

## BIOTECHNOLOGY

# Why Are People Hostile to Biotechnologies?

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Public debate on biotechnologies illustrates the difficulty of combining democratic forms with regulation of complex technoscientific issues. The root of the problem is often identified as a lack of “scientific literacy,” mainly caused by a distorted and alarmist representation of these issues by the mass media and associated with prejudice against science (1).

Two years ago, we used data collected from two large surveys of Italian public opinion to demonstrate that, although lack of information on biotechnologies and a marked hostility against food biotechnologies are clear, the links between media exposure, levels of awareness, and attitudes toward biotechnologies are far from straightforward. In other words, it is not sufficient to be more informed to be more open to biotechnologies; indeed, the contrary is sometimes the case (2). However, we left open the question of what—if media exposure and awareness itself do not seem to be so relevant—could actually explain public hostility to biotechnologies.

In 2003, another survey of Italian public opinion was carried out, specifically aimed at analyzing this question (3). A representative sample of 994 Italian citizens was interviewed by phone in late March 2003. A copy of the questions used in the survey and the percentage response rates are available on the *Science* Web site.

We believe that the negative attitudes toward biotechnologies that we have documented are not part of a more general public prejudice against science. Italians distinguish among biotechnologies; 84% are favorable to continuing research on medical biotechnologies, whereas 57.3% think that research on food biotechnologies should be continued. This is consistent with international surveys that indicate high levels of trust in science and its applications (4). That antiscience attitudes are not the key to answering our question is also confirmed

## WHO SHOULD DECIDE WHETHER TO CONTINUE RESEARCH ON BIOTECHNOLOGIES?

	Percent*
The Italian government	9.0
The European Union	29.9
Entrepreneurs funding research	2.0
Scientists	11.9
The Catholic church	2.2
All citizens	20.9
Potential beneficiaries of applications	5.1
No one is in a position to decide	14.4
Don't know — no response	4.5

\*Calculated on the basis of the 994 participants in the survey.

by scientists being indicated in the latest survey as the most trustworthy source of information on biotechnologies (39%).

At the same time, however, the perceived image of scientific research among citizens seems to have lost some of its aspect of impartiality and disinterestedness: 69% of respondents, for instance, define science as “loaded with interests.” Science is also increasingly seen as in internal disagreement: 68.6% think that the members of the scientific community have conflicting views on the issue of genetically modified organisms (food and plant products) (GMOs), and 83.3% perceive specialists in disagreement about cloning. Those who considered the scientific community to be in conflict were also somewhat more likely to be skeptical about biotech applications (5).

When it comes to indicating who should make decisions regarding biotechnologies, citizens express, as in the previous survey, a strong request for involvement and public participation: according to one respondent out of 5, such decisions should be the responsibility of “all citizens,” whereas only about 1 out of 10 assigns this responsibility to the scientists themselves. In particular, those who emphasize the risk of certain biotechnology applications are also in higher proportion among those who believe that decisions on biotechnologies should involve “all citizens.” Skepticism toward traditional forms of decision-making and rep-

resentation may also be detected in the fact that the majority of respondents indicate a transnational body (the European Union) as best placed to decide on biotechnology issues; those choosing the Italian government are even less numerous than those convinced that “no one is in a position to decide” (see the table).

Our study suggests that what we are witnessing represents concern for the procedures connecting scientific expertise, decision-making, and political representation. We believe that neither the elitist approach (“leave it to the experts”) nor the utopian approach (which assumes that all citizens can be transformed into scientific experts) is viable. Experts are not sufficient because political actors and institutions are considered inadequate in this area by the majority of citizens. Science, moreover, is increasingly perceived as feeding uncertainty rather than certainty. The objection toward (some) biotechnologies seems to derive from the currently

perceived absence of adequate and publicly accountable procedures for the governance of innovation.

Future studies are needed to explore how certain events and their media coverage may have contributed to shaping this perception. Journalists clearly have a significant responsibility in choosing the results and spokespersons which are used to represent the scientific point of view in the public domain; however, reducing this complex process to a simple matter of malpractice on the part of the media seems to respond only to the desire to find an easy scapegoat, while ignoring a dilemma which is increasingly serious and relevant.

### References and Notes

- See, for example, “U.S. Medical Association decries ‘lies’ vs. biotech,” March 2003; <http://lifesciencesnetwork.com/news-detail.asp?newsID=3564>.
- M. Bucchi, F. Neresini, *Nature* **416**, 261 (2002).
- The survey received financial support from the Bassetti Foundation and from Observa Cultural Association.
- Eurobarometer 55.2, 2001; Eurobarometer 58.2, 2003.
- Of the individuals in our survey, 34.8% thought that “modifying genes of fruit and vegetables to make them more resistant to parasites” was useful, as compared with 43.8% of the group who viewed the scientific community as basically consistent. Furthermore, 35% of those who believed scientists are in disagreement over GMOs considered the same application as morally acceptable, versus 44% of those who had emphasized agreement among experts ( $\chi^2 = 7.45$ ,  $df = 2$ ;  $P = 0.05$ ).

### Supporting Online Material

[www.sciencemag.org/cgi/content/full/304/5678/1749/DC1](http://www.sciencemag.org/cgi/content/full/304/5678/1749/DC1)

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