

Reducing Exposures to Pesticides in Humans and Wildlife Workshop

Recommendations

Participants with science/regulatory and educational/advocacy expertise developed recommendations to further our understanding and improve protection of at-risk populations from low dose exposures to current-use pesticides.

The following actions were recommended by the science group.

Recommendation #1: *Increase in basic research.* More research on exposure and health effects is needed for both humans and wildlife in order to fully understand the impacts of current-use compounds. Basic research of compounds and their breakdown products is necessary to understand the compounds' mechanisms of action and possible physiological and/or ecological effects. Novel approaches to understanding both exposure and effects on humans and wildlife should be encouraged and continued.

The Massachusetts Pesticide Laboratory housed at University of Massachusetts at Amherst is currently conducting human exposure research. The University of Massachusetts at Amherst, School of Public Health and Health Sciences has conducted studies of exposure and effects of toxic compounds on pets. Participants recommend that these institutions continue this necessary work.

Biomarkers of exposure and effect are not required in the current pesticide registration process. While exposure and effect biomarkers exist for organophosphate and carbamate pesticides via analysis of cholinesterase enzyme activities, newer compounds lack biomarkers for monitoring exposure or the degree of physiological response in an organism. Basic research into biomarkers of exposure and effects for individual or classes or compounds is greatly needed.

Research and formulation of inherently safer compounds should be encouraged, and research into Integrated Pest Management as well as into alternatives to conventional pest control promoted and maintained.

Recommendation #2: *Increase in monitoring programs.* In order to understand the distribution and magnitude of exposure to current-use compounds, improved systems for monitoring wildlife, humans, and the environment are recommended. Currently, monitoring of humans is limited to workers at risk due to occupational exposure to highly toxic compounds. Not monitored are humans exposed in home and recreational environments, and occupational exposure to compounds of low and moderate toxicity.

In addition, very little wildlife monitoring occurs. While fish in waterways heavily used by the public are screened for organochlorine, aromatic, and dinitroaniline pesticides for the purpose of determining potential fish consumption advisories, routine monitoring efforts for wildlife do not exist. Environmental monitoring is also limited. Water departments routinely monitor drinking water and source water for selected pesticides but little to no monitoring of other water resources is conducted.

It is recommended that the Tufts University Seabird Ecological Assessment Network (SEANET), US EPA Environmental Effects Research Laboratory, and Manomet Center for Conservation Sciences continue work to promote and maintain monitoring programs for beached bird mortalities, impacts on coastal water and watershed resources, and toxic exposures to waterbirds.

Effective and efficient monitoring incorporates relevant physiological and ecological endpoints according to the compound selected, species studied, and effect monitored. An inventory of endpoints/biomarkers needs to be developed, methodologies standardized, sample sizes increased to strengthen and increase confidence in results, and efforts communicated between agencies and stakeholders engaged in monitoring to insure comparable and systematic results.

Recommendation #3: Increase collaborations and communications. An increase in coordination of wildlife and human exposure studies and promotion of interdisciplinary collaboration between institutions (e. g. physicians; public health workers; veterinarians; ecologists; chemists and other scientists; educators; policymakers; agency workers; academics; and not-for-profit organizations) is required for greater definition of the issue. Searchable databases and associated GIS resources can be used to compile relevant studies and provide an important resource for researchers and stakeholders. For example, “[the Canary database] is a compilation of peer-reviewed research articles related to the use of animals as sentinels of human health hazards” and was created to “...overcome scientific barriers which limit the use of animal sentinel data for early recognition of human environmental health hazards. These barriers include difficulty in locating animal sentinel studies in current biomedical databases and a lack of communication between human health and animal health professionals” (canarydatabase.org/).

Importantly, results of these collaborative efforts should be published and made available to the greater scientific community, policy-makers, and general public stakeholders.

The following are recommendations from the education breakout group:

Recommendation #1: *“Weight-of-evidence statement” from the science community.* It is recommended that a symposium be convened to determine the weight of evidence for and significance of sublethal effects of low-dose exposure to pesticides on human and wildlife health. A public statement should be issued if scientific consensus warrants it.

Recommendation #2: *A Massachusetts coordinator for pesticide reduction issues* would fill a much needed role for the coordination of stakeholders and provide a focal point for connection to national groups and governmental agencies. A coordinator may also be able to function as a contact for any databases constructed to improve study result dissemination.

Recommendation #3: *Increase outreach to veterinarians, sporting groups, and the pesticide consumer to reduce exposure.* Continue and increase veterinary education to recognize toxic effects to pets as well as to the human caretakers. This may include continuing education classes for understanding treatments prescribed or used clinically and how they may impact both pet and caregiver health. Additionally, increased outreach to sporting groups such as fishing and hunting organizations, for the purpose of increasing awareness regarding the potential impacts of contaminants on fish and wildlife resources and habitats and human health, is warranted.

Consumers are not aware of proper use of pesticides. A prevalent belief is that over-the-counter applications must be safe and that safety extends to unregistered uses as well as over-usage and inappropriate concentrations, and use near vulnerable populations such as children. Consumers are not taught to consider potential effects to human, wildlife, and environmental health. Therefore, outreach and education needs to be continued and increased to reduce exposures and consequential health effects.

The following are policy recommendations:

Recommendation #1: *Increase research funding.* An increase in research funding and commitment will be necessary to conduct basic research on the exposure and efficacy of pesticides and their breakdown products exposure and effects and effective biomarkers, expand existing monitoring projects and initiate new ones, and increase consumer education regarding proper pesticide use and safety.

Recommendation #2: *Increase regulatory effort with regards to monitoring and sublethal effects of pesticides.* A regulatory framework that considers the effects and a means by which to monitor effects from pesticide exposures is required. Currently, little to no regulation exists that requires sublethal effects testing for product registration, development of biomarkers relevant for monitoring physiological effects to compounds, and further monitoring of effects on humans, wildlife, and environmental health when product is released for consumer use. Regulation that addresses these issues is required in order to minimize exposures to humans and wildlife, and extend the capacity to make sound public and environmental health decisions.

Recommendation #3: *Increase networking of governmental departments with the scientific and advocacy communities.* An increase in communication between regulatory agencies with researchers and advocacy groups would improve the communication of the research to the public and to legislators, and increase study power through collaborations, thereby augmenting the effectiveness of federal and state policies.