
# CHRD 2021: Abstract & Poster Submission Form

**Submitter Name**

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|---|---|
| First | Last |

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**Research Category:**

- ◉ Basic Science
- ○ Clinical
- ○ Community Health / Policy

**What was your role in the project?**

- ☑ Design
- ☑ Perform Experiments
- ☑ Analyze Data
- ☑ Write Abstract
- ☐

**Presenter Status:**

- ◉ Undergraduate Students
- ○ Masters Student
- ○ PhD Student
- ○ Post-Doctoral Fellows
- ○ Residents
- ○ Non-Trainee

**Title**

Development of a Three-Dimensional (3D) Bioprinted Experimental Model of Rhabdomyosarcoma


**Background**

Rhabdomyosarcoma (RMS) is a childhood cancer of the skeletal muscle, and is the most common soft-tissue sarcoma. Treatments for RMS are available, but survivability is low in metastatic tumors.

**Objective**

Understanding why metastasis is so dangerous in RMS is difficult with current two-dimensional (2D) cell culture models, therefore we aimed to create a more lifelike model of RMS using novel 3D bioprinting technology.

**Methods**

RMS cells (RH30 or A204) were stained with a fluorescent cell tracker dye (1-5 μM) and imaged for several days to confirm the feasibility of long-term observation. Skeletal muscle was created by bioprinting C2C12 myoblasts in an alginate/collagen/fibrinogen bioink. Pre-stained RMS cells were mixed heterogeneously into C2C12 cells before printing (5% RMS cells), or inserted as a spot tumor during the bioprinting process. Bioprinted constructs were imaged daily by live-cell microscopy.

**Results**

RMS cells retained the cell tracker dye for several days in 2D culture, and could be easily stained with 5 μM dye the day before printing. RMS and muscle cells in a heterogeneous mixture printed easily, and the stained RMS cells survived and were trackable for several days within the bioprinted structure. Inserting RMS tumors at specific spots within the muscle presented technical challenges, but RMS cells could be restricted to approximately one quarter of the ring during initial printing. Over time, RMS cells formed clumps and expanded into the surrounding tissue. RH30 cells inserted as a tumor were metastatic within the bioprinted muscle, and were eventually observed throughout the entire structure.

**Conclusion**

Our 3D bioprinted model of RMS shows great promise as an improved model for studying cancer cell survival and metastasis. Moving forward, we will trial new printing strategies to create more dense tumors, and test the response of bioprinted RMS cells to mitogens and chemotherapy drugs to simulate disease and treatment.

# Authors

- For each author, please click "**[+] Add Item**" and provide the author's information

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