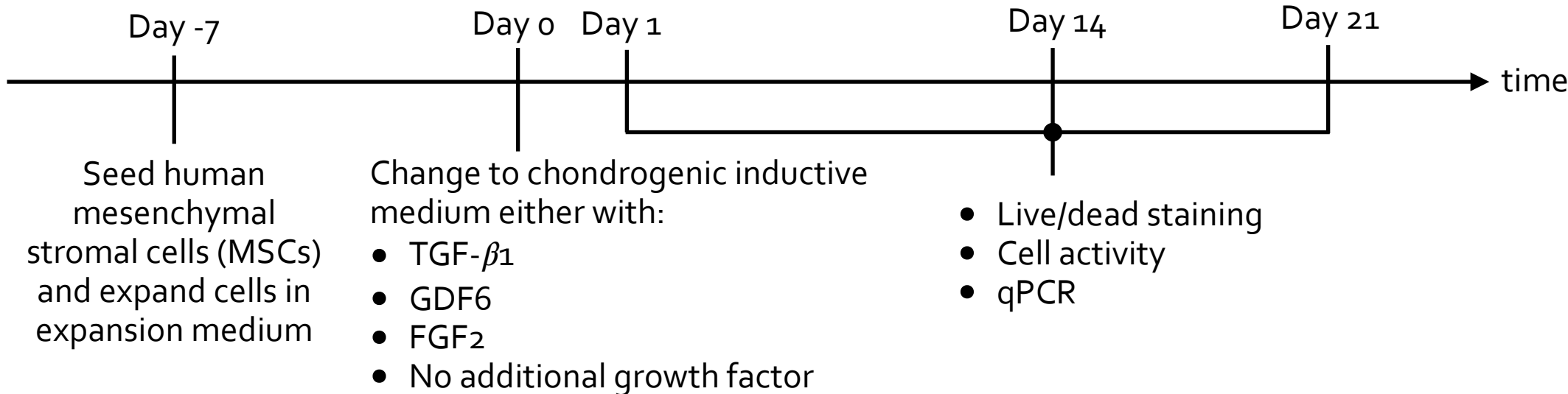
STUDY AIM

- Study the cyto-compatible properties of silk fibroin on human mesenchymal stromal cells with or without the addition of exogenously added growth factors.
- Investigate whether a 3D structure made of regenerated silk fibroin can potentially regenerate degenerated IVDs and ideally could be used for transplantation in patients suffering from damaged or degenerated IVDs.

MATERIALS AND METHODS



12-well plates covered with silk films



Day 1

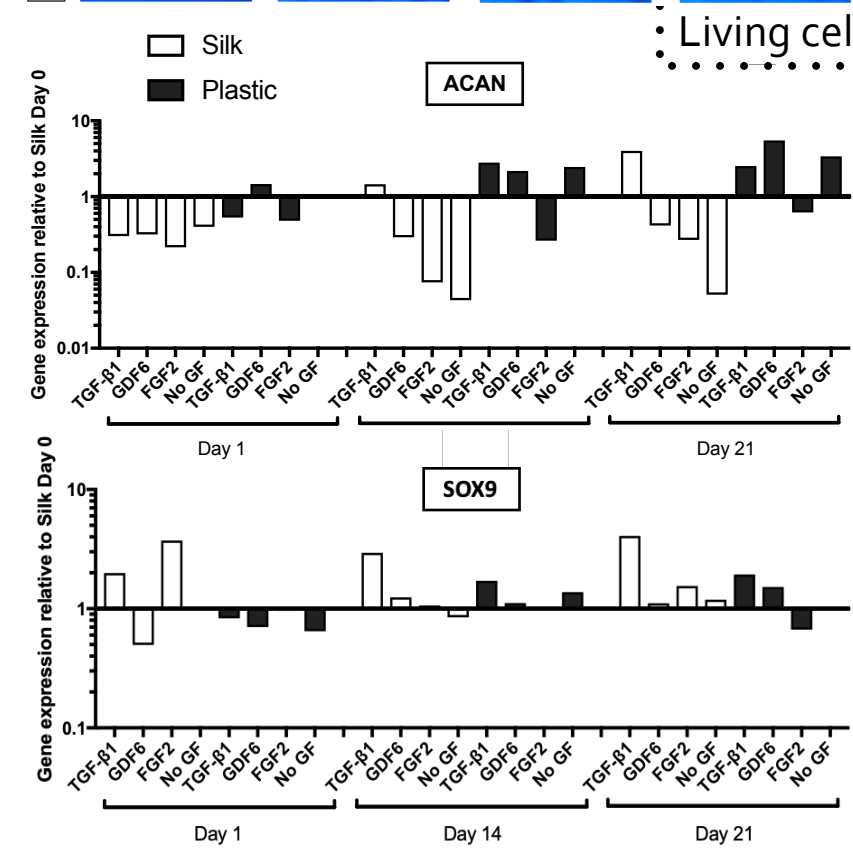
Day 14

Day 21

RESULTS

High cell viability at day 1. However, after 14 days, MSCs formed pellets on the silk films.

Living cells stained with Calcein-AM and dead cells stained with DAPI



NEXT STEPS ...



Investigate how 3D silk scaffolds, which mimic an IVD, influence the behavior of MSCs and IVD cells.

- Silk fibroin films promote pellet formation in MSCs and consequently decreases the cells' activity.
- All tested growth factors lead to a comparable chondrogenic differentiation of MSCs.

CONCLUSION

REFERENCES

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