



The Center for
Health & Risk Communication

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Toxicologists' Opinions on Chemical Risk: A Survey of the Society of Toxicology

Conducted By

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Introduction

If you believe what you see and hear in the media, Americans are being poisoned every day by the very chemicals we routinely use to improve our lives. Nora Ephron has told readers of the *Huffington Post* that she “loved” Teflon but had to throw out all her pans after hearing that the coating “probably causes cancer and birth defects.” The Environmental Working Group has repeatedly warned Americans that “millions of babies” are at risk from the chemical bisphenol A (BPA) in plastic baby bottles. Last week Chicago became the first city to ban the sale of baby bottles and sippy cups, on the grounds that BPA has been associated with everything from cancer to obesity.

Toys containing phthalates have been banned for fear that infants will put them in their mouths. People have been warned that chemicals producing a “new car smell” can poison them, and that even sunlight warming the plastic in a baby stroller can endanger their babies from toxic off-gassing. Activist groups have warned of chemical perils in iPods, air fresheners, pizza boxes, lipstick, perfume, window blinds, mattresses, and sunscreen.

These warnings have generated thousands of news stories. But in all the media coverage over the past few years, for all the scientists who were quoted on one side or the other, the community of experts who study the toxic risks of chemicals were never canvassed for their collective informed opinion on how much the public really was at risk.

Surveying Expert Opinion

In the past we had surveyed expert communities on the environmental sources of cancer, the risks of nuclear energy, and the likelihood and direction of climate change. Amid heightened public concern over manmade chemicals, it seemed an opportune time to survey the expert community on this topic – the science of toxicology, which focuses on the adverse effects of chemicals on living organisms.

In order to determine the collective judgments of toxicologists on chemical risks, we asked the Society of Toxicology (SOT), the professional association of this scientific discipline, for permission to survey their members. The SOT supplied us with a list of full members of the organization, with the understanding that this did not constitute an institutional endorsement of the study’s methodology or findings. Among the criteria for full membership are several years of professional experience in toxicology.

We created an online questionnaire with the assistance of Harris International, a prominent international survey research firm and an industry leader in online polling. Respondents were contacted by email requesting their participation. They were given passwords with which to log onto the questionnaire. From January 27 through March 2 we contacted 3562 SOT members, 1136 of whom responded, for a return rate of 32 percent. However, almost 200 of these filled out only part of the questionnaire, and many of these provided demographic information but skipped the key attitude questions. This initial presentation of our findings is based on the responses of the 937 who responded to every question.

We inquired into four different areas of toxicologists' attitudes, perceptions, and opinions about issues related to chemical risk. First, we asked whether they agreed or disagreed with a number of statements about the safety of currently used chemicals, the process of determining their safety, and the basis for making scientific judgments and regulatory decisions. Second, we asked them to rate the risk to human health posed by current levels of exposure to a list of chemical substances that have spurred controversy.

Third, we asked them to rate the quality of information about chemical risk associated with a wide variety of government, nonprofit, and private sector organizations that frequently address this issue. Finally, we asked their opinions on media coverage of chemical risk, including the media's ability to explain scientific issues in a way that will help audiences reach their own conclusions. The overall findings on all these questions are provided in the attached tables. The exact wording of the items discussed below are presented in **Appendix A**. We are continuing to analyze these data and will present additional results in scholarly journals.

Chemical health risks

In the attitudes they express toward chemical risk, toxicologists tend to downplay the dangers to human health, as the results summarized in **Table 1** indicate. Most do not regard either cosmetics or food additives as significant sources of health risks. Only one out of three ascribes significant risks to food additives and one out of four to cosmetics. They express more concern about pesticides and endocrine disruptors, which are seen by slight majorities as posing significant health risks.

They overwhelmingly reject the notion that exposure to even the smallest amounts of harmful chemicals is dangerous or that the detection of any level of a chemical in your body by biomonitoring indicates a significant health risk. And they are nearly unanimous in rejecting the notion that organic or "natural" products are inherently safer than others.

Regulation

Media coverage and public and political debate have featured strong criticism of the risk assessment approach taken by government agencies charged with regulating chemicals. But toxicologists give the system a vote of confidence. Fewer than one out of four believe that regulation should be guided by the precautionary principle, which mandates that a substance suspected to cause harm should be banned even in the absence of scientific consensus. Similarly, only one out of four believe that the US regulatory system is inferior to that of Europe, where the precautionary principle has the force of law.

But toxicologists do express concern over the politicization of science. Two out of three believe the peer review process is becoming too politicized, three out of four say scientists should restrict public statements to areas of their own expertise, and nine out of 10 believe research findings should be peer-reviewed before being released to the press.

Finally, majorities fault both the media and regulators for not doing a balanced job of explaining chemical risk to the general public.

Specific chemicals

We then presented respondents with a list of specific substances and asked them to rate the risk to human health posed by current levels of exposure to a list of specific substances to each, on a scale from very low to very high risk. **Table 2** shows the results in terms of both mean scores and proportions reading each substance as high risk. For example, 89 percent of toxicologists rate smoking tobacco as a high-risk activity, 44 percent regard second-hand smoke as high in risk to health, and 37 percent say exposure to mercury as a high risk. Next in line are exposure to sunlight, rated as high risk by 26 percent, and aflatoxin, a naturally occurring fungus found in peanut butter, rated as high risk by 29 percent.

In comparison, toxicologists rate certain chemicals that have generated considerable public controversy as significantly less dangerous to human health. Phthalates, which are added to plastic products to make them flexible, including many children's toys, are rated as high risk by just 11 percent of respondents. High fructose corn syrup, seen by many people as a cause of obesity was also rated as high risk by 11 percent.

Bisphenol A, or BPA, which is used to harden plastics, and was recently discontinued by makers of baby bottles, was rated as high in risk to human health by 9 percent. Despite recent controversy over the safety of Teflon coatings, it is rated as a high health risk by just 3 percent of toxicologists. Similar results were obtained for several other magnets of public controversy, from flame retardants to genetically modified organisms.

Getting accurate information

In addition to their own views on chemical risk, we asked toxicologists to rate the organizations involved in public debate over chemical risks in terms of how accurately they portray these risks. The results appear in **Table 3**. There were considerable variations in the number of respondents who were familiar enough with the various organizations to rate their accuracy. To insure that the comparisons are commensurable, the percentages exclude "not sure" responses. We added a column indicating the percentage of respondents who rated each organization. The table includes only organizations rated by more than one-third of respondents. Organizations failing to meet this level of recognition included the Biotechnology Council, National Nanotechnology Initiative, Pew Charitable Trusts, and American Council of Science and Health.

In addition, we present the same data with the "not sure" responses included in the rating percentages in **Table 3A**. (Please note, the full names associated with these abbreviations and acronyms are listed in **Appendix A**.)

Among respondents who rate these organizations, large majorities view the leading environmental groups as overstating risk. 96 percent believe Greenpeace overstates

chemical risk, 85 percent say the same of the Environmental Defense Fund's risk portrayals, as do 80 percent of those rating PETA. 79 percent believe that chemical risk is overstated by the Environmental Working Group, the Natural Resources Defense Council, and the Center for Science in the Public Interest.

Conversely, smaller majorities see industry related groups as understating chemical health risks. This includes 57 percent of those rating the American chemistry Council, which represents the chemical industry, and 60 percent of those rating PhRMA, the Pharmaceutical Researchers and Manufacturers of America.

By contrast, majorities rate most government agencies and all professional associations as providing mainly accurate portrayals of chemical risk. An exception is the Environmental Protection Agency, which is rated as overstating risk by 41 percent, accurately stating risk by 40 percent, and understating risk by 19 percent. But increasingly large majorities see accurate risk portrayals coming from such agencies as OSHA, the FDA, the CDC, and the National Science Foundation, whose portrayal of chemical risk is rated as accurate by 85 percent of toxicologists.

At the opposite end of the reliability scale are the news media, which are seen as overstating risk to an even greater degree than the environmental groups. Public broadcasting does best among the mainstream media with "only" two out of three toxicologists describing PBS and NPR as overstating chemical risk. Over 80 percent see America's leading newspapers, news magazines, and health magazines as overstating chemical risk, and the proportion rises above 90 percent for both broadcast and cable television networks.

New media trumps old

In perhaps the most surprising finding in the entire study, all these national media outlets are easily eclipsed by two representatives of "new media" – WebMD and Wikipedia. WebMD is the only news source whose coverage of chemical risk is regarded as accurate by a majority (56 percent) of toxicologists, closely followed by Wikipedia's 45 percent accuracy rating. By contrast, only 15 percent describe as accurate the portrayals of chemical risk found in the *New York Times*, *Washington Post*, and *Wall Street Journal*. The preference for Wikipedia in particular seems like an indictment of professional journalism, since anyone can contribute to this site.

Figure 1 presents this information in a more compact form by arraying all the organizations that were rated according to their mean scores along a spectrum from "strongly understates" (scored as 1) to "strongly overstates" (scored as 5). The government agencies and professional bodies are clustered near the midpoint of 3, while the media outlets and environmental groups cluster together almost interchangeably from 4.0 to 4.3.

The only exceptions are public broadcasting, whose 3.8 rating represents a slightly lesser degree of overstating risk, and Greenpeace, whose 4.5 rating (representing slightly more

overstatement) is the highest in the study. Of course the two industry organizations, PhRMA and the American Chemistry Council, are rated as understating risk. Perhaps surprisingly, however, their 2.3 ratings put them considerably closer to the midpoint (3.0, representing an “accurate” appraisal of risk) than any of the environmental groups and any of the traditional media outlets except for public broadcasting.

Scientific illiteracy

The disdain that toxicologists apparently feel toward traditional journalism is evidenced by their unwillingness to credit the media with getting almost anything right in covering chemical risk. **Table 4** shows that nine out of 10 fault the media for not seeking out diverse scientific views to balance stories, and it only gets worse from there. At least 95 percent describe the media’s performance as “poor” in distinguishing good from bad studies, distinguishing correlation from causation, explaining the trade-off between risks and benefits, distinguishing absolute from relative risk, explaining the odds ratios, and explaining that “the dose makes the poison” – a fundamental tenet of toxicology.

Finally, we asked toxicologists about the weight that the media give to several elements of the coverage of chemical risk. As **Table 5** shows, three out of four toxicologists complain that the media overplays individual studies relative to the overall body of evidence and gives too much attention to the views of individual scientists relative to those of the broader toxicological community. More specifically, two out of three (68 percent) say there is too much attention given to studies by scientists working with environmental groups, compared to only 10 percent who see too little attention to these studies. Conversely, nearly half (48 percent) say there is too little attention to studies from scientists working in the private sector compared to 18 percent who say too much attention is given to the studies.

This survey was supported by a grant from the Stuart Family Foundation. We wish to express our gratitude to them for making this research possible. We also thank the Society of Toxicology (SOT) for permitting us to conduct this survey of their members and Harris Interactive for administering the survey instrument. However, the authors of this report bear sole responsibility for all aspects of the survey methodology and the presentation and interpretation of the findings.

Table 1: ATTITUDES ON CHEMICAL RISK ISSUES*

	MEAN	AGREE	DISAGREE	DK
Safety of Chemicals				
Chemicals cause endocrine disruption	2.6	53%	35%	12%
Pesticides significant health risk	2.6	55%	43%	2%
Food additives significant health risk	2.1	33%	62%	5%
Cosmetics significant health risk	2.0	26%	66%	8%
Any exposure level is unacceptable	1.8	6%	92%	2%
Organic/natural products safer	1.5	10%	87%	3%
Any level of chemical shows health risk	1.3	18%	81%	1%
Animal testing not needed	1.5	10%	89%	1%
Government Regulation				
Regulators balanced in explaining risk	2.3	40%	54%	7%
US regulation inferior to Europe	2.2	23%	44%	33%
Regulate with precautionary principle	1.9	24%	69%	7%
Informing the Public				
Peer review findings before news coverage:	3.5	90%	10%	1%
News of chemical risk not balanced	3.5	87%	11%	2%
Restrict public statements to own expertise	3.1	76%	23%	7%
Peer review system is politicized	2.9	64%	21%	15%

* 1-4 scale when 1= strongly disagree and 4 = strongly agree

Table 2: RISK LEVEL OF CHEMICALS*

	MEAN	HI	MED	LO	DK
Smoking tobacco	6.5	88%	10%	1%	1%
Chewing tobacco	5.9	70%	25%	3%	2%
Second-hand smoke	5.0	44%	46%	9%	1%
Mercury	4.5	35%	43%	18%	4%
Sunlight	4.5	26%	60%	12%	2%
Aflatoxin	4.3	29%	42%	23%	6%
Ethyl alcohol	4.2	25%	52%	19%	4%
Benezene	4.1	24%	44%	22%	10%
Radiation	3.9	23%	46%	27%	4%
PCB's	3.9	21%	47%	27%	5%
Dioxin	3.8	24%	41%	30%	5%
Hormones	3.7	14%	52%	22%	12%
PBDE's	3.7	10%	38%	20%	32%
Enviro. Estrogens	3.6	14%	50%	30%	6%
Formaldehyde	3.6	14%	50%	32%	4%
Acrylamide	3.5	13%	44%	31%	12%
Chlorpyrifos	3.4	10%	35%	27%	28%
EDB	3.3	7%	23%	20%	49%
Phthalates	3.3	11%	45%	34%	10%
PFOA	3.2	5%	31%	23%	41%
Atrazine	3.2	9%	32%	29%	30%
Nanomaterials	3.2	6%	30%	23%	41%
Bisphenol A	3.2	9%	39%	37%	15%
DDT	3.1	14%	36%	45%	5%

Corn syrup	3.0	11%	36%	44%	9%
Chlorine	3.0	7%	43%	42%	8%
Triclosan	2.9	4%	22%	27%	47%
Parabens	2.7	3%	24%	32%	41%
Teflon	2.3	3%	27%	57%	13%
Genetically modified orgs.	2.1	3%	19%	68%	10%
Surcralose	2.0	1%	16%	49%	34%
Saccharine	1.9	2%	18%	74%	6%

*1-7 scale where 1-2 equal low, 3-5 equal moderate, 6-7 equal high

Table 3: RATING RISK PORTRAYALS*

Enviro Groups	MEAN	OVERSTATE	UNDERSTATE	ACCURATE	PERCENT RATING
Greenpeace	4.5	96%	1%	3%	87%
PETA	4.4	80%	12%	2%	81%
Enviro. Defense Fund	4.2	85%	4%	12%	72%
Enviro. Working Group	4.2	79%	3%	18%	51%
Nat. Res. Defense Council	4.1	79%	5%	16%	61%
Center Sci. Pub. Interest	4.1	79%	4%	17%	54%
Industry Related					
American Chem. Council	2.4	2%	57%	41%	71%
Pharm Res.+Manuf. America	2.3	2%	60%	38%	69%
Government					
EPA	3.3	41%	19%	40%	96%
CPSC	3.2	36%	17%	47%	75%
WHO	3.3	31%	5%	65%	88%
NIEHS	3.3	29%	4%	67%	91%
NIOSH	3.2	29%	9%	61%	88%
OSHA	3.1	28%	18%	54%	88%
Int'l Agency Res. Cancer	3.3	28%	3%	69%	72%
FDA	3.0	22%	24%	55%	94%
Nat'l Cancer Inst.	3.2	21%	4%	75%	86%
CDC	3.1	17%	6%	76%	90%
USDA	2.8	12%	32%	56%	77%
Nat'l Sci. Foundation	3.1	11%	3%	85%	69%

Professional Societies

AMA	3.1	28%	16%	56%	76%
ASPET	3.0	7%	9%	85%	53%
FASEB	3.0	10%	5%	86%	59%
SOT	3.0	8%	6%	86%	91%

Media

Local TV News	4.3	94%	3%	3%	87%
Broadcast News Networks	4.2	92%	3%	5%	87%
Cable News Networks	4.2	92%	5%	4%	83%
USA Today	4.2	90%	4%	6%	74%
Local Newspaper	4.2	90%	4%	6%	86%
Nat'l Health Magazines	4.1	86%	3%	10%	56%
Nat'l News Magazines	4.1	85%	3%	12%	84%
National Newspapers	4.0	82%	4%	15%	87%
Public Broadcasting	3.8	66%	2%	33%	85%
Wikipedia	3.5	50%	5%	45%	46%
WebMD	3.3	38%	6%	56%	50%

*1-5 scale where 1=strongly understates, 3= accurately states, 5= strongly overstates
Respondents expressing no opinion excluded from calculations.

Table 3A: RISK PORTRAYALS INCLUDING NO-OPINION RESPONSES

	MEAN SCORE	OVERSTATES	UNDERSTATES	ACCURATE	DK
Non-Gov't Orgs					
Greenpeace	4.5	83%	1%	3%	13%
PETA	4.4	70%	10%	1%	19%
EDF	4.2	61%	3%	9%	28%
EWG	4.2	40%	1%	9%	49%
NRDC	4.1	48%	3%	10%	39%
CSPI	4.1	43%	2%	9%	46%
NAS	3.1	15%	3%	67%	14%
AMA	3.1	21%	12%	43%	24%
FASEB	3.0	6%	3%	51%	41%
SOT	3.0	7%	6%	78%	9%
ASPET	3.0	4%	5%	45%	47%
ACC	2.4	1%	41%	29%	29%
PhRMA	2.3	1%	41%	26%	31%

	MEAN SCORE	OVERSTATES	UNDERSTATES	ACCURATE	DK
Gov't Orgs					
NIEHS	3.3	27%	4%	61%	9%
IARC	3.3	23%	2%	57%	18%
EPA	3.3	39%	18%	38%	4%
WHO	3.3	27%	5%	56%	12%
NIOSH	3.2	26%	8%	54%	12%
CPSC	3.2	27%	13%	35%	25%
NCI	3.2	18%	3%	65%	14%
CDC	3.1	16%	6%	65%	10%
OSHA	3.1	24%	16%	47%	12%
NSF	3.1	8%	8%	59%	31%
FDA	3.0	20%	2%	51%	6%
USDA	2.8	9%	25%	43%	23%

	MEAN SCORE	OVERSTATES	UNDERSTATES	ACCURATE	DK
Media Outlets					
Local TV News	4.3	81%	3%	2%	12%
Broadcast news	4.2	80%	3%	4%	13%
Cable News	4.2	76%	4%	3%	17%
USA Today	4.2	66%	3%	5%	26%
Local paper	4.2	77%	4%	5%	14%
Health mags	4.1	48%	3%	6%	44%

News mags	4.1	72%	2%	10%	16%
National papers	4.0	71%	3%	13%	13%
PBS, NPR	3.8	56%	1%	28%	15%
Wikipedia	3.5	23%	2%	21%	54%
WebMD	3.3	19%	3%	28%	50%

Table 4: EVALUATIONS OF MEDIA'S REPORTING*

	MEAN	POOR	WELL	DK
Diverse views, balance	1.7	90%	8%	2%
Explain risk, benefit tradeoff	1.5	95%	3%	1%
Explain dose makes the poison	1.4	96%	3%	1%
Distinguish correlate/cause	1.4	96%	3%	1%
Distinguish absolute/relative risk	1.4	97%	2%	1%
Distinguish good/bad studies	1.3	97%	2%	1%
Explain odds/ratios	1.3	96%	2%	2%

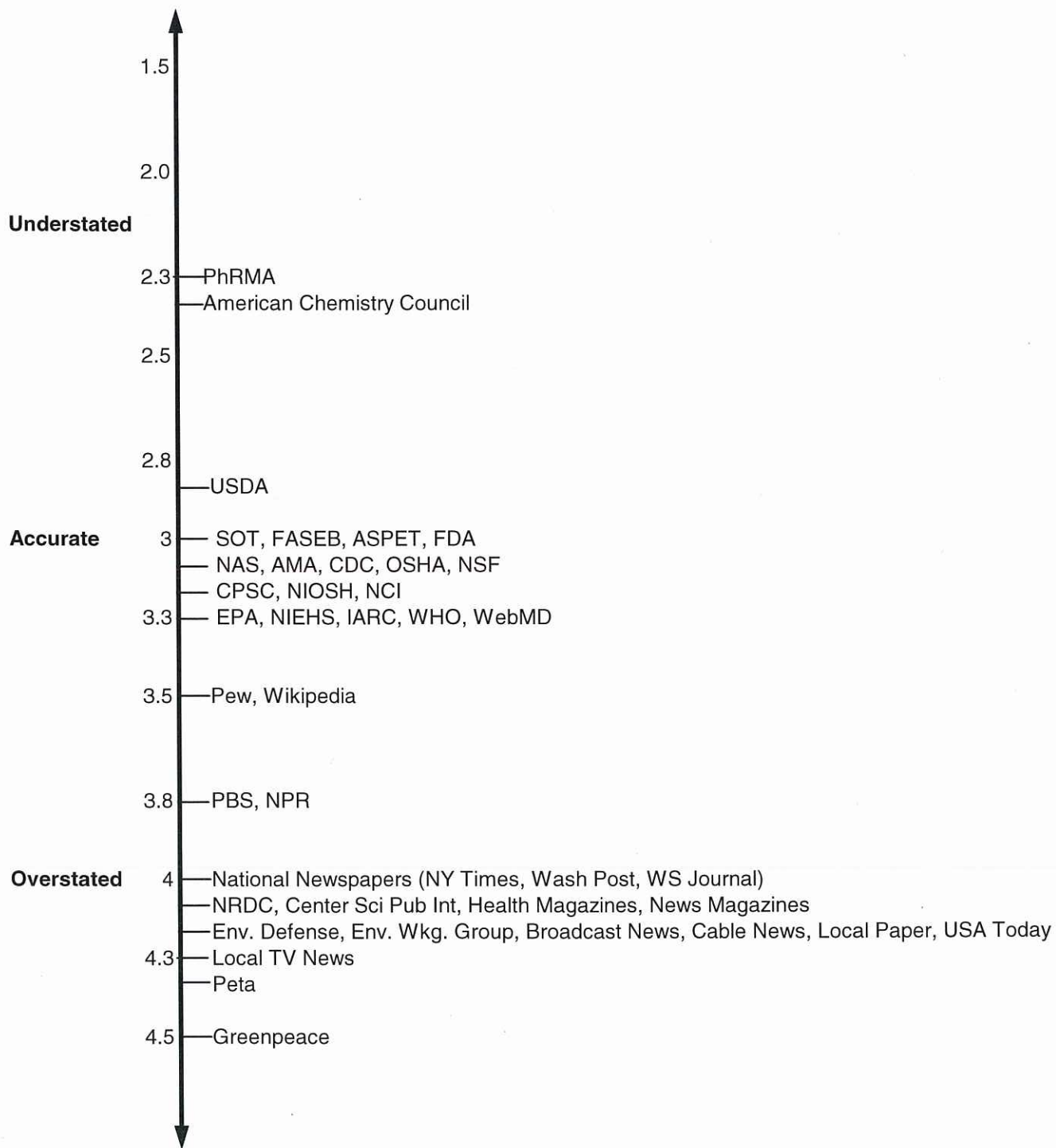
*1-4 scale where 1= not at all well and 4= very well

Table 5: EVALUATIONS OF WEIGHT MEDIA ASSIGNS TO SCIENTIFIC EVIDENCE*

	MEAN	TOO LITTLE	RIGHT	TOO MUCH	DK
Individual studies relative to overall evidence	4.1	14%	6%	74%	6%
Individual scientists relative to scientific commu	4.0	12%	9%	73%	6%
Studies by enviro. group scientists	4.0	10%	13%	68%	9%
Studies by government scientists	3.0	28%	36%	27%	9%
Studies by private sector scientists	2.5	48%	21%	18%	14%

*1-5 scale where 1= too little, 3= appropriate, 5= too much

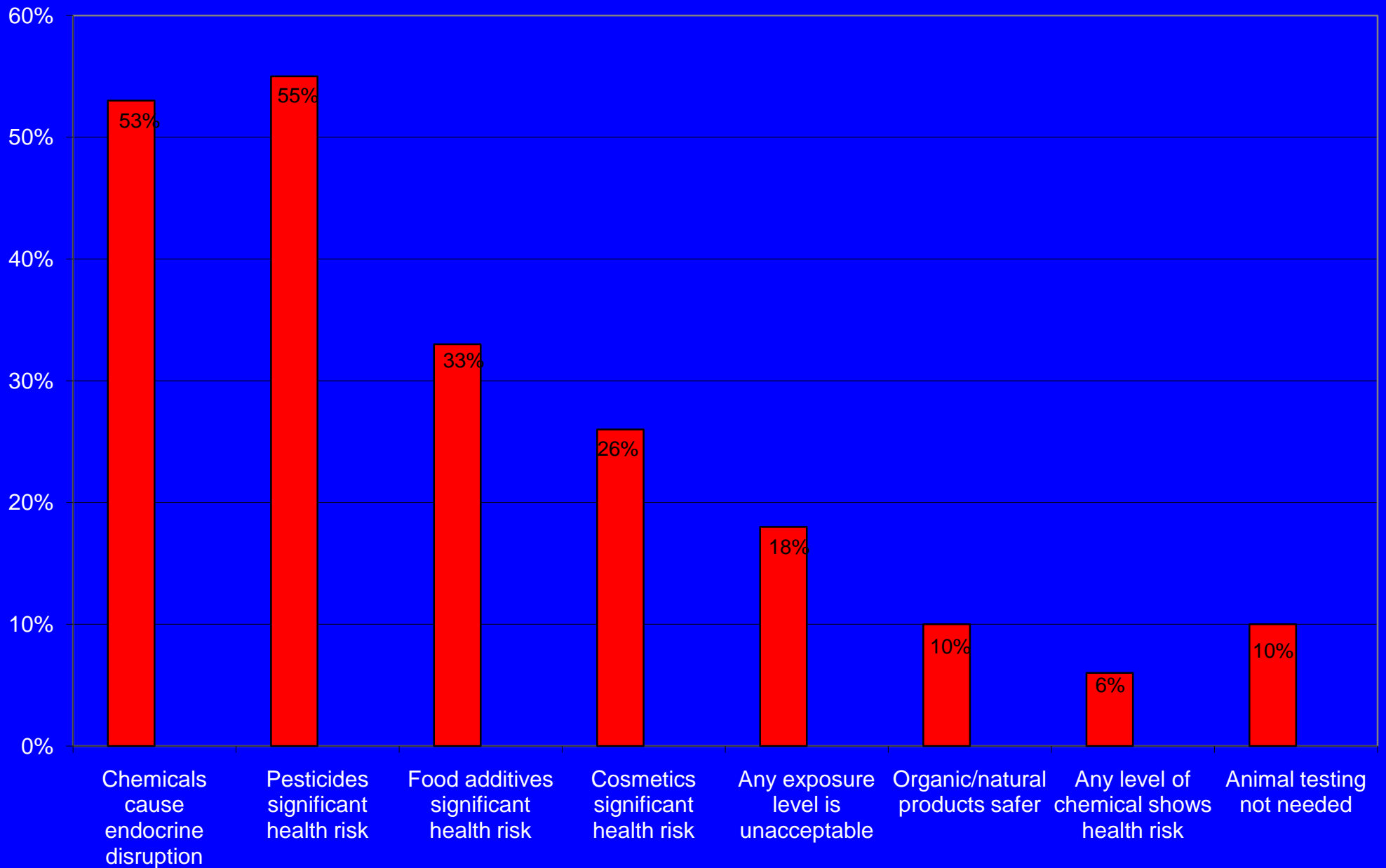
Figure 1: RATING RISK PORTRAYALS - Mean Scores



Note: Mean scores based on 1 to 5 scale where 1 equals strongly understate, 3 equals accurate, 5 equals strongly overstate

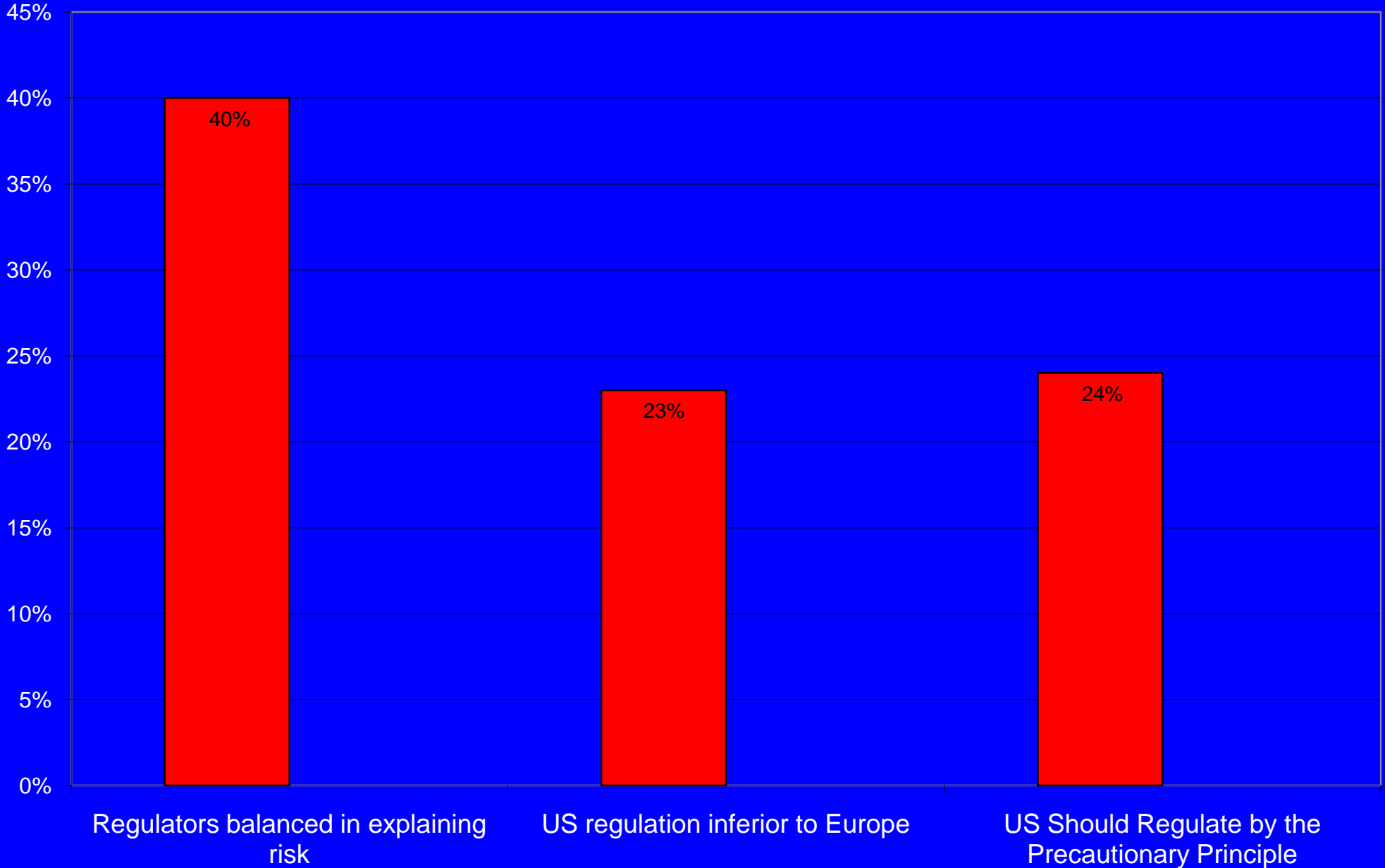
SOT Attitudes on Chemical Risk

Percentage of toxicologists that agree with the following statements



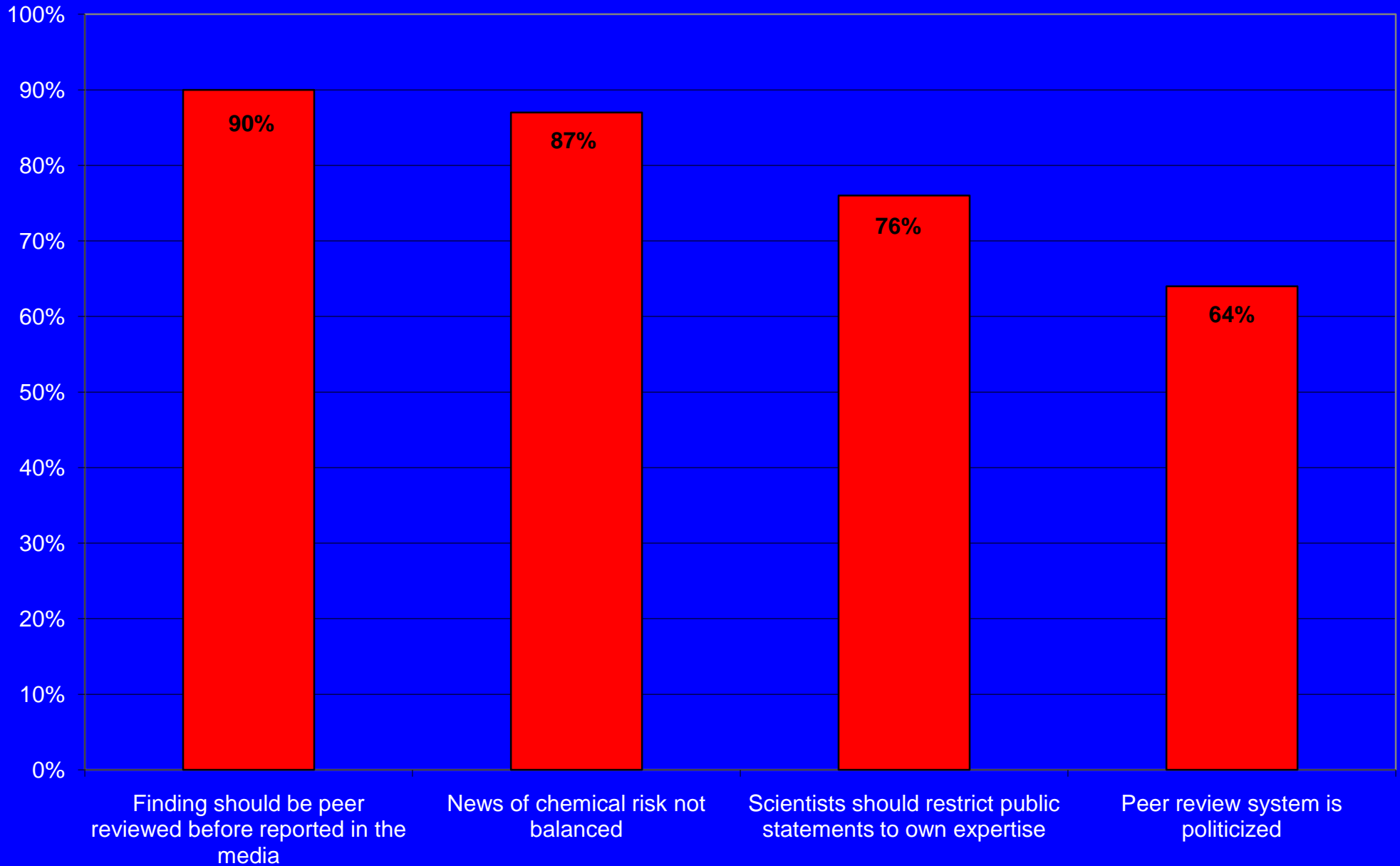
SOT Attitudes on Regulating Chemicals

Percentage of toxicologists that agree with the following statements



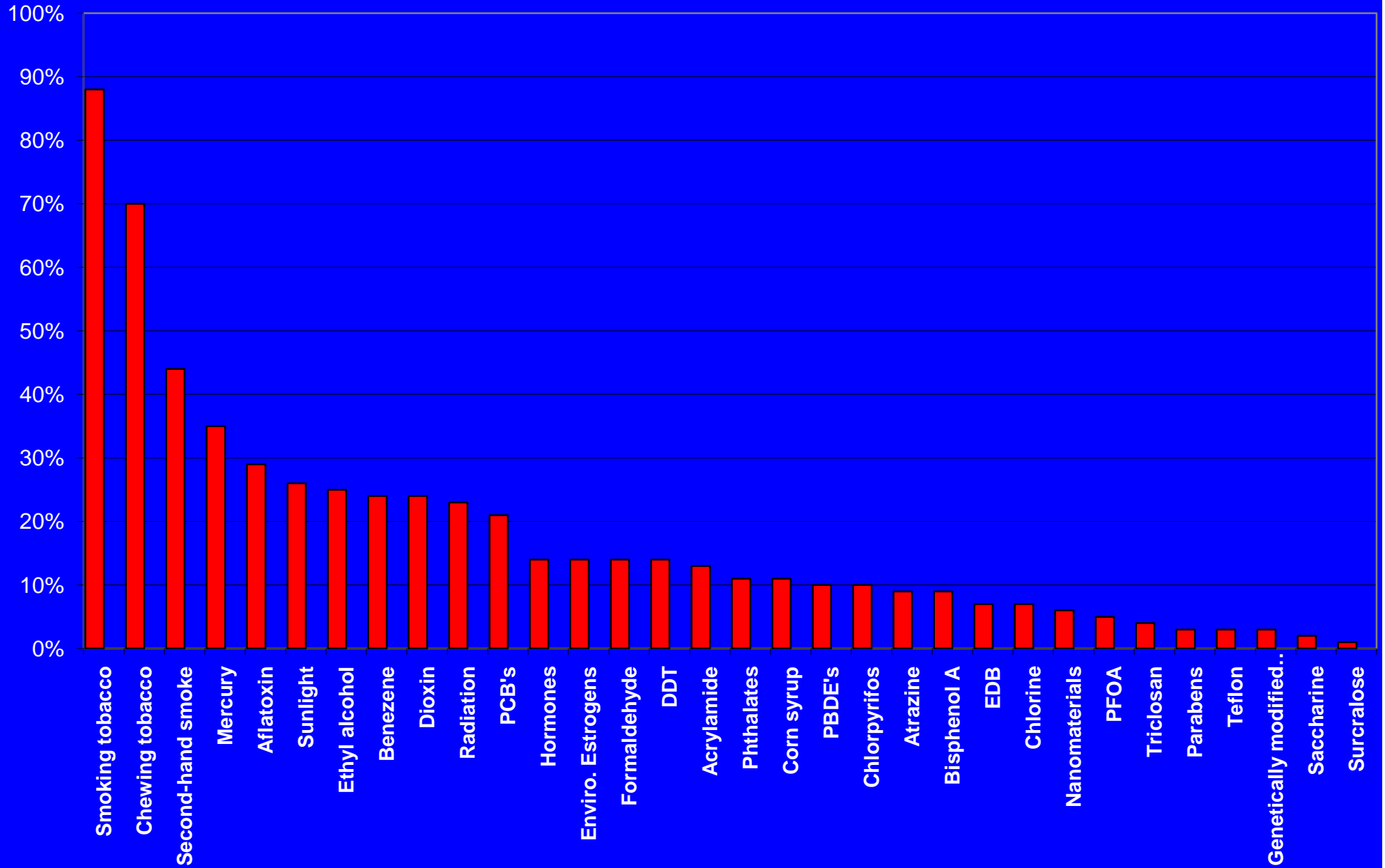
SOT Attitudes on Informing the Public

Percentage of toxicologists that agree with the following statements

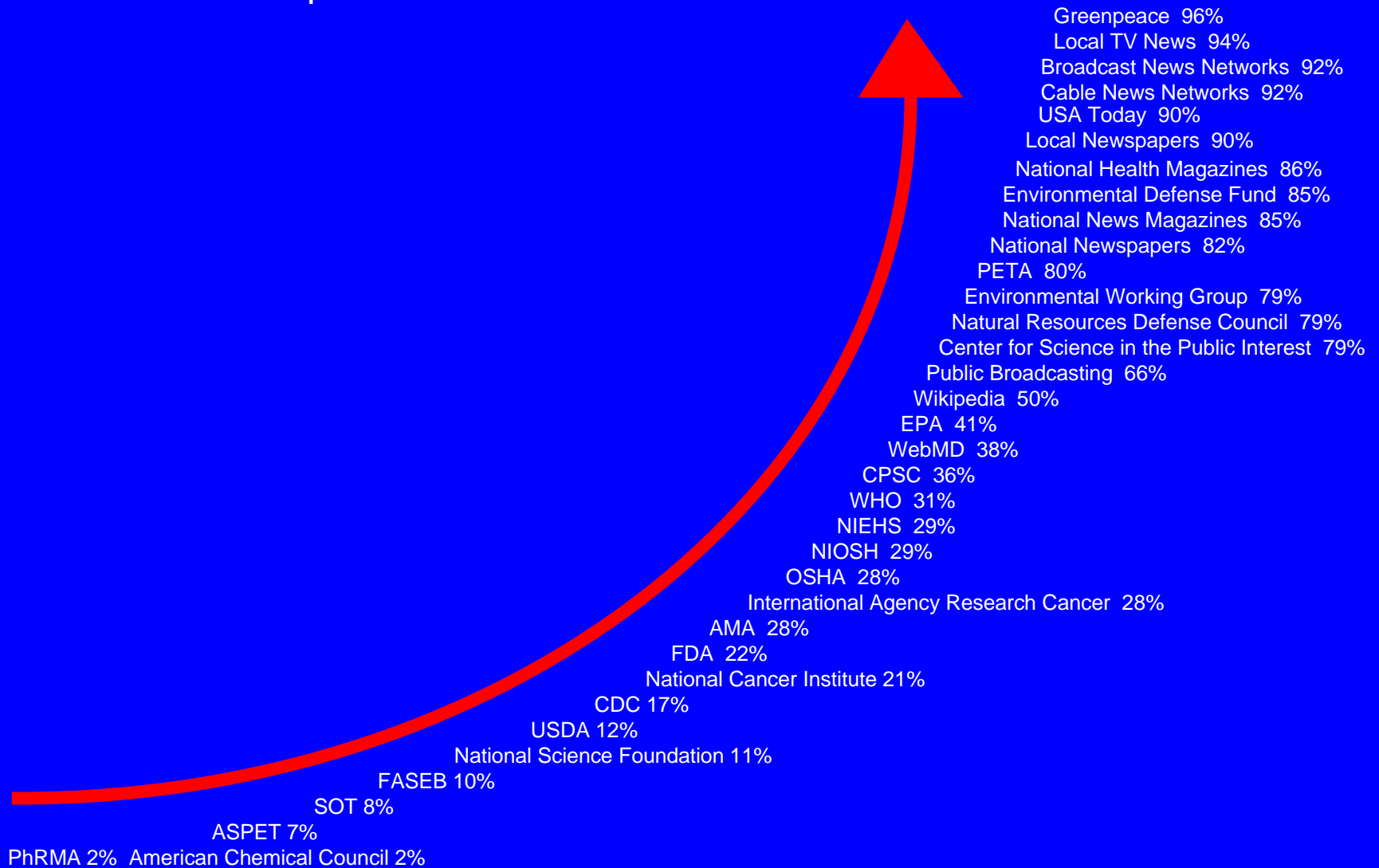


How SOT Members Rate the Risk of Exposure to Various Substances

Percentage that Rate Substance as High Risk

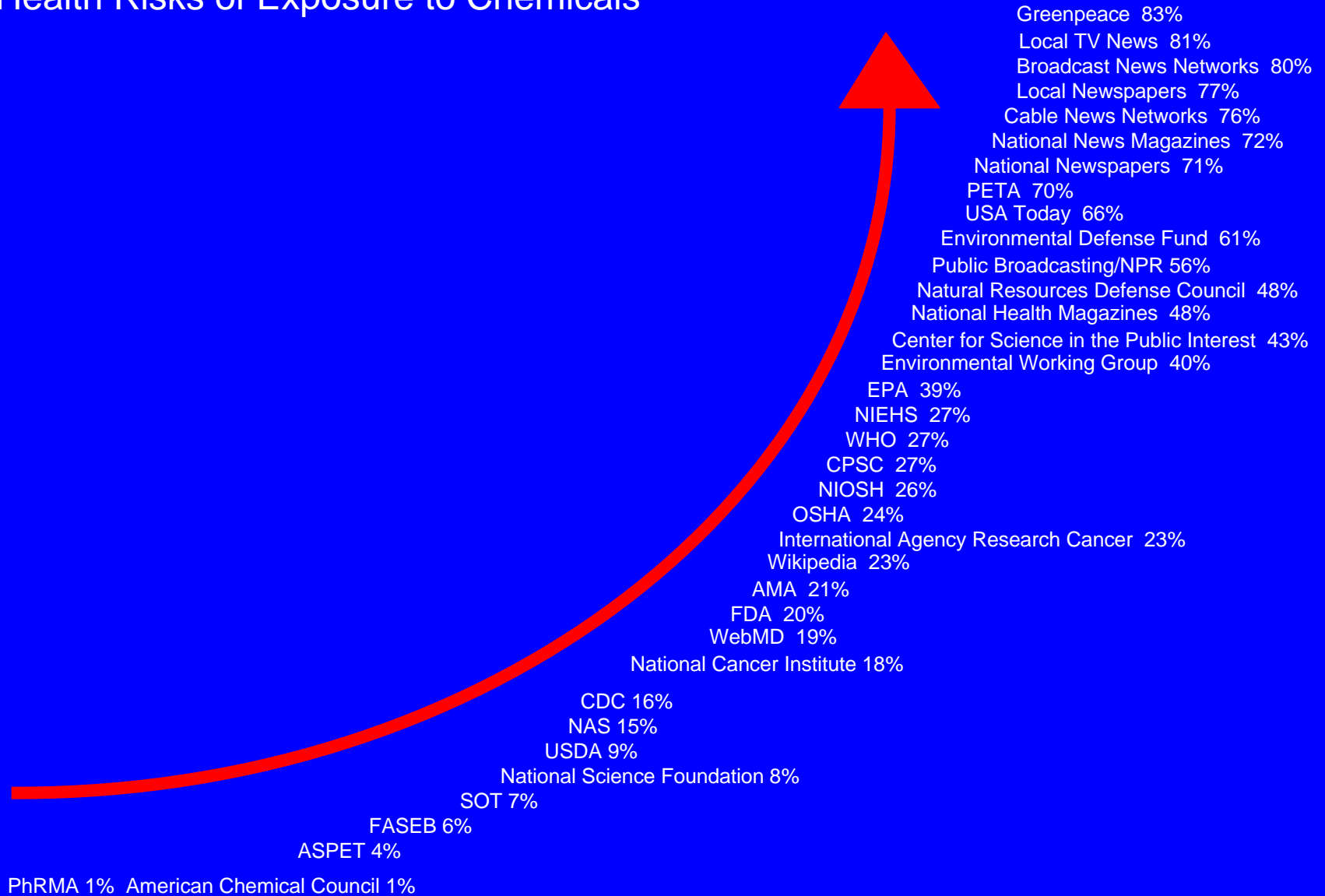


Percentage of SOT Respondents Who Believe Certain Organizations Overstate Health Risks of Exposure to Chemicals*



*Note: Respondents expressing no opinion excluded from calculation

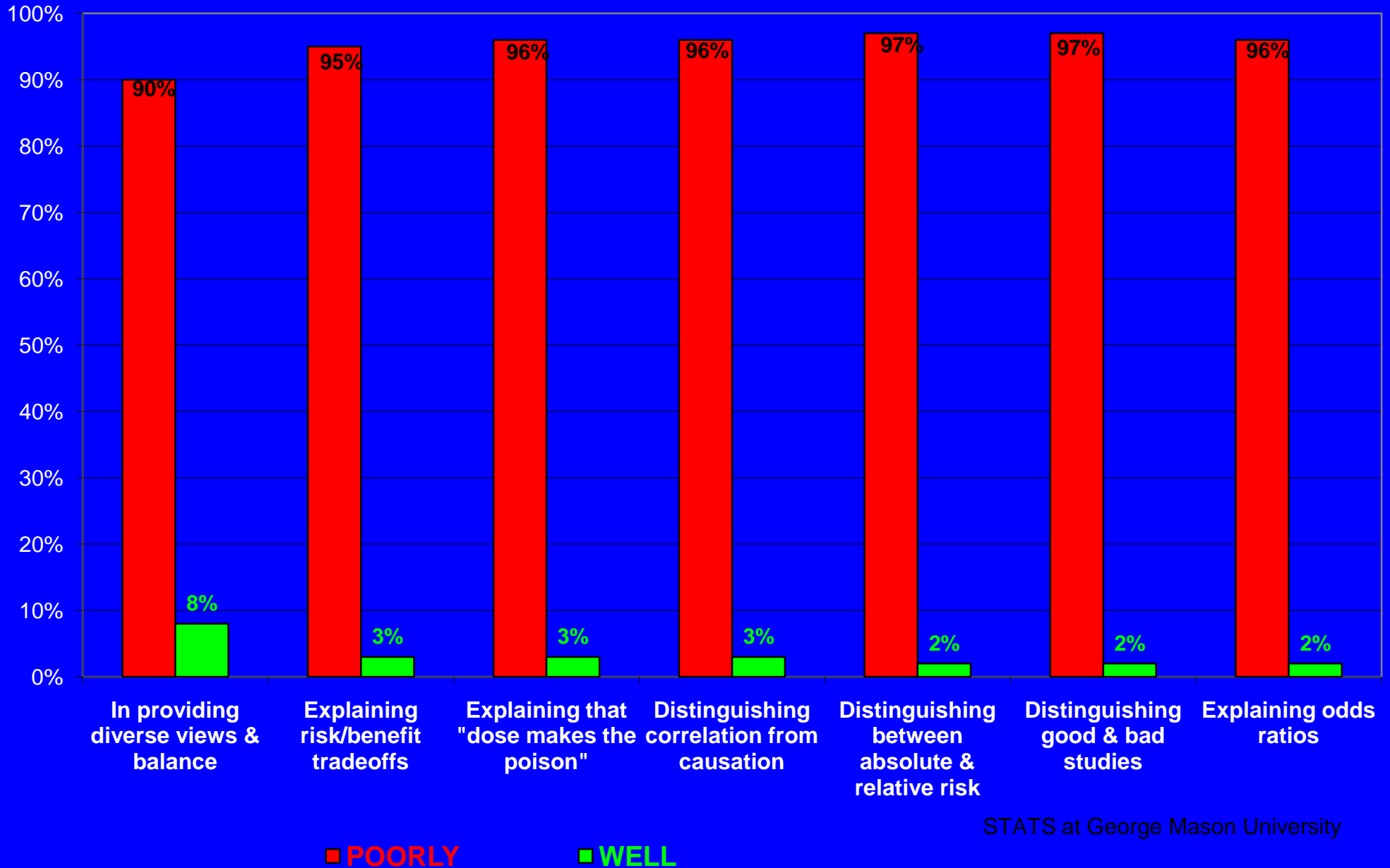
Percentage of SOT Respondents Who Believe Certain Organizations Overstate Health Risks of Exposure to Chemicals*



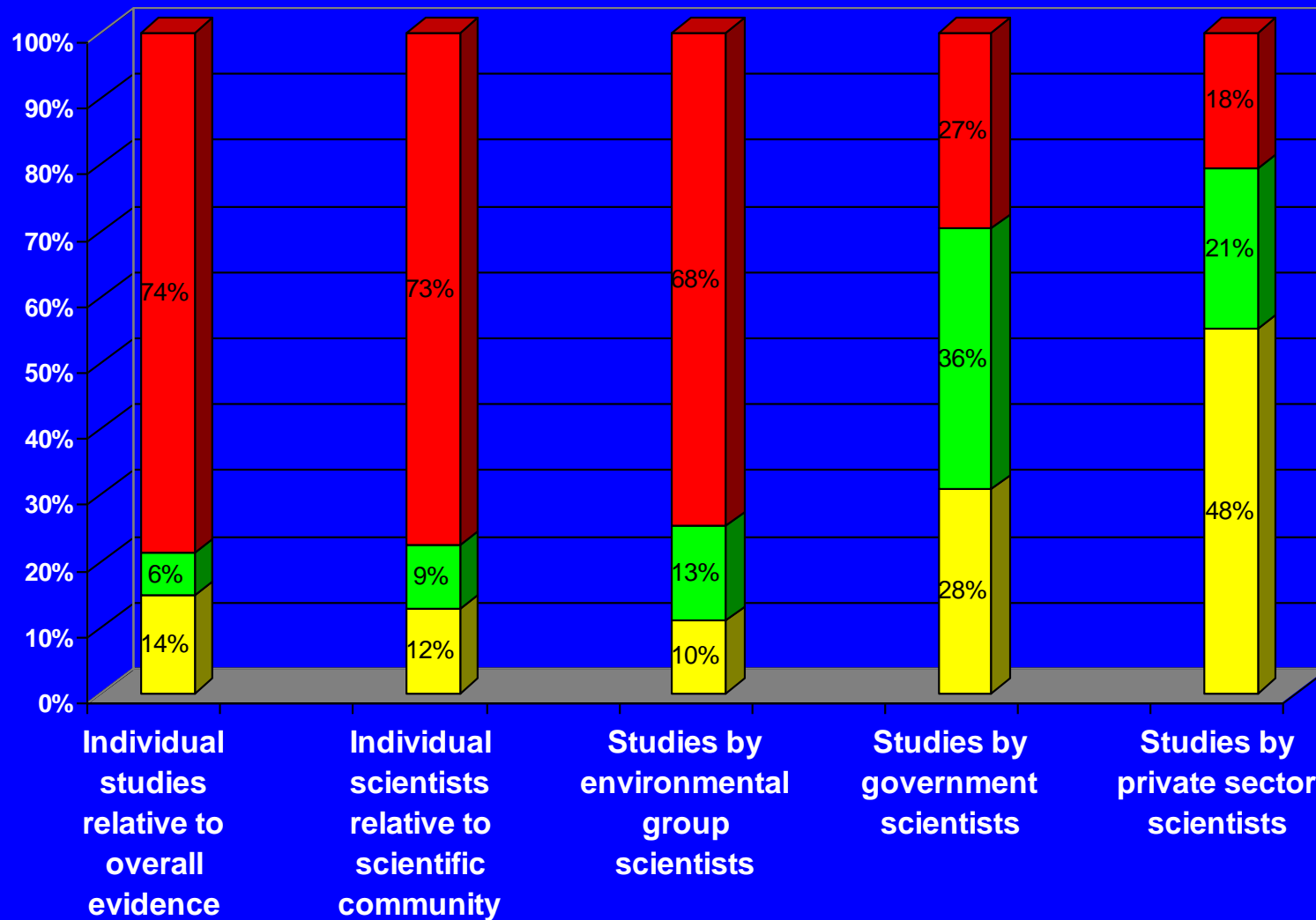
*Note: Respondents expressing no opinion included in calculation

How SOT Members Rate the Accuracy of the Media's Reporting on Certain Scientific Issues and Principles

Percentage Rating Poorly/Well



How SOT Members Rate the Weight the Media Gives to Studies From Various Sources and Groups



STATS at George Mason University

■ TOO LITTLE ■ RIGHT ■ TOO MUCH

Appendix A: Item Wordings from Survey

ATTITUDES TOWARD CHEMICAL SAFETY

- | | |
|----|-------------------|
| 1 | Strongly disagree |
| 2 | Somewhat disagree |
| 3 | Somewhat agree |
| 4 | Strongly agree |
| 98 | Not sure |

- 01 Chemicals should be regulated according to the precautionary principle rather than risk benefit analysis
- 02 The safety of most chemicals can be determined without animal testing
- 03 Organic or "natural" products are inherently safer than other products
- 04 Any level of exposure is unacceptable for chemicals that have been identified as carcinogens, mutagens or reproductive toxicants
- 05 The detection of any level of a chemical in your body by bio-monitoring indicates a significant health risk
- 06 Cosmetics are a significant source of chemical health risk
- 07 Food additives are a significant source of chemical health risk
- 08 Exposure to environmental chemicals contributes to adverse reproductive health effects associated with endocrine disruption
- 09 Scientists should restrict their public statements on science policy matters to their own areas of expertise
- 10 U.S. government regulators do a balanced job of explaining chemical risk to the general public
- 11 The news media do not do a balanced job of explaining chemical risk to the general public
- 12 Research findings should be published by professional peer-reviewed journals before they are reported in the media
- 13 The peer review process is becoming overly politicized
- 14 The U.S. system of chemical management and regulation is inferior to the European system
- 15 Pesticides are a significant source of chemical health risk

PERCEIVED LEVEL OF RISK

Below is a list of items. Please indicate what you feel is the degree of risk to human health posed by current levels of exposure to each item

- | | |
|----|----------------|
| 1 | Very Low Risk |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | Very High Risk |
| 98 | Not sure |

- 01 Acrylamide
- 02 Aflatoxin
- 03 Artificial hormones

- 04 Atrazine
- 05 Benzene
- 06 Bisphenol A
- 07 Chlorine
- 08 Chlorpyrifos
- 09 DDT
- 10 Dioxin
- 11 EDB
- 12 Environmental estrogens/endocrine disruptors
- 13 Ethyl alcohol
- 14 Formaldehyde
- 15 Genetically-modified organisms (GMOs)
- 16 High fructose corn syrup
- 17 Mercury
- 18 Nanomaterials and nanoparticles
- 19 Parabens
- 20 PBDEs
- 21 PCBs
- 22 PFOA
- 23 Phthalates
- 24 Radiation
- 25 Saccharine
- 26 Second-hand smoke from tobacco
- 27 Smoking tobacco
- 28 Chewing tobacco
- 29 Sucralose
- 30 Sunlight
- 31 Teflon
- 32 Triclosan

INFORMATION RELIABILITY

Below is a list of non-government organizations. Using the scale below, please indicate how accurately you feel each of these organizations portrays chemical risks to human health

- 1 Strongly understates risk
- 2 Somewhat understates risk
- 3 Accurately states risk
- 4 Somewhat overstates risk
- 5 Strongly overstates risk
- 98 Not sure

- 01 American Chemistry Council (ACC)
- 02 American Council on Science and Health (ACSH)
- 03 American Medical Association (AMA)
- 04 Center for Science in the Public Interest (CSPI)
- 05 Council for Biotechnology
- 06 Environmental Defense Fund
- 07 Environmental Working Group
- 08 Federation of Societies of Experimental Biology (FASEB)
- 09 Greenpeace

- 10 National Academy of Science (NAS)
- 11 National Cancer Institute (NCI)
- 12 National Nanotechnology Initiative (NNI)
- 13 Natural Resources Defense Council (NRDC)
- 14 National Science Foundation (NSF)
- 15 People for the Ethical Treatment of Animals (PETA)
- 16 Pew Charitable Trusts
- 17 Pharmaceutical Research and Manufacturers of America (PhRMA)
- 18 Society of Toxicology (SOT)

Below is a list of government organizations. Using the scale below, please indicate how accurately you feel each of these organizations portrays chemical risks to human health.

- | | |
|----|---------------------------|
| 1 | Strongly understates risk |
| 2 | Somewhat understates risk |
| 3 | Accurately states risk |
| 4 | Somewhat overstates risk |
| 5 | Strongly overstates risk |
| 98 | Not sure |

- 01 Centers for Disease Control (CDC)
- 02 Consumer Product Safety Commission (CPSC)
- 03 Environmental Protection Agency (EPA)
- 04 Food and Drug Administration (FDA)
- 05 International Agency for Research on Cancer (IARC)
- 06 National Institutes of Environmental Health Sciences (NIEHS)
- 07 National Institute of Occupational Safety and Health (NIOSH)
- 08 Occupational Safety and Health Administration (OSHA)
- 09 U.S. Department of Agriculture (USDA)
- 10 World Health Organization (WHO)

Below is a list of media sources. Using the scale below, please indicate how accurately you feel each of these media sources portrays chemical risks to human health.

- | | |
|----|---------------------------|
| 1 | Strongly understates risk |
| 2 | Somewhat understates risk |
| 3 | Accurately states risk |
| 4 | Somewhat overstates risk |
| 5 | Strongly overstates risk |
| 98 | Not sure |

- 01 Your local newspaper
- 02 Your local television news
- 03 Broadcast network news (ABC, CBS, NBC)
- 04 Cable news channels (CNN, FOX, MSNBC)
- 05 National newspapers like the New York Times, Wall Street Journal, and the Washington Post
- 06 USA Today
- 07 National news magazines such as Newsweek and Time
- 08 WebMD
- 09 Wikipedia
- 10 National health magazines such as Modern Health and Prevention
- 11 Public broadcasting such as NPR, PBS

MEDIA EFFECTIVENESS

In your opinion, how well does the news media as a whole do each of the following when reporting issues related to toxicology?

- 1 Not at all well
- 2 Not very well
- 3 Well
- 4 Very well
- 98 Not sure

- 01 Explain that the dose makes the poison
- 02 Distinguish between correlation and causation
- 03 Distinguish between studies that are statistically rigorous and those that are not
- 04 Explain the risk-benefit trade off in restricting certain chemicals
- 05 Adequately distinguish between absolute and relative risk
- 06 Accurately explain odds ratios in stories on risk
- 07 Seek out diverse scientific views to balance stories on potential chemical risks

Using the scale below, please indicate how appropriate you feel the weight the news media as a whole gives each of the following is when reporting issues related to toxicology?

- 1 Too little weight
- 2
- 3 Appropriate weight
- 4
- 5 Too much weight
- 99 Not sure

- 01 Individual studies relative to the overall body of evidence
- 02 The views of individual scientists relative to those of the broader toxicology community
- 03 Studies from scientists working with environmental groups
- 04 Studies from scientists working in the private sector
- 05 Studies from scientists working in the government sector