

Figure 1.  
Family Tree of  
perfluoroalkyl and  
polyfluoroalkyl  
Substances

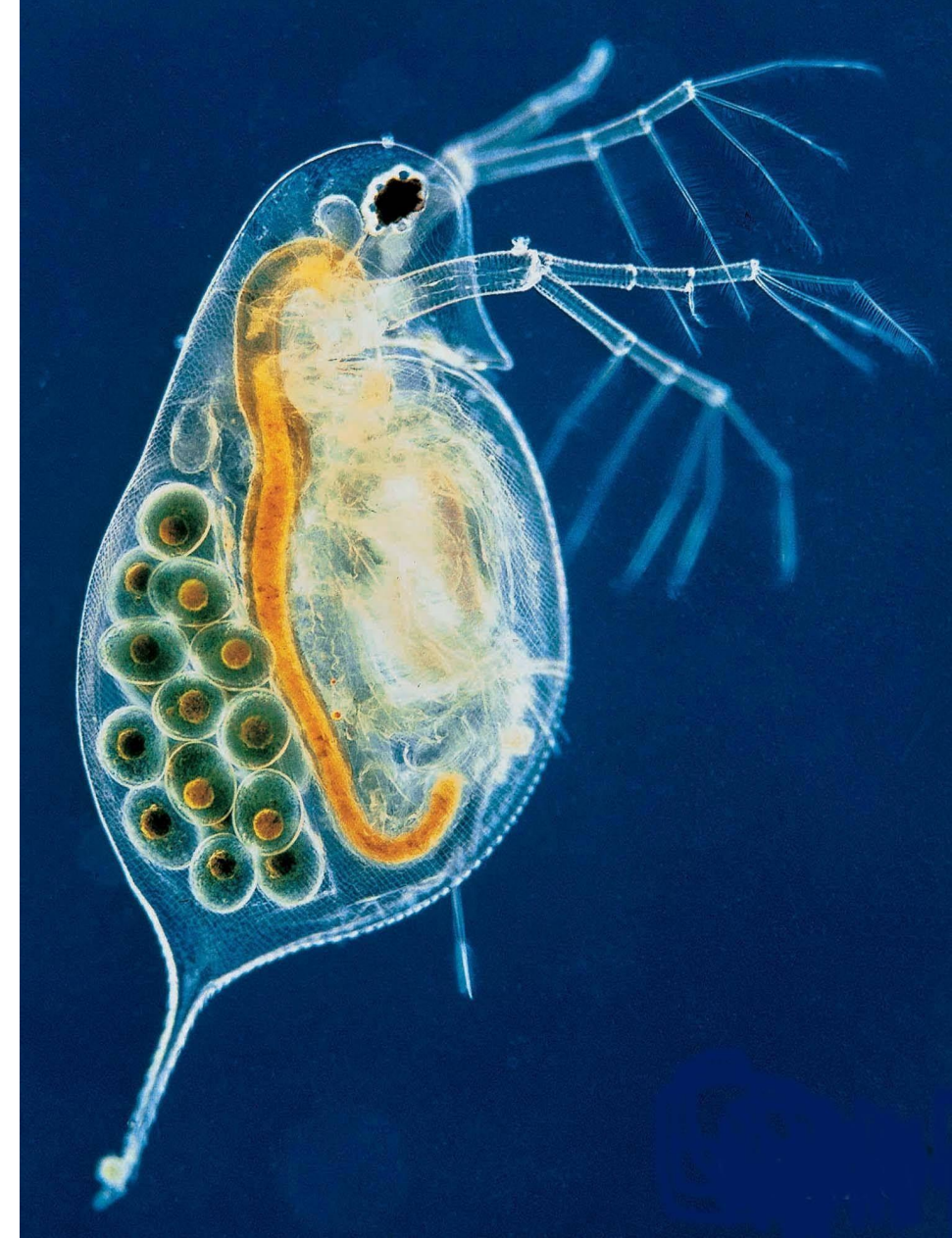
# The effects of PFAS on *Daphnia magna*

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# Summary

In this project, I explored the effects of PFAS on the microorganism *daphnia magna*

- PFAS (Teflon non stick spray) was sprayed into petri dishes containing *daphnia magna* cultures
- The heart rate of the *daphnia* was measured using a microscope
- There were two petri dishes of control cultures and two of Teflon cultures
- The results supported my alternative hypothesis that the heart rate of the *daphnia* in the teflon petri dish was significantly lower than the heart rate of the *daphnia* in the control petri dish

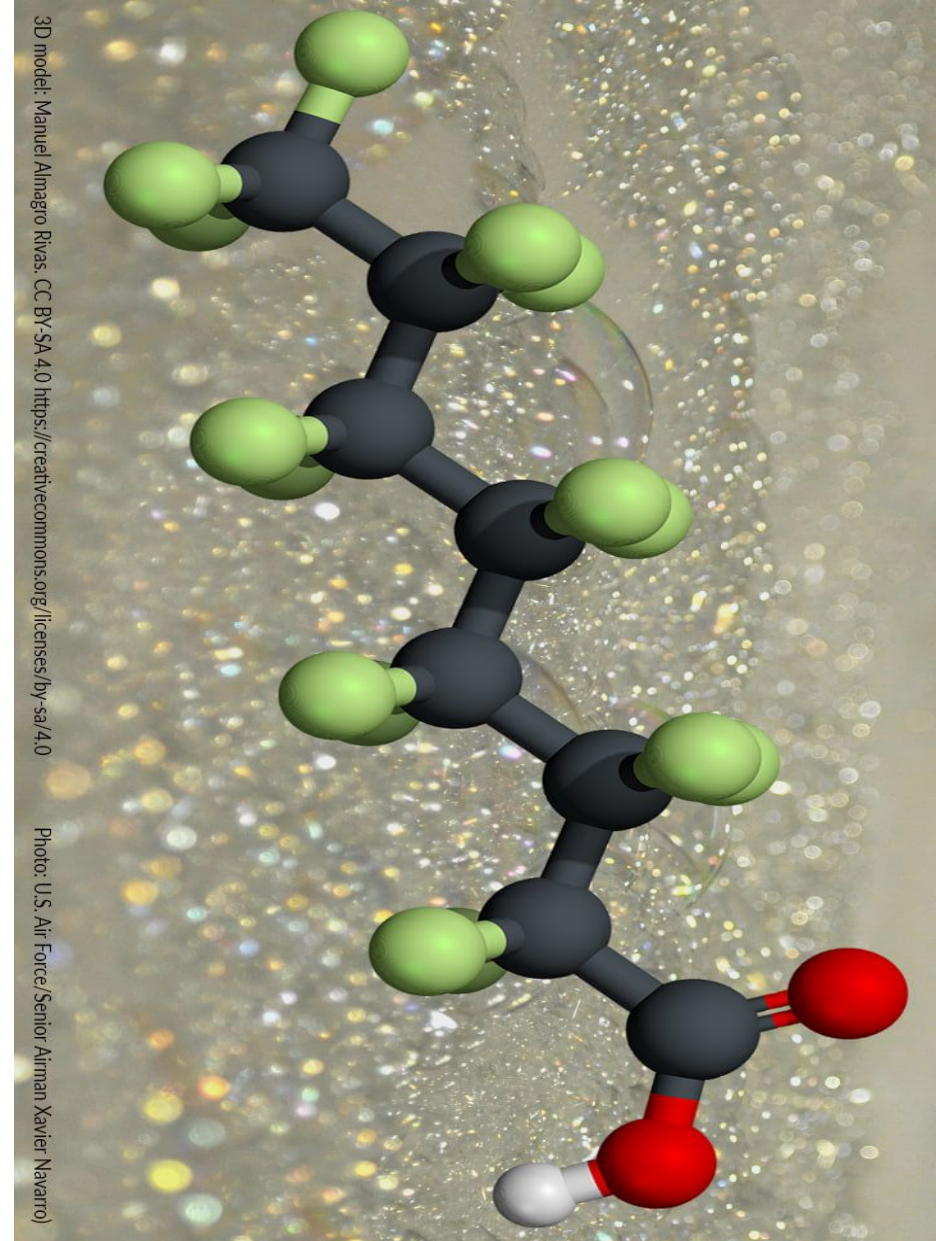


<https://www.pinterest.com/pin/317785317448189093/>

Link to the image source

# What are PFAS?

- PFAS are a group of manmade chemicals that are made up of a linkage of fluorine and carbon atoms (C8HF15O2)
- These chemicals are found everywhere from our nonstick cookware, stain and water repellents to the foams used by firefighters to fight fires
- They have very unique properties - resistant to degradation (due to Carbon - Fluorine Bonds strength)
- These chemicals have become a concern in the recent past because of the adverse health effects they can cause to the human body such as cardiovascular disease, which is the one I focused on in this project
- Other effects include cancer, liver damage, decreased fertility, increased risk of asthma and increased risk of thyroid disease



<https://www.iafc.org/topics-and-tools/resources/resource/pfas>

Link to the image source

# Hypothesis

I performed a one tail t test, so I needed both a null and alternative hypothesis

1. Alternative Hypothesis: The heart rate of the daphnia magna in the Teflon petri dish will be significantly lower compared to the heart rate of the daphnia in the control petri dish
2. Null Hypothesis: The heart of the daphnia magna in the Teflon petri dish will not be significantly different from the heart rates of the daphnia magna culture in the control petri dish

# Materials

- Syringe
- *Daphnia magna* (Home Science Tools)
- Petri Dishes
- Teflon Non-Stick Coating
- Water
- Microscope (Maximum Magnification 1200 x)
- Timer

# Procedure

- 1) Fill both petri dishes to the brim with water
- 2) Spray the teflon spray into two of the petri dishes
- 3) Let the petri dishes sit for an hour
- 4) Add the daphnia magna cultures using a syringe into both petri dishes
- 5) Wait for 30 minutes
- 6) Grab the syringe and take out one daphnia magna from the control petri dish
- 7) Put it on the microscope slide and count heart rate for 15 seconds and multiply it by 4 to get the beats per minute
- 8) Repeat step 7 with the control daphnia 5 times
- 9) Repeat steps 6 - 8 with the Telfon daphnia
- 10) Put the daphnia back into the petri dishes and wait for another 30 minutes
- 11) Repeat steps 6 - 10 in order to collect more data



Teflon Petri Dish

Taken by me



Control Petri Dish

Taken by me

# How did I record my data?

## Control

- Each time I went to measure the heart rate, I measured it 5 times meaning I took five readings
- Then, I put this into a table and calculated the average

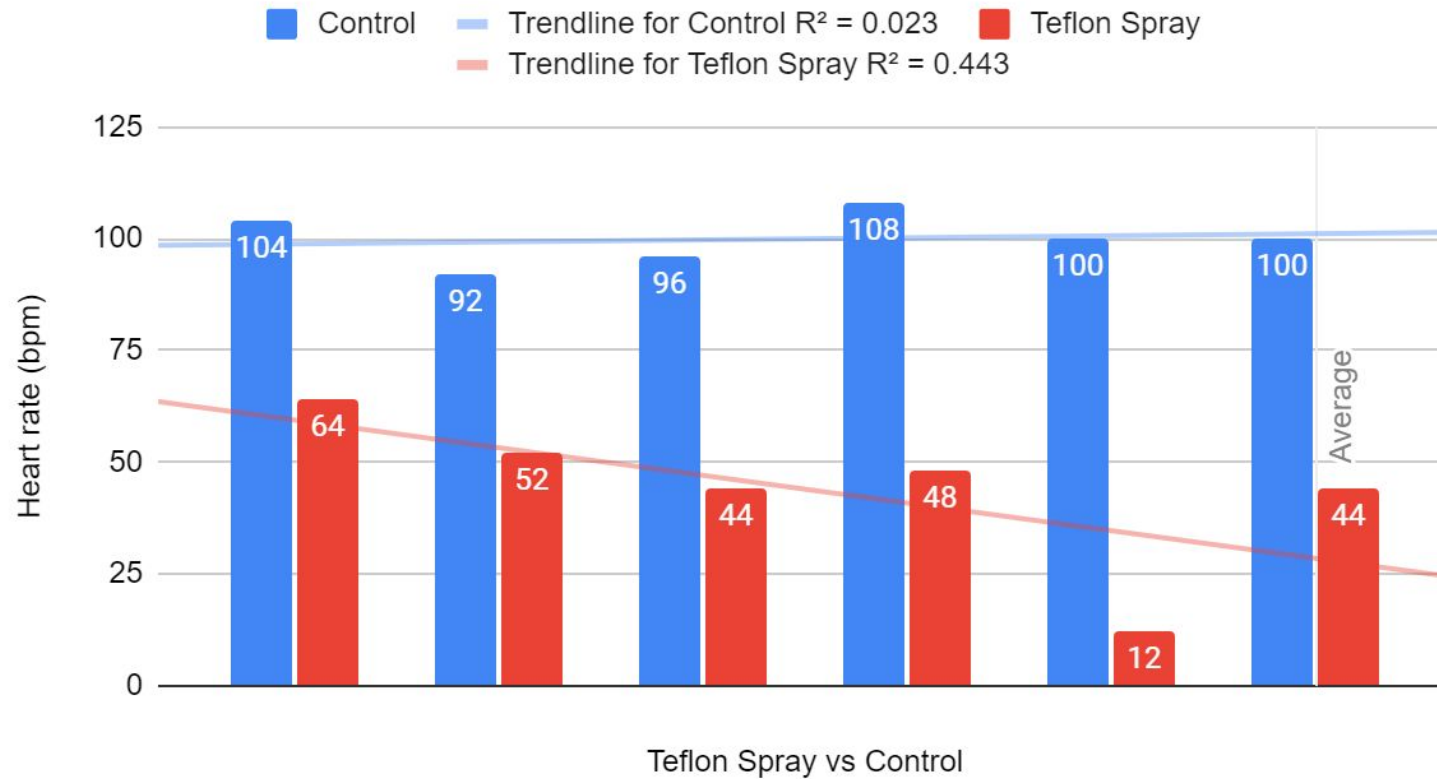
## Teflon

- Each time I went to measure the heart rate, I measured it 5 times meaning I took five readings
- Then, I put this into a table and calculated the average

# Charts and Graphs

After 30 minutes

## Teflon Spray vs Control Daphnia Magna after 30 minutes

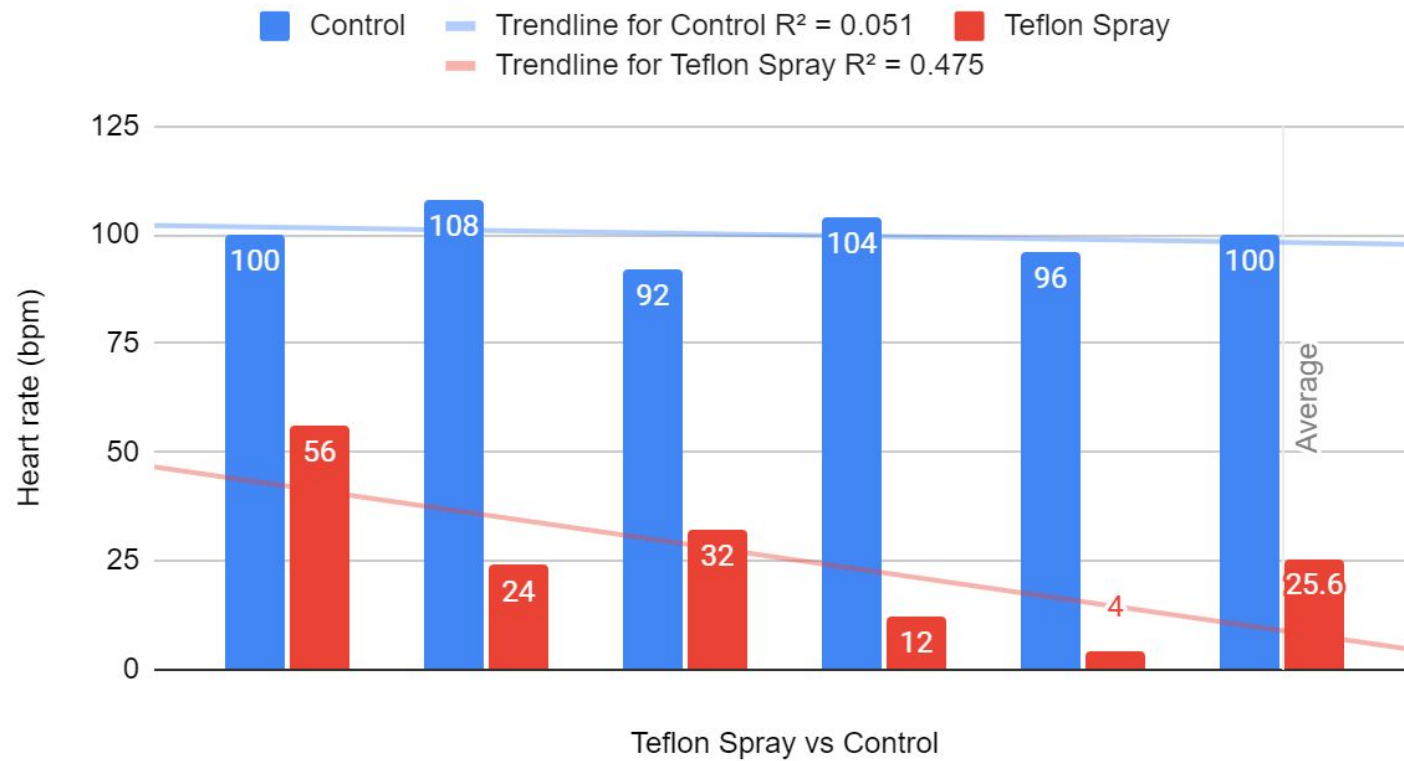




# Charts and Graphs

After 30 minutes (2<sup>nd</sup> trial)

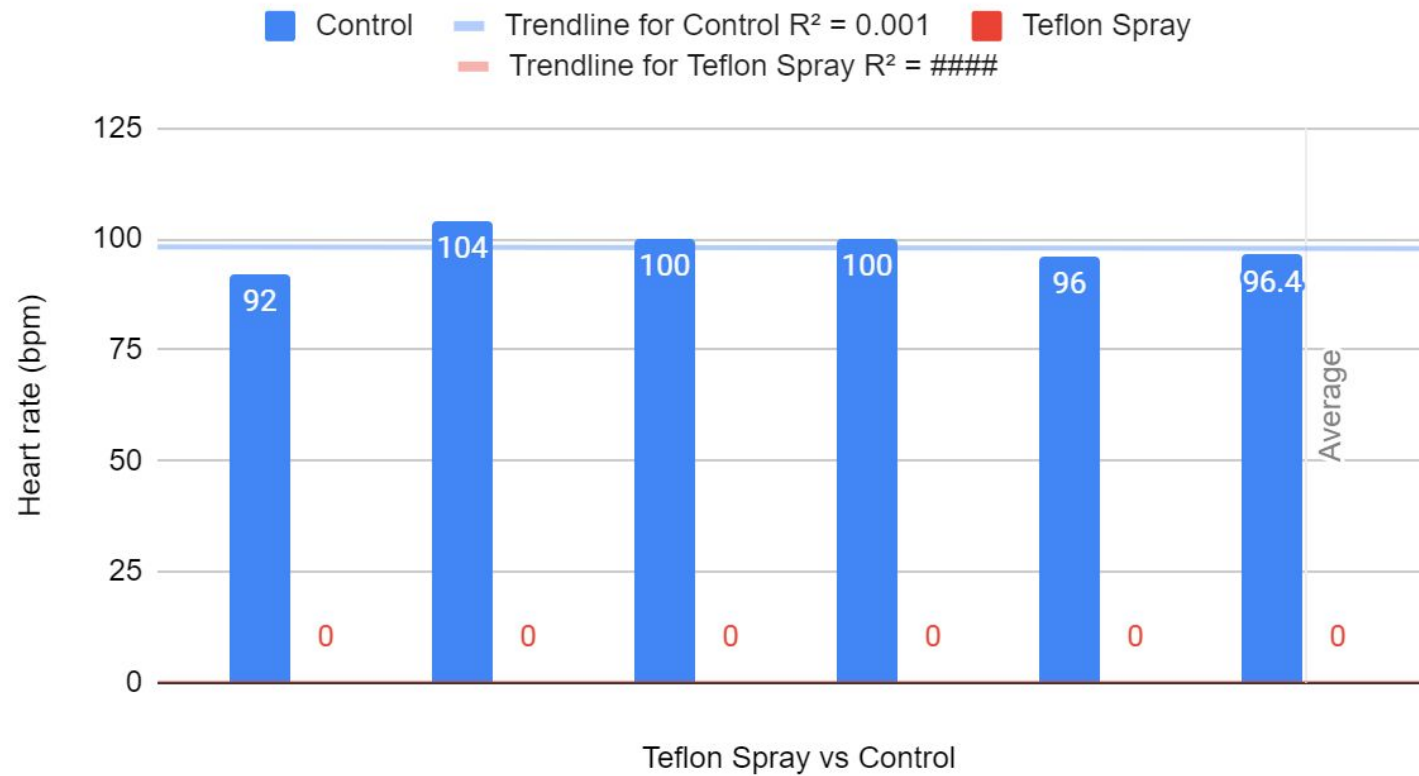
## Teflon Spray vs Control Daphnia Magna after 30 minutes



# Charts and Graphs

After 1 hour

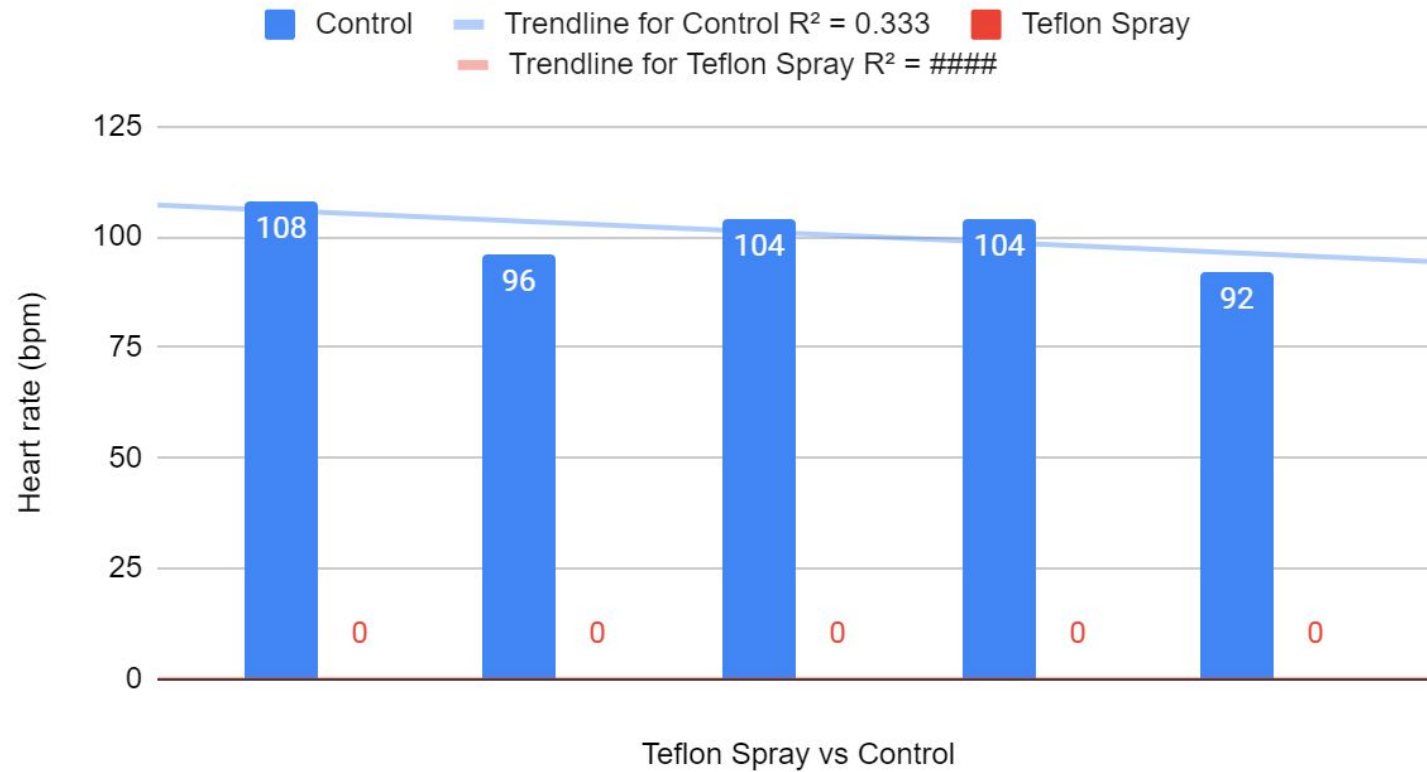
## Teflon Spray vs Control Daphnia Magna after 1 hour



# Charts and Graphs

After 1 hour (2<sup>nd</sup> trial)

## Teflon Spray vs Control Daphnia Magna after 1 hour



# Mean and Standard Deviation Table

	Mean (bpm)	Standard Deviation
Control - 30 mins	100	6.3
Teflon - 30 mins	34.8	19.8
Control - 60 mins	98.6	5.6
Teflon - 60 mins	0	0

# T Test table

Trial Number	P values	T values
1	0.00002415951072	7.88816
2	0	48.24457
3	0.0001385985529	6.13941
4	0.000000000285731664	34.29286

# Conclusion and Future Plans

- My results were supportive of my hypothesis and the heart rate of the daphnia in the Teflon petri dish was significantly lower than the heart rate of the daphnia in the control petri dish
- Future research ideas include testing the water to check that PFAS was the only cause of the death of the daphnia
- I am evaluating the option of changing the microorganism to see the effects on different body systems



# Thank you

