Cellular exploration of childhood cancers

Shazia Begum, Joanna Denbigh, Anna Akinshina

University of Salford MANCHESTER 1967-2017 50 YEARS

Kidscan Children's cancer research

Introduction

What?

- Rhabdoid tumours are a rare form of childhood affecting young children under the age of 1 years old.

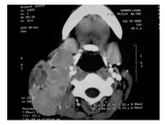
Where?

- They can occur anywhere in the body with the most common sites being the kidneys, soft tissue and the brain.

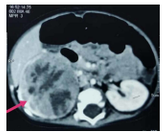
Survival?

- This cancer is difficult to cure, and the survival is poor with only 31% of those who are diagnosed living to the age of 1 years old.

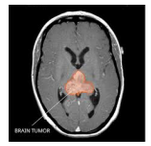
Soft tissue – Neck



Kidney



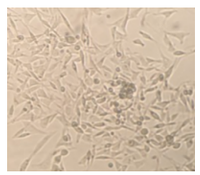
Brain

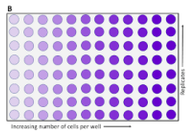


Methodology

Experimental approaches

- Cell culture
- Cell toxicity experiments





Computational approaches

- Molecular modelling
- Atomistic molecular modelling of the model membranes and drugs

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Conclusions

- These findings suggest and reiterate the potential benefits repurposing of already approved drugs for the treatment of childhood RT.
- Cancer membrane is more fluid and permeable for both drugs
- Combination of drugs has shown synergy.

Treatments

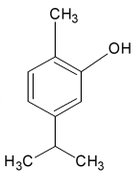
- Chemotherapy and radiation therapy are very aggressive and highly toxic to young children
- Chemotherapy drugs, that target rapidly dividing cancer cells, also damage healthy cells in children.
- Results in many short-and long-term side effects such as heart problems, brain disorders and learning difficulties.
- Therefore, there is a need for less toxic treatments for children.

Drug repurposing

New uses for existing drugs

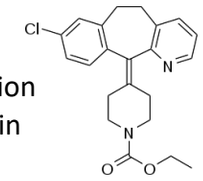
Carvacrol

- Monoterpene phenol
- Found in aromatic plants such as oregano and thyme



Loratadine

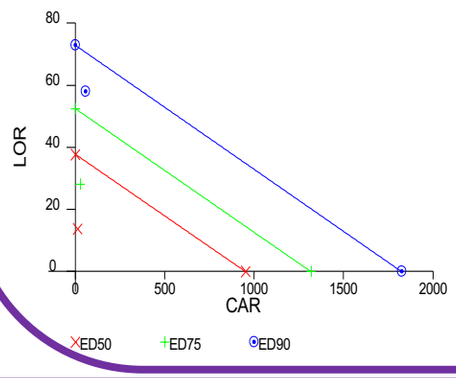
- 2nd generation antihistamine medication
- Used for hay fever, hives and other skin allergies



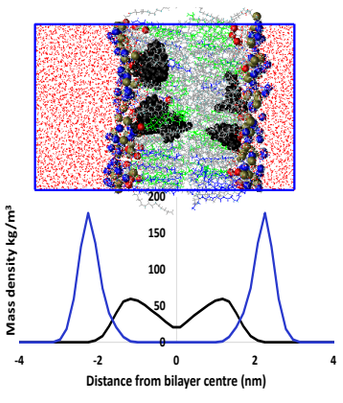
Results

- **Simulation results** show that carvacrol (pink) permeates into and affects any membrane and loratadine (black) permeates cancer membrane but not the normal ones.
- **Experimental results** show that the drugs kill cancer cells and not healthy cells.
- The drugs show a synergistic effect when used in combination, so the combined effect of the drugs was better than that produced individually.

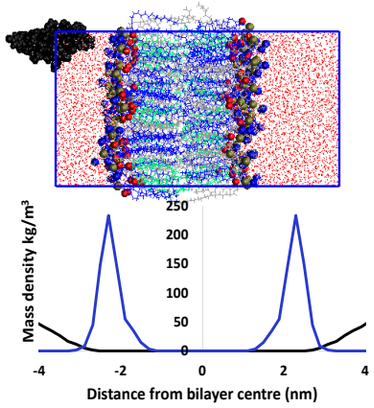
Isobologram



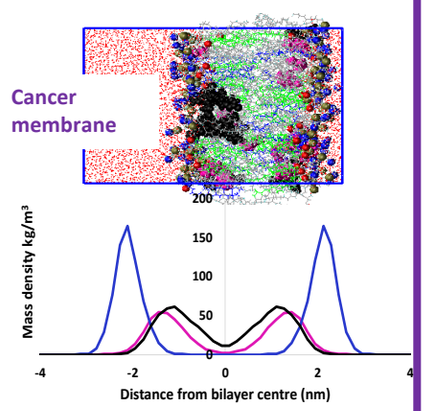
Cancer membrane

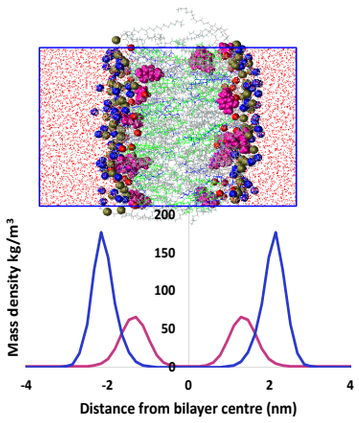


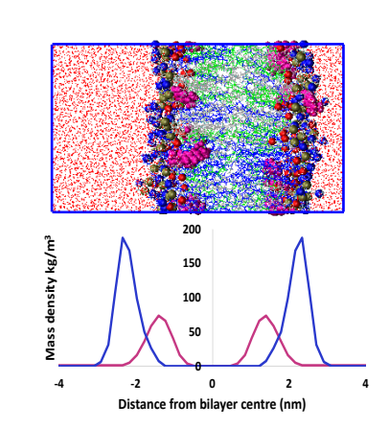
Normal membrane

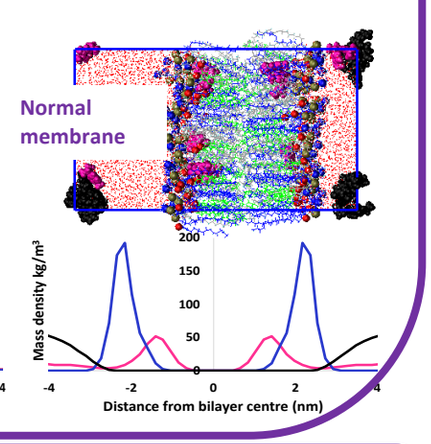


Drug combination









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