REQUEST FOR PROPOSALS

High or Medium Throughput Biodegradation Determination Development

American Chemical Society Green Chemistry Institute Pharmaceutical Roundtable
Biodegradation Focus Team

Background

The **American Chemical Society (ACS)** is the world's largest scientific membership organization. Within ACS, the **Green Chemistry Institute (GCI)** operates under the Division of Science, Research, and Sustainability, and its mission is to catalyze the implementation of innovative approaches to chemistry and engineering that enables sustainable development across the globe.

One of its flagship initiatives, the **ACS Green Chemistry Institute Pharmaceutical Roundtable (GCIPR)**, is a collaborative partnership between ACS GCI and leading global pharmaceutical companies and allied industries. The ACS GCIPR aims to drive innovation and accelerate the integration of green chemistry and engineering practices throughout the pharmaceutical sector and its related industries.

Business Initiative and Scope

The **ACS GCIPR Biodegradation Focus Team** (the Team) is guided by a charter that emphasizes the practical application of a biodegradation/biotransformation screening tool tailored for the lead identification and optimization phases of drug discovery. This initiative supports the implementation of the **10th Principle of Green Chemistry – Design for Degradation**. *Currently, available methods do not offer rapid or cost-effective means to evaluate the biodegradability of candidate molecules, creating a critical gap that the team aims to address.*

We are seeking to establish a reliable, predictive, and scalable assay/workflow with a relatively fast turnaround time that allows for comparisons amongst different chemical classes and supports a structure- and/or molecular property-based understanding of biodegradability of biologically active substances during drug discovery.

Although complete biodegradation (mineralization) of preclinical candidates in a wastewater treatment plant would be ideal, even partial degradation would be beneficial when designing a biologically active substance. The assay/workflow should allow for testing and ranking of several hundred molecules based on relative biodegradability. To ensure assays are fit for purpose, compounds with relevant chemotypes will be supplied by member companies for testing; the Team has identified ~800 compounds that can be evaluated for suitability into the assay/workflow testing pool. The goal is to generate data that can inform guidance on how to apply assay/workflow results to support the **design and/or selection of preclinical candidates with improved biodegradation profiles.** The selected partner will work with the Team and receive funding (up to $130,000 USD) within an 18-month period to deliver solutions suggested below.

Solutions In Scope

- Solutions with sufficient throughput to enable compound ranking based on relative degradability during drug discovery and/or allowing for structure-property-relationship insights
- Approaches combining substance testing and predictive modelling – in silico models can be in scope when combined with experimental design/validation
- Quantitative or semi-quantitative investigation of degradation of parent molecules
- Qualitative solutions identifying transformation products and allowing insights into biotransformation pathways

Solutions Out of Scope

- Assays requiring:
    - Radiolabeled test substances
    - Test substance quantities > 5 mg
    - Test substance incubation/testing time > 5 days (data analysis not included)
- Stand-alone, non-experimental predictive model approaches
- Photodegradation assays/models
- Abiotic degradation assays/models

Suggested Work Package

- ACS GCIPR members will assist in providing compounds from their compound sharing sites (up to five companies have been identified with these); these are free when used for research purposes.
- The chosen research group will subject the compound set to the biodegradation assay/workflow and analyze results.
- The compound set will include reference molecules with OECD314 study data (or similar) - potentially from the PREMIER DAS database.
- If necessary, the chosen research group and members of the Team will collaboratively work to identify a chemically diverse selection of the compounds that will be used in the study.
- The final deliverable will be the submission of a report of data findings and a reproducible methodology addressed to the ACS GCIPR that could lead to an open-access publication describing the results and the reproducible step-by-step procedure.

Proposal Requirements

- Describe the proposed solution, including experimental set-up and number of molecules to be tested
- Outline the capabilities of the research team and details on available facilities including laboratory equipment

- Describe any relevant work examples you/your team completed in this area with references
- Provide a project timeline, not to exceed 18 months
- Provide a detailed budget (One-page limit)
- Proposals are limited to 5 pages including budget and references
- The chosen research group will meet with the GCIPR members and provide bimonthly reports (oral or written) of the research outcomes