

# **Risky Business: Issues in Teaching about Safety and Regulation**

By [Tom Zinnen](#)

Stigmatization of biotechnology's safety has caused a curious twist in public policy, says Mark Cantley of the [Organization for Economic Cooperation and Development](#). Scientifically, it's safe--that is, as safe as other genetic manipulations. But opinion polls indicate the public does not perceive it as safe. One response is to erect special regulations intended to reassure the public. This causes Cantley's Curious Twist: the new regulations are intended to protect biotechnology from the public, rather than their proper role of protecting the public from biotechnology. Cantley's comments concluded the Third International Symposium on the Biosafety Results of Field Tests of Genetically Modified Plants and Microorganisms held November 13-16, 1994 in Monterey, California. Cantley points out another problem with such 'reassurance regulations.' The public reacts more to the message sent by government action than the one sent by government statements. The actions say "special biotech regulations are needed because biotechnology poses special risks" while the statements are "we conclude based on the scientific evidence that biotechnology poses no special risks." Mixed messages confuse the public, undermine rational and science-based regulation, and choke off public access to the benefits of safe and effective biotechnologies.

## **Teaching and Talking About Safety**

Safety issues challenge teachers and communicators from universities and industry in several ways:

- Defining safety
- Distinguishing between safety and the feeling of safety
- Accommodating people with profound concerns unfounded by the available data
- Clarifying criteria for assessing safety
- Assessing public policies that would generally prohibit or specifically penalize the commercialization of safe and effective products.

There's another specific challenge for teachers. Biotechnology is often cited as a vehicle for teaching about the role of ethics, morality and social obligation in science. While student interest and the availability of case studies makes biotechnology a good vehicle, it is not--and should not be presented as--the sole technology infused with such issues. Clearly biotechnology regulation is a case study for developing critical thinking in students, but to focus all "Science in Society" issues on biotechnology falsely implies that those issues are unique to biotechnology.

## **"Safe" versus "Feeling Safe"**

Assessing the safety of the field release of transgenic plants and microbes is a contentious task entangling principles of science, the pragmatism of commerce, and the politics of government. Napoleon is credited with saying that "laws should be equitable, just, and understandable to all." I wonder if such principles are expected of public policy regulating agricultural biotechnology. Being understandable to all requires being clear in the criteria used to define and assess safety. "Safety has at least two components," notes Paul Thompson of Texas A&M University. "One is the risk measurable by experiments. The other is the public's feeling of safety." While scientists focus on the first, policy

makers usually also consider the second. Accommodating profound concerns unfounded by the data taxes the wisdom of public officials and requires the vigilance of scientists to ensure that concerns about the feeling of safety are not confused with the actual assessment of risk. A simple and clear statement of the criteria of safety of transgenic organisms in agricultural biotechnology has yet to be produced by the US government, and waiting for one would require Jobian patience and an expectation of life-long frustration. Such clarity is unlikely--all the more reason for cultivating scientific literacy in students and the public.

### **Clarifying Criteria: Pegging Regulations Based on Politics**

Mark Cantley notes the scientific community has repeatedly concluded "there is no scientific basis to justify specific regulations for recombinant DNA applications." Which is not to argue that specific regulations should never be applied in response to local political concerns, but "don't delude yourself that you need to do so based on the scientific evidence," warns Cantley. Such unfounded stigmas can damage the public good by "impeding the flow of ideas, of technologies and of trade," Cantley adds. Cantley cited Article 19.3 of the Biodiversity Treaty, which characterizes biotechnology as a specific threat to biodiversity, as an example of the stigmatization. In 1992, the Bush administration objected to the treaty's treatment of biotechnology. The Clinton administration will have to resolve these issues as the treaty is implemented. If the conclusion that recombinant DNA poses no special risks is accepted, then the criteria used to evaluate the risk of products of recombinant DNA would be the same criteria used to evaluate products of traditional and familiar genetic modifications. The feeling of safety may not be the same, but the risk assessment principles would be the same. Even if those principles are not clearly stated, one can ask a critical question: are transgenic organisms tested with the same scrutiny as other genetically modified organisms. If not, why not?

### **How Closely Linked are Public Acceptance and Public Understanding?**

An increase in the number of field tests worldwide, and a spate of new products clearing the final hurdles to commercialization in the US, has spiked interest in improving public understanding of biotechnology in the hope of increasing public acceptance of biotechnology products. Clearly public understanding will not of itself cause public acceptance. Acceptance is a function of both information and values, so an improved understanding of the science will not necessarily change values. People choose to reject a new technology for several reasons, including misinformation leading to misconceptions, as well as well-informed people rejecting a tool because the tool is inconsistent with their values. To some people new technologies such as recombinant DNA are taboo. Taboos are real, can be profound, but are capricious and not bounded by reason. One is left asking if taboos are sound principles on which to base public policies that restrict liberty or demand compulsory action against a person's will. Common sense tells me that an informed public is less likely to reject biotechnology products because of misconceptions. And an involved public is less likely to reject biotechnology products because of a feeling of exclusion from the process of assessing safety. An informed public is also more likely to participate effectively in the debate. Effectively addressing safety issues and regulations is a key component of that debate.