

Humanised model systems for practical teaching and demonstration of pharmacokinetic processes

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SJ Tucker

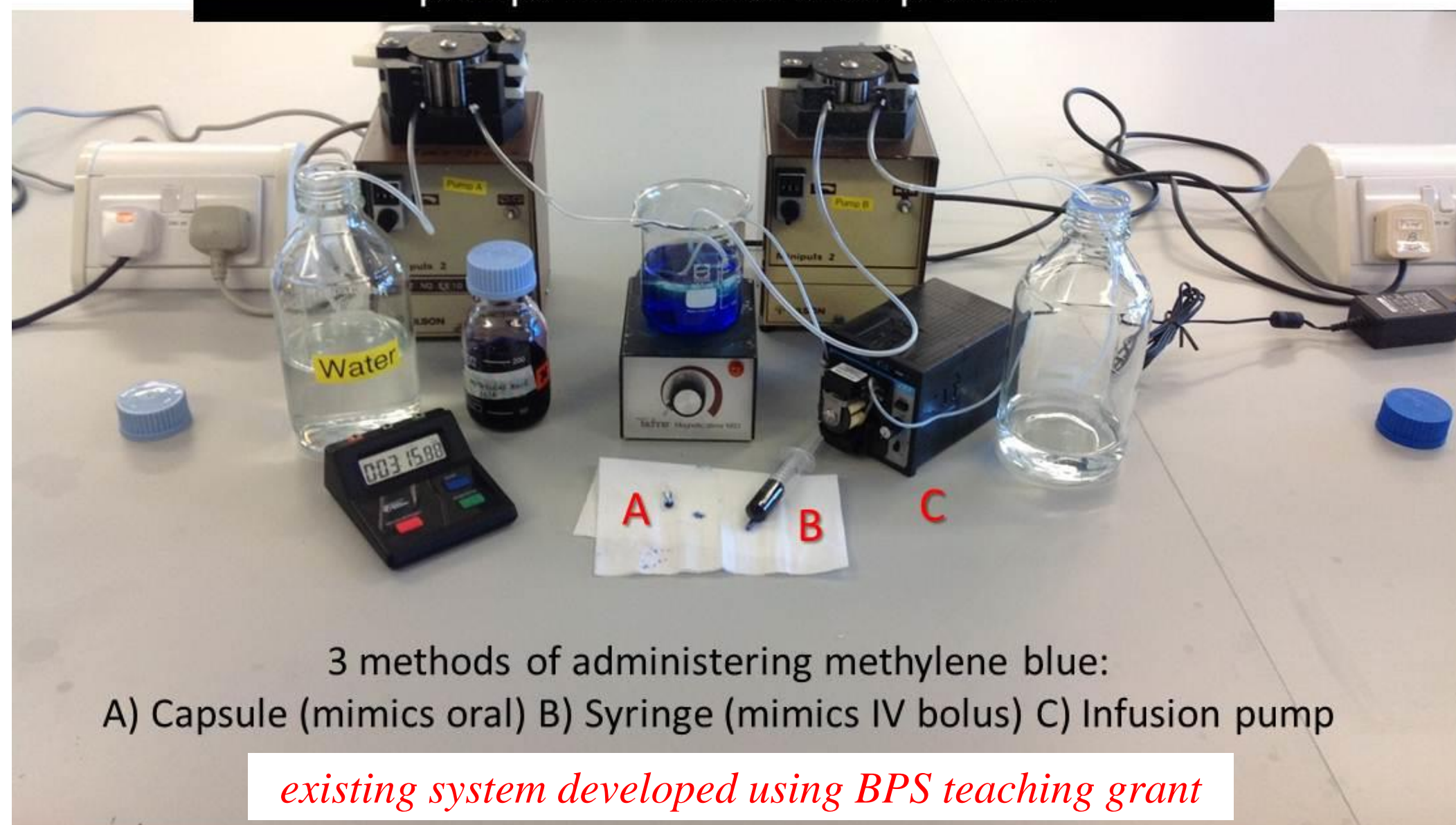


School of Medicine, Medical Sciences & Nutrition, University of Aberdeen

1. Background context

- Pharmacokinetic teaching has been enhanced by development of model systems **funded by BPS teaching grants**
- These are effective, but are quite far removed from the actual human:

central beaker contains volume of distribution, pumps mimic clearance process



3 methods of administering methylene blue:
A) Capsule (mimics oral) B) Syringe (mimics IV bolus) C) Infusion pump

existing system developed using BPS teaching grant

The apparatus used to model pharmacokinetic processes in class practicals. This has created a novel, interactive and innovative way of teaching the subject and allowing students to bring the numbers to life.

2. Aim

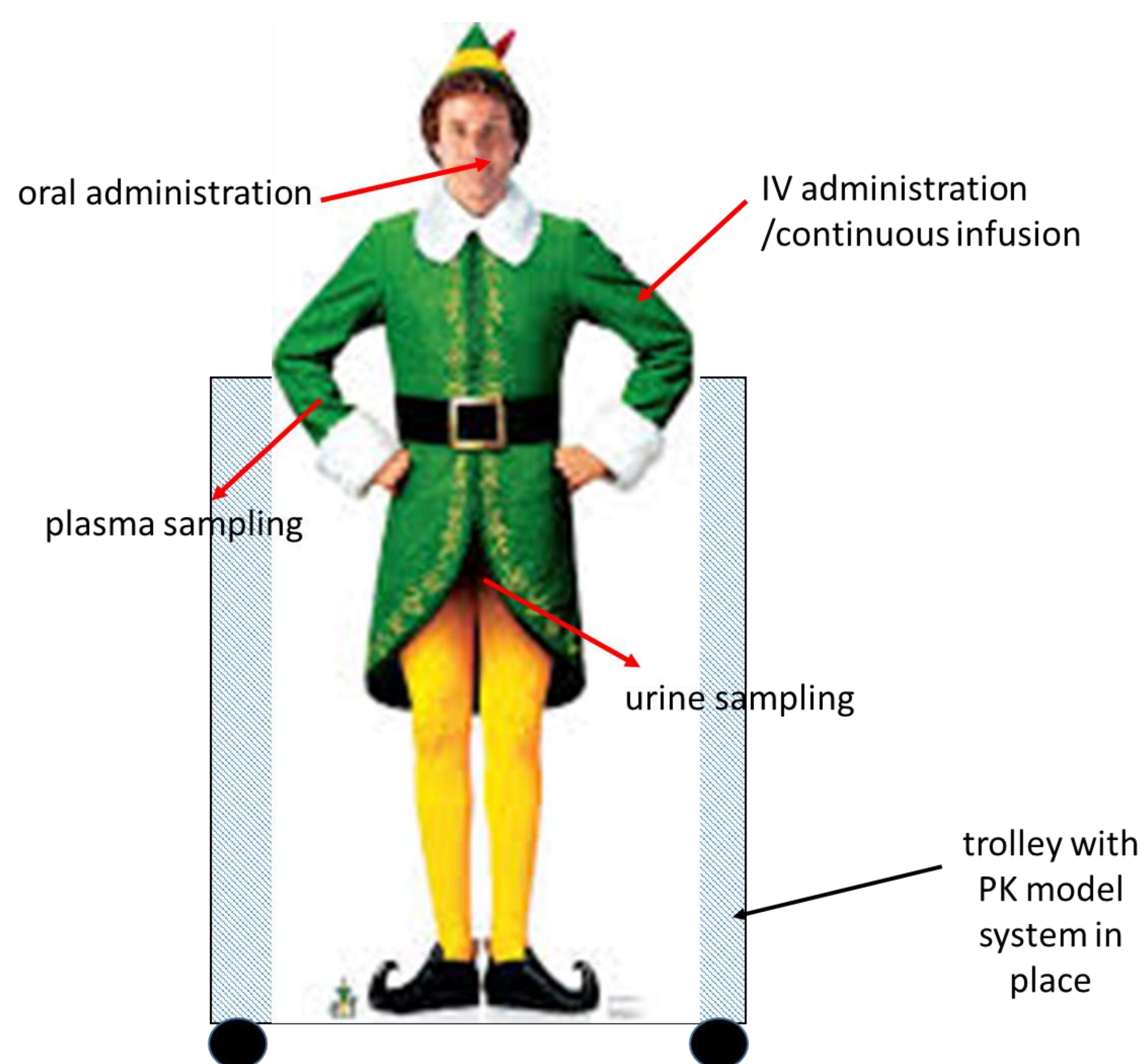
- To streamline the existing system into a more flexible modular system
- To enhance the model with humanised apparatus and develop project-based study rather than prescribed practical classes

3. Streamlining/mobilisation



- The system was adapted onto a trolley
- far more mobile, easy to store and flexible
- requires transformation into a more human form for better PK understanding
- mounted a wooden cut out of a human on the front of the trolley, and threaded tubes from apparatus into place for drug administration and sampling

4. Humanisation



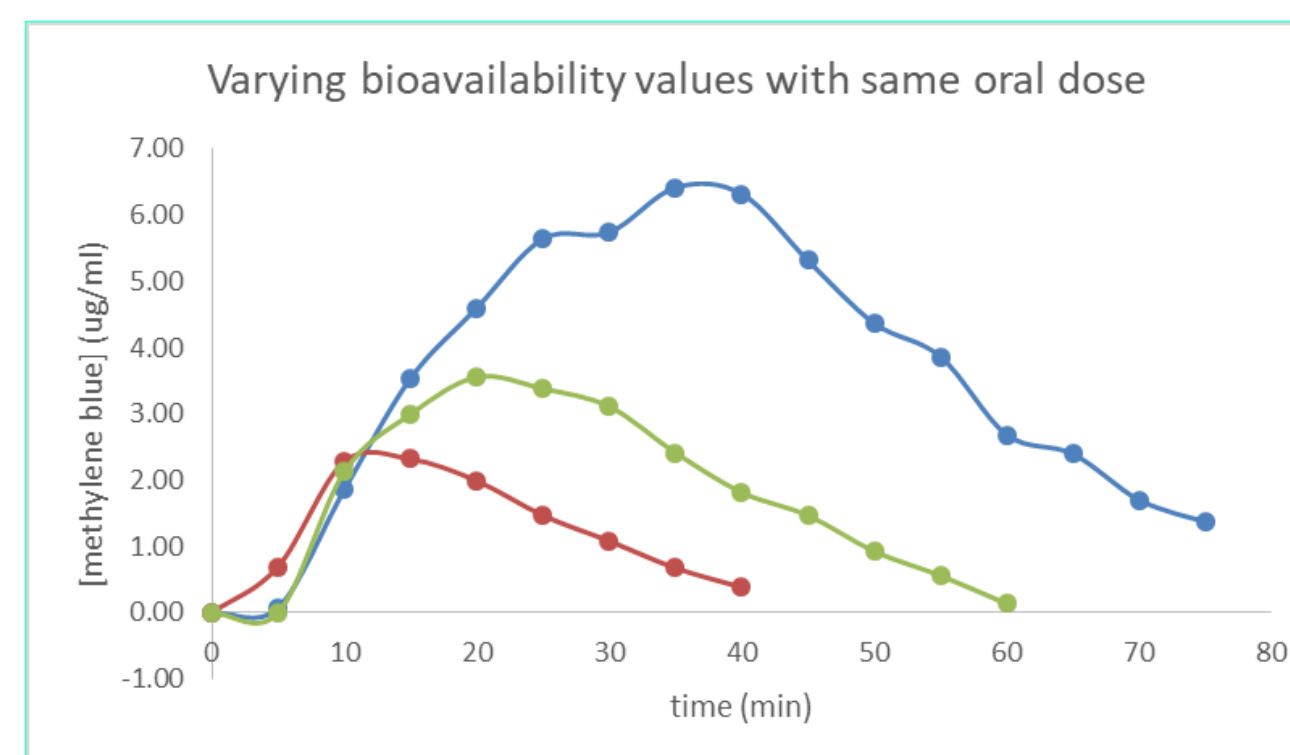
- Trolley and apparatus concealed behind wooden cut-out
- Administration tubes threaded and mounted in place
- Sample points were similarly secured
- Provides a human to administer drugs to and sample plasma and urine from

5. Modularisation

- Previous system redesigned with a core circuit - additional "modules" can be attached
- Flexibility allows students to investigate a PK area of their choosing
- Students do their own investigations and present in a **flipped classroom exercise**

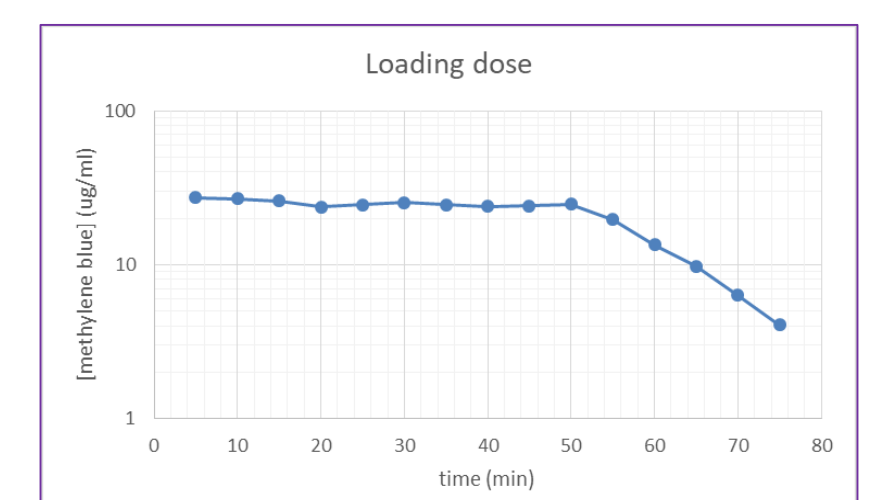
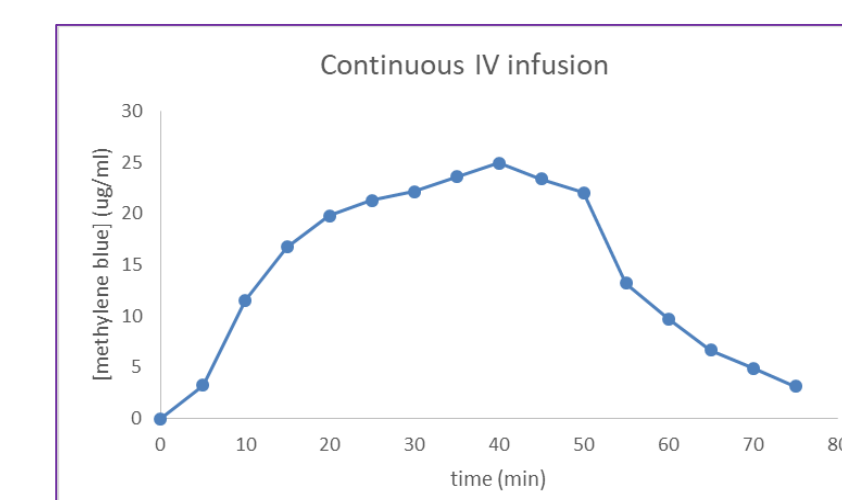
6. Outcomes

- Adaptable/portable
- Obvious connection to **human PK**
- Modular design allows tailoring to needs of the class/project
- Human context delivers realistic, immersive and expansive view of PK
- Allows students to:
 - focus on their own areas of interest
 - develop a research plan
 - carry out experiments/generate data
 - analyse and present to class
- A working "human" PK simulator in the comfort of your own lab!

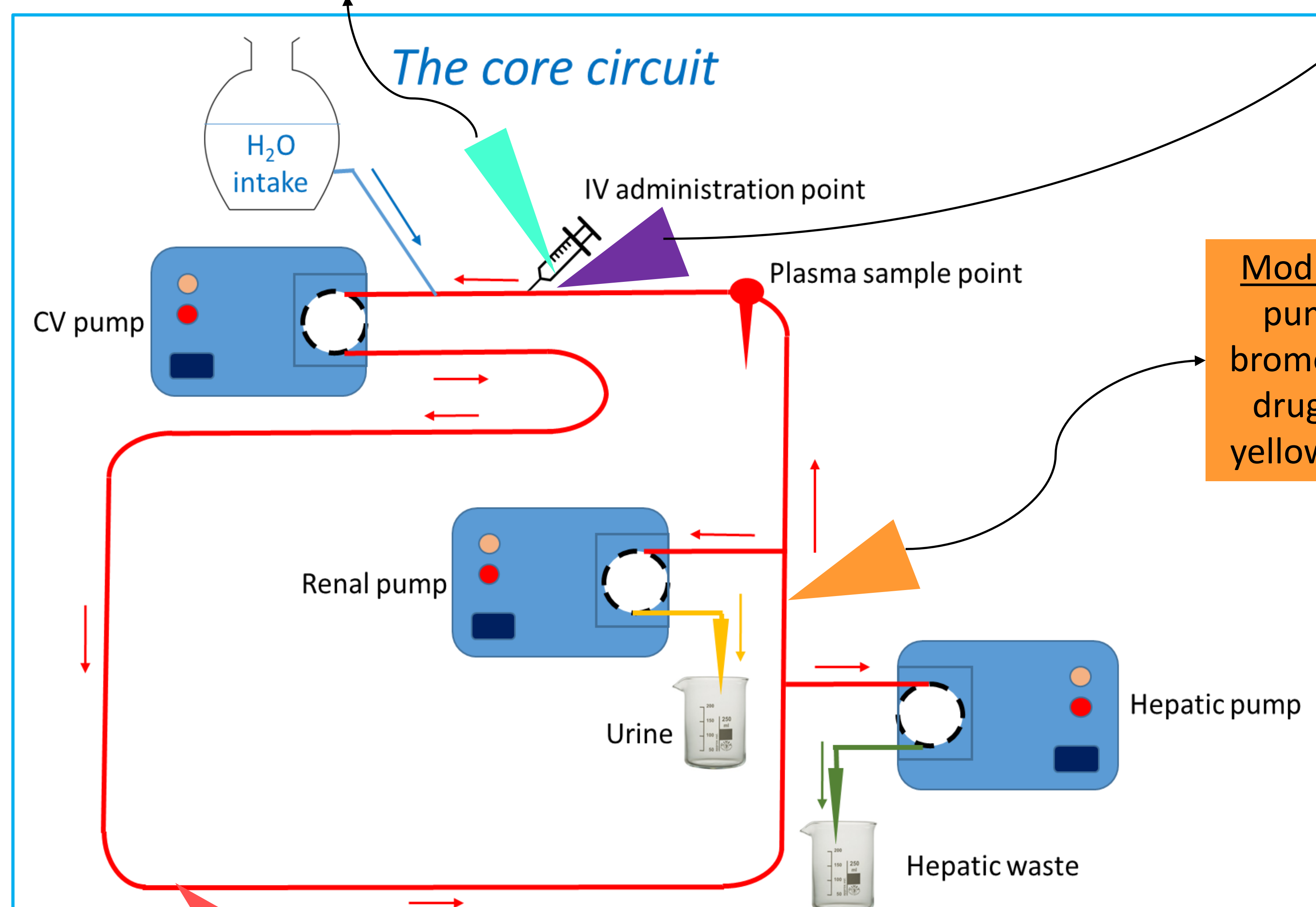


Module 1A: addition of a stomach compartment to allow oral administration

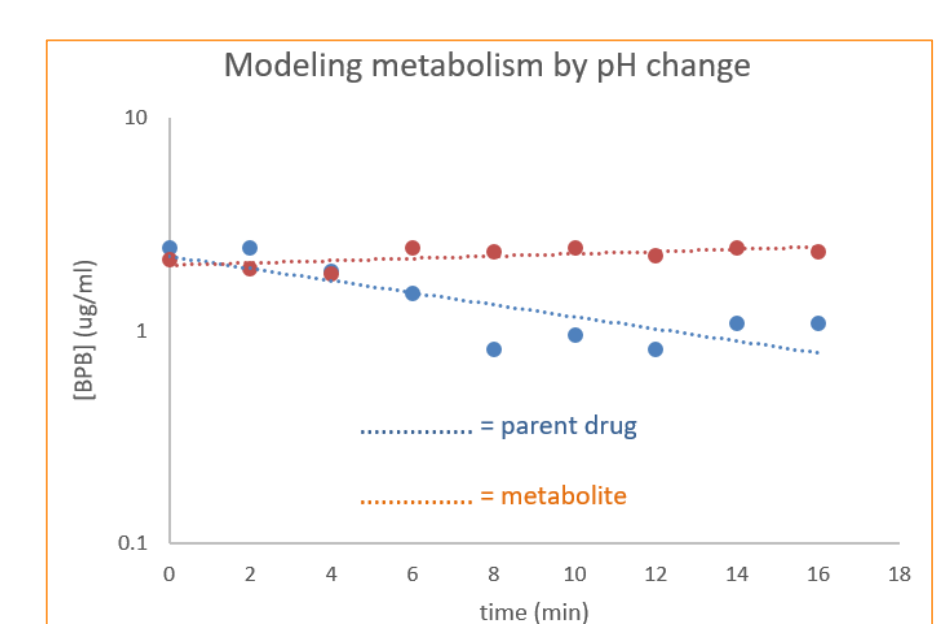
Module 1B: bioavailability module to demonstrate IV vs oral AUC and 1st pass metabolism



Module 2: attachment of drip line for continuous infusion/loading dose



Module 3: micro infusion pump to change pH of bromophenol blue (parent drug) to create partially yellow colour (metabolite)



Module 4: extra compartment for 2 compartment models/tissue accumulation

