

# HOW Hard Candy CAN HELP US MAKE ...Artificial Organs?!

Artificial organs can help treat diseases like diabetes and shorten transplant waitlists

**300K**

CANADIANS ARE LIVING WITH TYPE 1 DIABETES

**4052**

CANADIANS ARE WAITING FOR A TRANSPLANT

LAST YEAR

**280**

CANADIANS HAVE DIED WAITING FOR A TRANSPLANT

Artificial organs need **blood vessels** to survive & function

These are needed to distribute nutrients and oxygen that keep the organ healthy

Did you know...

## WE CAN CREATE BLOOD VESSELS USING Hard Candy?

1



We start by making a 3D template of a blood vessel pattern

2



An artificial organ can then be built around the template

3



We can then remove the template to end up with hollow channels

4



The hollow channels can then work as blood vessels

**HARD CANDY IS GREAT FOR MAKING 3D BLOOD VESSEL TEMPLATES**

- It's affordable, accessible, cell-friendly, and it can easily be removed from the organ to leave behind hollow channels!

**WE CAN ALSO 3D PRINT IT!**

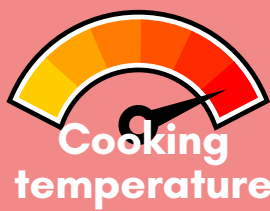
3D printing is **precise and automated** making it amazing for creating **complex and intricate patterns** - like what we see in blood vessels!



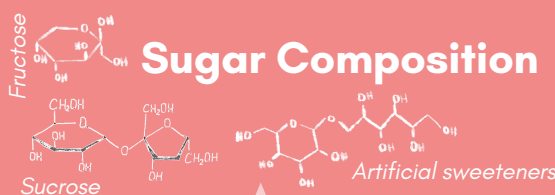
Sugar can be easily and safely washed away with water

**But...** not all 3D printing inks are created equal!

We can customize the behavior of candy based on:



**Cooking temperature**



**Water Content**

Lower cooking temperature

Syrups



Fondant

Taffy



Hard candy



Caramel sugar glass



Higher cooking temperature

Lower water content

Softer & less solid

Here's a great place to be: strong and rigid but not too caramellized!

During caramelization, many chemical reactions occur at once making the final material unpredictable and difficult to control

HARDER & MORE SOLID

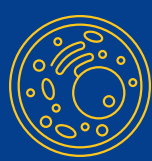
**USING ONLY SUCROSE, A LOW WATER CONTENT, AND A HIGH COOKING TEMPERATURE, WE CREATED A 3D PRINTABLE HARD CANDY THAT WE CAN USE TO:**

...print blood vessel templates that are large and intricate enough for human-sized artificial organs

...accurately reproduce computer-generated designs & patterns



...print templates that are structurally stable for long periods of time



& do all this without harming cells!

RESEARCH ARTICLE HERE:



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