TWENTY-SOMETHING YEARS OF POPS RESEARCH: THE ROLE OF A GOVERNMENT LABORATORY

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Introduction
As part of the celebration of the journey from Bayreuth to Cairns, we look back at the evolution of POPs science and policies from the viewpoint of a government laboratory. It has been a rocky road, full of accomplishments, budget problems, breakthroughs, bureaucracy and risk taking. The lessons we learned may be useful to the next generations of government scientists serving public health.

Materials and methods
We reviewed laboratory activities in response to Departmental priorities over the past few decades and juxtaposed them to major publications by our laboratory staff.

Results and discussion
The (then) Hazardous Materials Laboratory was one of several laboratories within the California Health Department, with its primarily role being the measurement of regulated chemicals in soils and wastes. Under Dr. Stephens' leadership and vision, the laboratory expanded its GC/MS group to explore dioxin analysis. In the mid 1980s, collaborating with Umea University and Professor Chris Rappe, Stellan Marklund spent several months in Berkeley helping staff establish methodologies. He was succeeded by the late Judith Charles and, subsequently, Doug Hayward (now with USFDA) and Ruth Chang (now retired) were able to perform dioxin analyses. In 1988, an explosion at a wood treatment plant in Northern California, provided the first opportunity for the State laboratory to not only test dioxins in soils but also in grazing animals and farm residents (1-6). Studies on biotransfer and bioaccumulation of POPs were expanded by exploring dioxins, furans and PCBs in bivalves, fish and marine mammals from the San Francisco Bay (7-8) providing data for Health Advisories and clean up goals. (9).

In the mid 1990s, we obtained the first federal grants to study POPs and health effects (10-16). When we tested breast adipose tissue samples from those studies for PBDEs, we discovered the extremely high levels in California (17, 18). Subsequent studies in humans, wildlife and waste streams confirmed the ubiquity of PBDEs (19-23) in California (and N. America), probably because of the State's flammability standard.

We were fortunate to have enlightened and supportive management. Competing priorities at times of tight budgets, however, always raise questions about the usefulness of research studies and even the role and existence of the laboratory. The compass we use before pursuing any new project are the answers to two simple questions: "Is the project within our mission? " and "How will the people of California benefit from the project?"

Pursuing, and eventually obtaining, extramural funding (DOD, USEPA, NIEHS, CDC) was critical in securing resources that could focus on the project unaffected by shifting policy priorities. Mentoring students benefits both sides and expands collaboration opportunities.

Work on metabolites of PCBs and PBDEs helped refine exposure assessment and increase statistical power in many studies of health effects (24-27). Recent work with PFCs also showed unusual patterns in California (28).

The laboratory has a strong QA/QC program and is often sought after for collaborations. We have collaborated with several national and international groups and studied POPs in biological specimens (human serum, adipose, milk and wildlife tissues) beyond the US, from Brazil to Kazakhstan (24-25, 29-35).

Conclusions and Lessons Learned

A strong QA/QC program with participation in international testing programs boosts staff confidence and earns trust from collaborators.

Networking, such as participation at Dioxin and other relevant meetings was crucial to share knowledge and resources and draw support from colleagues around the globe.

Leading by example is important to inspire staff to do their best to protect public health.

Supporting staff to reach their goals relies on continuous education, cross-training, publications.

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