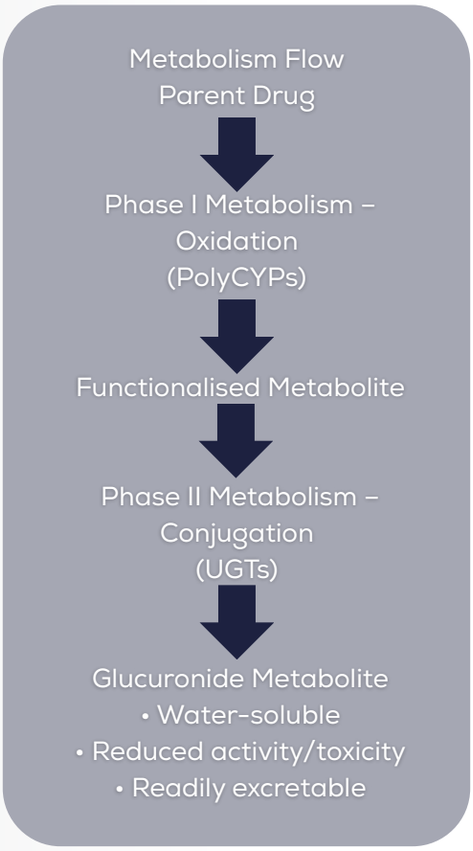
CONSTANT SYSTEMS
CELL DISRUPTION MADE EASY

HYPHA DISCOVERY

Technical Note

"From Liver to Lab Bench: How Bioengineered PolyCYPs Unlock Drug Metabolism Insight"

When a drug enters the body, it typically undergoes a twostage metabolic journey to make it suitable for elimination.
First, Phase I metabolism—largely driven by cytochrome P450 enzymes in the liver—chemically modifies the drug by oxidation, introducing or exposing functional groups such as hydroxyl or carboxyl moieties. These transformations often reduce biological activity and create a more reactive, polar intermediate that can be further processed. This sets the stage for Phase II metabolism, where conjugation enzymes such as UDP-glucuronosyltransferases attach bulky, charged groups like glucuronic acid to the Phase I product, greatly increasing water solubility and facilitating excretion in bile or urine. In drug discovery and development, recombinant systems such as PolyCYPs are extremely valuable because they replicate the first stage of this metabolic pathway in vitro. By bioengineering diverse microbial cytochrome P450 enzymes, PolyCYPs allow researchers to predict, generate, and scale up oxidative metabolites that the human body would produce. This enables early identification of metabolite structures, evaluation of safety or efficacy, and provision of authentic standards needed for pharmacokinetic and regulatory studies—functions that would be difficult, slow, or ethically restricted to achieve solely through in vivo testing.



Read what **Jonathan Steele**, Founder and CSO is saying about Constant Systems and how the cell disruption platform used by **Hypha Discovery** is central to extracting PolyCYP enzymes from engineered **E. coli**.

"Hypha has been using the TS Series 1.1kw Cell Disruptor system from Constant Systems for several years to great effect. The system is mainly applied to E. colibased materials and occasionally other host types.
The system is now integral to production of Hypha's PolyCYPs products, as well as research towards new recombinant product lines. The engineering support provided by Constant Systems has been excellent and provided in an attentive and professional manner, showing their understanding of our needs and urgency in the rare event of system issues."

Jonathan Steele – Hypha Discovery Ltd

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About The Continuous Flow Cell Disruptor

The CF Cell Disruptor offers Continuous Flow Processing with two models, the CF1 and CF2. Both models offer the same process and differ only by process speed.
The CF1 offers up to 6L per hour and the CF2 offers up to 24L per hour processing rates.

Both models benefit from a HMI control, a maximum process pressure of 40kpsi (2700 bar), integrated sample cooling jacket, 200mL inlet reservoir (hopper), auto shut down feature for when the process is complete and both models take advantage of Constant Systems precise and consistent hydraulic control which is fully scaleable through the whole product range from 0.5mL single preparation processing to large volume processing at 150L per hour. This precise control ensures that the entire sample is processed at the operators set pressure to ensure accurate and consistent results and in most cases a single process or pass is adequate meaning multiple passes are not required. Both models are capable of processing fluid or re-suspended sample types and are utilised for many sample types such as bacteria, yeast, algae and mammalian / insect cell types.

CF1 Model
At approximately 700mm² the CF1 is small enough to bench mount if required but is best suited when used on its tailor made trolley. The CF1 trolley ensures that the equipment is situated at its optimum working height and is mounted on full swivel and lockable casters that enables safe and free movement of the equipment when needed. The CF1 is recommended for process volumes in the range of 15mL through to 10L. For those processing larger volumes in this range the CF1 can be offered with an integrated peristaltic pump fully controlled through the HMI which will ensure that the inlet reservoir is continually fed whilst recirculating the sample to help avoid any settling until the entire sample is processed.

CF2 Model
With a footprint of approx. 700mm² the CF2 is a floor standing model that is recommended for process volumes from 15mL through to 100L. The CF2 is offered with an integrated peristaltic pump as standard. The CF2 is mounted on full swivel and lockable castors that enables safe and free movement of the equipment when needed.

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