

Digital transformation in Health and Care

Developing of a forefront in-silico
method for Understanding and
Predicting Drug-Induced Liver Injury



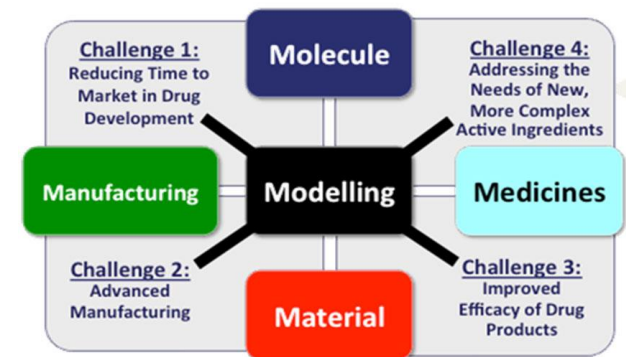
School of
Chemistry

Dr Davide Tiana

Organization

- **University College Cork** researchers have secured 145 Horizon 2020 awards:
 - 34 MSCA projects (split between COFUND, RISE, ITN and IF)
 - 8 ERC projects
 - 103 Societal Challenges projects
- **Synthesis and Solid State Pharmaceutical Centre:**
 - Consortium of Irish Institutes linking academia with pharmaceutical industry, to address critical research challenges.

The University research strategy is focused on creating major centres of excellence for world-class research and is closely aligned with key relevant Government and European Commission policies.



Our Project: Motivation

- Do you know what is the most common cause for liver failure?
- Do you know what is the major reason why drugs are not approved?
- Do you know what is the major reason for a medication approved by the US Food and Drug Administration to subsequently be withdrawn from the market?

Drug Induced Liver Injury (DILI)

- DILI is both difficult to predict and challenging to recognize.
- DILI is thought to occur via several different mechanisms
- DILI is influenced by patient risk factors (e.g. genetics, gender, race, pregnancy)

It is essential to employ novel strategies for predicting the fate of the drugs

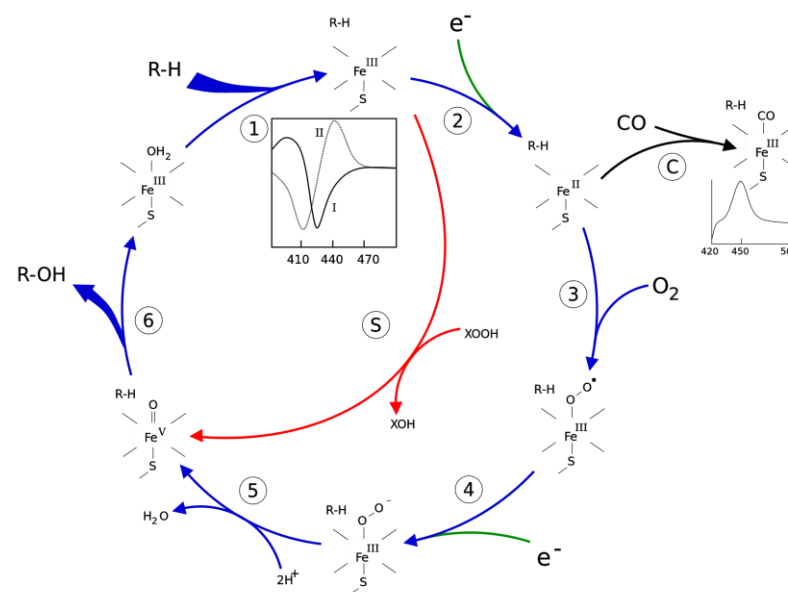
Our Project: Idea

- In vitro and In vivo studied are expensive and long
- In silico study are fast and cheap BUT current bioinformatic approaches have limits
 - 80% success rate (1 person of 5 could have DILI)
 - Based on statistic → can only study similar molecules
 - Do not provide information on why a drug is hepatotoxic
 - No info on time-dependent inhibition

HOWEVER

Our Project: Idea

- The fate of a drug in the liver is nothing but a chemical reaction catalysed by cytochrome P450
- Use Computational chemistry for simulating how a drug interacts with P450



We can study the chemical reactions occurring inside of the liver

Our Project: Consortium looking for partners



#H2020PartnerHealth

- Existing partners:
 - University College Cork, School of Chemistry
 - University of Liverpool, Centre for Drug Safety Science
 - US Food and Drug Administration, National Center for Toxicological Research
 - (European Liver Patient Association, under review)
- Looking for
 - Pharmaceutical Companies
 - Hospitals and Faculties of Medicine
 - Pharmacists Associations and Faculties of Pharmacy

Partner looking for Consortium and Collaborations



#H2020PartnerHealth

Cork Computational Chemistry and Programming (CCCP)

- Drug-Design:
 - Interactions
 - Stability
 - Toxicology
- Drug-Delivery:
 - Nanocarriers
- Crystal Engineering:
 - Design of Co-crystals
 - Most Stable Polymorph
 - Predicting Crystal Solubility

Contact

davide.tiana@ucc.ie