

Module Details	
Module Title	Molecular Mechanisms of Toxicity
Module Code	INC7009-B
Academic Year	2021/2
Credits	20
School	School of Pharmacy and Medical Sciences
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Laboratories	5
Tutorials	10
Lectures	18
Directed Study	166
Online Lecture (Asynchronous)	4

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims
<p>To develop a critical evaluative understanding of the molecular mechanism underlying cellular toxicity.</p> <p>Emphasis is placed on emerging concepts that reflect the changing nature of modern drug development. The module will address the mechanisms responsible for drug target toxicity and the evolution of new preclinical strategies to identify and predict such mechanisms.</p> <p>The module is structured as a combination of lectures, online lectures (asynchronous), tutorials, student-led seminars and laboratory investigation, plus student directed learning.</p> <p>The student led seminars consist of the preparation and delivery of a drug profile presentation, where students individually review and present a selected drug profile with an emphasis on toxicity and in vitro screening methods as an alternative to in vivo toxicology. The laboratory investigation includes the preparation of a detailed experimental report covering methods, data collection and data analysis and interpretation.</p> <p>The acquired knowledge will be assessed by coursework evaluation and examination at the end of the semester.</p>

Outline Syllabus

This module will cover the molecular mechanisms underlying the potential toxicities of new drugs under development. Topics to be covered include chemical carcinogenesis, genotoxic and non-genotoxic mechanisms, receptor mediated toxicity including biological mimicry, direct and indirect toxicity, regenerative hyperplasia as a toxicological mechanism, molecular mechanisms of cell death and hyperproliferation, sex and species differences. The module will also cover methodology for identifying molecular mechanisms including toxicogenomics (incl. toxicant fingerprinting), toxicoproteomics (incl. global proteomic change and signalling pathway specific changes) and the importance of extrapolation of risk data from rodent studies to humans. An important area in safety pharmacology is the development of alternative strategies to preclinical in vivo studies for identifying drug toxicity and or predicting drug safety. As such this module will address alternatives to animal testing, the advent of non-invasive imaging for toxicology evaluation and predictive computational models (incl. in silico toxicity prediction). Students will also extend their literature searching and written communication skills through the preparation of a report on molecular mechanisms of toxicity and an oral communication on alternatives to animal testing through presentation of a seminar.

Learning Outcomes

Outcome Number	Description
01	Critically evaluate the mechanisms underlying toxicity in the context of drug development.
02	Understand the different cellular mechanisms of toxicity and their relevance to drug development
03	Critically evaluate methods and techniques for predicting potential toxicities
04	Describe toxicological screening tools as alternatives to in vivo drug screening
05	Understand the requirements for regulatory body approval
06	Critically evaluate and interpret the molecular mechanisms underlying toxicity
07	Describe current and new methods for identifying drug toxicity and their underlying molecular basis
08	Understand methodology for identifying molecular mechanisms of toxicity and discuss strategies for predicting toxicity
09	Work as part of a team, interpret data, plan experimental work and work to deadlines
10	Develop a strategy to present a discussion of a research paper or research theme.
11	Develop generic literature skills for life-long learning (literature & databases).

Learning, Teaching and Assessment Strategy

The module will be delivered using a blended learning approach. Students will undertake a combination of lectures and online lectures (asynchronous) which will be supported by tutorial sessions to consolidate and expand understanding of topics. Students will also undertake a laboratory session (assessing cell death) and deliver an oral presentation in a student-led seminar. There will also be supporting directed learning for students to complete to further expand and consolidate their understanding of topics in this module.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - Closed Book	One 2-hour examination (two essays to be answered from a choice of five)	50%
Summative	Presentation	One oral presentation of drug profile and alternative screening methodologies	25%
Summative	Laboratory Report	A molecular mechanism of apoptosis written report	25%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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