Report 78: How can Environmental Health Sciences Help Chemists Create Benign 21st century materials – Creating a protocol for green chemists to design out endocrine disruption

Conveners: Terry Collins and Karen Peabody O'Brien

Brief History: In recent years the environmental health sciences have revealed profoundly important information on the mechanisms behind chemical toxicity, especially on the issue of endocrine disruption. Since the goal of Green Chemists is to create inherently benign chemicals, having access to this science is crucial, yet the majority of chemists have no training in basic toxicology or an understanding of the more recent science around EDCs and other cutting edge tox issues.

Discussion Highlights: The group agreed that enhanced communication across the scientific disciplines is critical, both around the issues of EDC and other tox issues.

The group also agreed that there should be better communication to chemists and companies of what testing tools are available.

There was disagreement about whether EDCs is the most pertinent tox issue to focus on; but framing EDCs as a test area in which to begin cross-discipline communication was agreed to be a good and necessary step.

It was argued that there are already enough assays on EDCs and enough educational materials exist so no additional work on this area is needed. The reply was that chemists and companies cannot negotiate the thicket of information around all available assays on EDCs. Chemists need a vetted and reliable shortcut for navigating through available tools, and a clearly delineated suite of tests that would be necessary and/or sufficient to establish confidence that a new compound is not an EDC. Moreover, there is a need for clear scientific principles by which companies and chemists can evaluate the reliability of assays and tools as well as the practices of the many research and testing companies offering these services.

Toxcast and TOX21 and other HTS tools were discussed, as potentially useful tools for a quick and relatively inexpensive wide net to test to toxicity. Their shortcomings were also noted in that they still turn up both false negatives and false positives and miss some important end points. A tiered testing protocol designed to catch missed endpoints was discussed, moving from broader, cruder tools up the ladder to more refined and specific assays. The one thing that must be kept in mind in such an approach insofar as chemists are concerned in that the testing system be actionable, economical, and transparent. Lastly, the protocol should allow for periodic review and updates

Recommendations:

NIEHS should play a role in convening scientists from multiple disciplines (namely chemistry and environmental health sciences) to meet and educate one another of both their needs and capacities.

NIEHS should help develop educational materials on toxicology and EHS for chemists (this could be both for university and industry research chemists).

NIEHS should develop fora to inform research chemists of the latest testing and assaying tools available (running the gamut from HTS through cell and whole animal based assays).

In addition to EDCs, nanotech is an emerging area in which both chemists and environmental health scientists need to share information and testing tools.

Discussion Participants:

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