UCLouvain-Beltox Course Module on Principles in Toxicology

Date	Time	Lecturers	Detailed programme
18/02/2019	9.00-13.00h	Dominique Lison	- What is toxicology about? - Routes of exposure - Expression of exposure - Biokinetics and metabolism - Mixtures toxicology - Epidemiology in toxicology
	13.00-14.00h		*Lunch*
	14.00-17.00h	Perrine Hoet	- Thresholds of toxicity - Exposure-effect/response relationship - No observed adverse effect level (NOAEL) - Benchmark dose (BMD) - Extrapolation of exposure from animals to man
	17.00-18.00h	Dominique Lison	- Introduction to exercise as home work
19/02/2019	9.00-11.30h	Tamara Vanhaecke	- What is in vitro toxicology? (the difference with in vivo toxicology, adaptive response, metabolism) - What are in vitro alternative methods? (3R principles, validation) - In vitro methods: important factors to take into consideration (e.g. media composition, cryopreservation and thawing, sterility check, metabolic activation, reference and control items,…) - Regulatory: examples of validated in vitro methods - Non-regulatory: examples of non-validated methods (simple to complex liver systems, Caco-2) - Challenges and future perspectives (human stem cell derived target cells, organoids, organ-on-a-chip, omics and systems toxicology, reprogramming, gene editing)
	11.30-13.00h	Hanneke Stegeman, Birgit Peter	- General introduction in vivo toxicology testing (regulatory guidelines, overview of general testing strategy, animal welfare, GLP) - Animal species used in general toxicity safety studies and their characteristics (animal model selection, rodent models, non-rodent models) - Dose administration routes and dosing formulations (oral, gavage & diet, dermal, inhalation, dosing formulations, vehicles used) - Study design of in vivo toxicology studies (size of groups, length of treatment period, recovery period) - In-life evaluations (clinical observations, body weight, food consumption, ophthalmological examination, clinical pathology, toxicokinetic evaluation applied to in vivo studies)

			- Post-mortem evaluations (necropsy, organ weights, microscopic pathology)
			- Additional evaluations (neurotoxicity, immunotoxicity, miscellaneous)
	13.00-14.00h		*Lunch*
	14.00-15.00h		- Overview of in vivo OECD Test Guideline studies (short term, long term, reproduction toxicity, embryo-foetal development toxicity studies)
	15.00-16.30h	Philippe Vanparys	- Definitions (mutagenic, clastogenic, aneugenic, genotoxic, polyploidy, genotoxic carcinogens, non-genotoxic carcinogens) - Mechanisms of genotoxicity (DNA-damage and repair, type of aberrations, harmful effects of mutations) - Core tests (Ames test, Mouse lymphoma test, in vitro micronucleus test, in vitro chromosome aberration test, in vivo chromosome aberration test, in vivo micronucleus test) - Follow-up tests (in vivo comet test, in vitro comet test, in vivo unscheduled DNA-synthesis test) - Screening tests (Ames MPF test, Vitotox test, GreenScreen test, ToxTracker test) - In silico methods (SARs, QSARs) - Genotoxicity tier testing strategy (in vitro and in vivo) - False positives and negatives (cell lines, cytotoxicity parameters)
	16.30-18.00h	Larry Higgins	- General introduction into omics technologies (transcriptomics, proteomics, metabolomics) - General overview of the methodology and process for transcriptomics and metabolomics - Transcriptomic sample preparation and analysis (traditional microarray and RNASeq technologies) - Metabolomic sample preparation and analysis (MS/MS and NMR analysis) - Consideration of the advantages and disadvantages of omics technologies - Worked examples of practical use of omics in toxicology
20/02/2019	9.00-13.00h	Philippe Hantson	- Clinical diagnosis of intoxications - Treatment of intoxications and emergency medicine - Forensic toxicology - Epidemiology of poisonings
	13.00-14.00h		*Lunch*
	14.00-16.00h	Francesca Tencalla	- What is ecotoxicology about? - Aquatic toxicity testing, characterisation of the aquatic environment (water: trophic levels, representative species, sediment: representative species) - Hazard assessment for the aquatic environment (test types, relevant endpoints, non-animal test methods, deriving PNEC values, endocrine disruption testing) - Risk assessment for the aquatic environment (water and sediment) - Terrestrial toxicity testing, characterisation of the terrestrial environment (above-ground species, soil species) - Hazard assessment for the terrestrial environment (test types, relevant endpoints, deriving PNEC

			- values) - Risk assessment for the terrestrial environment
	16.00-18.00h	Frederik Verdonck	- Environmental fate testing (vapour pressure, water solubility, degradability, octanol/water partitioning, bioaccumulation) - Environmental fate modelling, exposure scenario and release estimation - Environmental fate model types (deterministic, probabilistic, geo-referenced and dynamic with focus on deterministic) - Environmental fate model principle (mass balance for each environmental compartment) - Multimedia environmental fate models at local and regional scale (example EUSES) - Sewage treatment plant fate models (example SimpleTreat) - Secondary poisoning in the environmental food chain - Accumulation in human health food chain - Environmental fate monitoring (environmental compartments, contaminants in human food)
21/02/2019	9.00-12.00h	Perrine Hoet	- Occupational toxicology - Sources of toxicological information with practical exercise
	12.00-13.00h	Vincent Haufroid	- Exposure monitoring
	13.00-14.00h		*Lunch*
	14.00-18.00h	Mark Martens Miranda Cornet	- Practical exercises with realistic toxicology studies under guidance - Discussion of results with feedback
22/02/2019	9.00-13.00h	Mark Martens Miranda Cornet	- Practical exercises with realistic toxicology studies under guidance - Discussion of results with feedback
	13.00-14.00h		*Lunch*
	14.00-17.00h	Dominique Lison	- Presentation and discussion of the home work - Closure of the 1st module