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Introduction to Papers for the AChemS Symposium 'Short-Term Effects of Environmental Chemicals'

James C. Walker, Martin Kendal-Reed and Wayne L. Silver[1]

FSU Sensory Research Institute, B-340 NHMFL, 1800 East Paul Dirac Drive, Tallahassee, FL 32306-2741 and [1]Department of Biology, Wake Forest University, Winston-Salem, NC 27109, USA

Correspondence to be sent to: James C. Walker, FSU Sensory Research Institute, B-340 NHMFL, 1800 East Paul Dirac Drive, Tallahassee, FL 32306-2741, USA. e-mail: jwalker@darwin.psy.fsu.edu

At the 1999 meetings of the Association for Chemoreception Sciences, a symposium was held titled 'Short-Term Effects of Environmental Chemicals'. The purpose of this was to highlight areas of possible overlap between traditional academic research on responses to odorants and irritants and 'real world' problems where at least some of the issues relate to odor or irritation. In a typical laboratory experiment in this area a single compound in the vapor phase only is presented (at various, reasonably well controlled concentrations) to a human or animal subject for very brief periods. The response measures usually deal only with some level of response from the olfactory or trigeminal (ocular and/or nasal) inputs. These features all make good sense in terms of the need to minimize extraneous influences and variation so that responses can be related unequivocally to one or more stimulus parameters.

One can also make the case, however, that laboratory studies should be designed to incorporate some of the variables at play in actual environments, so that a greater understanding of practical problems can be obtained. In marked contrast to the issues that can be addressed in a laboratory setting are issues that must be confronted by legislators, regulators, industrial hygienists, clinicians and public health officials. These include the following.

1. Exposures in everyday life are almost always of varying duration but last much longer than the few seconds normally employed in laboratory studies. Both physical (particulate as well as vapor phase) and chemical (number of chemicals represented) complexity are far greater than that seen in the laboratory situation. For this reason, and given the possibility of chemical interactions and the dynamic nature of particulate stimuli, the exposures are very temporally unstable. Also, exposures involve the whole body, unlike the situation normally seen in the laboratory setting.
2. In terms of the individuals being exposed, the real world situation is also vastly more 'messy'. Typically, someone charged with trying to understand (and then ameliorate) a given complaint from a group of exposed individuals has little or no knowledge about the characteristics of these individuals. A given exposed group will no doubt vary in terms of demographic variables vastly more than is the case in a laboratory setting. Children as well as adults are often exposed and the range of susceptibility to various short-term effects may range from essentially none to extreme. Similarly, the levels of mental health problems may range from none to severe.
3. Finally, one can note important differences between the laboratory and field in terms of responses. As noted above, a typical laboratory study of odor or irritation will include only one or two endpoints, with each related directly to some aspect of stimulation of just one chemosensory input. In contrast, an exposure in everyday life can affect any combination of at least the following endpoints: cognitive ability or productivity, psychological state or mood, eye blink rate, breathing or neuromotor function and a variety of subjective somatic complaints.

Given the considerable differences that currently exist between the questions and problems apparent in real world situations, two objectives were developed that led to the symposium organized by Martin Kendal-Reed, Wayne Silver and Jim Walker. The first objective was to inform AChemS members about the range of important issues now being grappled with in the odor/irritation area. The second objective was to promote interactions with our four speakers that might lead to the transfer of information from AChemS to those engaged in solving practical problems.

Four individuals were invited to present their work. Each is performing research and developing practical guidelines to deal with environmental causes of odor and irritation. The speakers are actively contributing to the effort to provide the sound science required for improved management of a wide range of environmental odor/irritation issues and problems.

Bob Bottcher is an agricultural engineer at North Carolina State University and deals broadly with issues relating to waste generated by livestock operations. More specifically, he has worked for 7 years in trying to address the air pollution issues associated with pig production, including waste that is generated by very large pig farms. In

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this capacity he often has to understand odor as a response. For example, he has been charged with developing standards for use in evaluating products or processes that are stated to lessen the odor annoyance or magnitude from such operations.

Brigitta Danuser is an occupational physician at the Swiss Federal Institute of Technology, an organization that has great responsibility in the area of indoor air regulation. Brigitta's expertise extends to asthma and its exacerbation in some individuals by second-hand (or environmental) tobacco smoke. She has more recently been engaged in an effort to better understand the effects of indoor air contaminants using breathing changes as response measures. In her presentation she discussed the very intriguing lines of investigation she is pursuing to better understand the meaning of various kinds of breathing changes. Her work could lead to important changes in how indoor environments in workplace situations are regulated.

Dennis Shusterman is a researcher and a public health official who has responded to events such as environmental spills. As a result of his dual role as both clinical researcher and field investigator, Dennis has had the chance to observe psychological and physiological aspects of responses of rather large groups of individuals to various chemicals. This has helped him formulate hypotheses and models about the various levels of responses to airborne chemicals and how they might best be interpreted.

Pawel Wargocki represents the area of indoor air, a field in which only a very few chemical senses individuals (most notably Bill Cain) have been active. Pawel is a member of what is probably the most influential research group for setting ventilation standards based on human appraisals of indoor air quality. His presentation and paper presents the dominant approach now in use to quantify the level of aversiveness, or unacceptability, of room air and to relate this measure to fairly simple physical aspects of the indoor environmental space.

Each of these individuals made excellent presentations at the meeting and a number of questions were fielded for each talk, and during roundtable discussions of all the talks considered together. In order to increase the likelihood of more sustained interactions between the AChemS community and these four individuals, each was asked to prepare a paper for publication in this journal. In the papers that follow, each of the participants outlines the nature of the problems that they are dealing with and highlights specific areas where chemical senses researchers could contribute. The organizers ask that the readership of *Chemical Senses* give some thought to the issues raised by these four colleagues and evaluate the possibility of factoring into future research plans studies that would provide useful data on some of the most pressing areas of ignorance noted. Alternatively, AChemS members could contribute by collaborating with or simply advising those doing more applied kinds of research to address everyday problems.

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