

Edexcel A Biology A-Level

Core Practical 1

Investigate the effect of caffeine on heart rate in *Daphnia*.



In humans, caffeine is a **stimulant** which increases heart rate by **increasing release of excitatory neurotransmitters**. *Daphnia* are water fleas, used in this case because they have a **translucent** body through which the heartbeat can be observed, and hence the effect of caffeine on heart rate can be measured.

Equipment

- *Daphnia*
- Cavity slides
- Dropping pipettes
- Distilled water
- Caffeine solution
- Cotton wool
- Test tubes
- Stop clock
- Filter paper
- Optical microscope

Method

1. Dilute the caffeine solution with **distilled water** to produce several **different concentrations**.
2. Place some cotton wool (to **restrict movement**) on a cavity slide. Add **one** large water flea.
3. Use filter paper to absorb the water around the flea.
4. Then use a dropping pipette to add a **few drops of distilled water** to the slide. **Do not** use a coverslip to prevent conditions from becoming **anoxic**.
5. Use a stop clock to time a **minute** and record the **number of heartbeats**.
6. Repeat the experiment, replacing the distilled water with a **caffeine solution**.

Risk Assessment

Hazard	Risk	Safety Precaution	In emergency	Risk Level
Biohazard	Contamination	Use disinfectant; wash hands with soap after handling <i>Daphnia</i> .	Seek assistance	Low





Broken glass	Cuts from sharp object	Take care when handling glassware; keep away from edge of desk	Elevate cuts; apply pressure; do not remove glass from wound; seek medical assistance	Low
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Graph

- Plot a graph of **heart rate** against **caffeine concentration**.

Conclusion

- Caffeine **increases** the heart rate of *Daphnia* by increasing the release of **stimulatory neurotransmitters**. As concentration of caffeine increases, heart rate also increases.

NB: it is important to treat the *Daphnia* **ethically** during the experiment and **release them** back into a **stream/pond** afterwards.

