The Centre for Drug Candidate Optimisation (CDCO) is a collaborative research centre based within the Monash Institute of Pharmaceutical Sciences that provides biopharmaceutical lead optimisation expertise to academic, commercial and not-for-profit drug discovery programs.

Drug candidate optimisation is a key component of modern drug discovery, playing a critical role in compound design, selection and progression. Optimising physicochemical, metabolism and pharmacokinetic properties of drug candidates is essential in guiding medicinal chemistry, developing formulation and delivery strategies, and informing dosing regimens to ensure safety and efficacy.

**KEY INSTRUMENTATION**
- Six LC/MS instruments coupled with UPLC (triple quadrupole MS and time of flight MS)
- Automated small animal *in vivo* blood sampling using BASi Culex™
- Automated *in vitro* assays using a Hamilton MICROLAB® STAR liquid handling robot
- *In silico* and *in vitro* methods for profiling physicochemical properties
- Plate based assays for CYP450 metabolic stability, metabolite profiling and metabolic drug interactions
- Cell culture facilities for permeability assessment (Caco-2 or MDCK)

**EXPERTISE**
The CDCO is led by Professor Susan Charman, who has more than 20 years’ experience working and consulting on ADME lead optimisation in collaborative drug discovery programs. Our team is comprised of experienced staff with expertise spanning the five major functional areas responsible for physicochemical profiling, drug metabolism, *in vitro* biopharmaceutics, *in vivo* pharmacokinetics and bioanalysis using mass spectrometry. We utilise fully validated scientific platforms to help researchers enhance their chemistry and biology programs. Rather than a one-size-fits-all model, we work with our collaborators to tailor our study designs to the needs of each specific project and ensure we are running the right study at the right time. Our focus is on the timely delivery of high impact, decision-quality data to inform and enhance drug discovery projects, leading to an enhanced IP position for improved commercial attractiveness of the program.

**WORKING WITH US**
- Collaborative research
- Fee for service
- Consultancies
SPECIALIST SERVICES

The CDCO fosters scientific innovation in drug discovery through multidisciplinary collaborations. We provide translational expertise in drug absorption, distribution, metabolism and excretion (ADME) properties of drug candidates.

Physicochemical profiling
The physicochemical properties of drug candidates, including solubility, partitioning, ionisation and stability, underpin all aspects of drug formulation, delivery and disposition. Poor physicochemical properties can contribute to low bioavailability and unfavourable distribution.

Drug metabolism, metabolite identification and metabolic drug-drug interactions
Rapid metabolism is a major limiting feature of many drug candidates and can lead to low oral bioavailability, a short half-life or the production of potentially toxic metabolites. Serious adverse events can also arise through metabolic drug-drug interactions. Understanding metabolic liabilities by identifying metabolites and elucidating metabolic pathways provides a rationale for structural modifications to reduce associated risks.

Bioavailability and pharmacokinetics
Pharmacokinetic (PK) properties dictate the route and frequency of administration, how extensively a drug is distributed throughout the body and how long efficacious concentrations are maintained. An appropriate PK profile is essential in achieving the desired therapeutic response. Defining drug absorption, distribution and clearance processes and mechanisms in preclinical models provides insight into dose and dosage from selection, optimisation of dosing regimens, and prediction of human PK properties.

Bioanalysis
Rapid, specific and quantitative analysis is required to support all aspects of ADME lead optimisation. Specialised LC-MS/MS instrumentation enables the rapid development of specific methods for the analysis of candidate drugs and their metabolites in complex biological matrices.

platforms.monash.edu/cdco