



Revista de Saúde Pública

ISSN: 0034-8910

revsp@usp.br

Universidade de São Paulo  
Brasil

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Revista de Saúde Pública, vol. 45, núm. 5, octubre, 2011, pp. 986-990

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São Paulo, Brasil

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# Understanding the Health Effects of Soyfoods and Unfair Characterization of Promotional Efforts by the Soyfood Industry

## Entendendo os efeitos de alimentos à base de soja à saúde e esforços promocionais injustamente caracterizados da indústria de soja

Port Townsend, Aug 11<sup>th</sup> 2011.

Dear editors

In her article “Risks and controversies in the social construction of the concept of healthy food: the case of soy,” Elaine de Azevedo misrepresents the current state of knowledge about the health effects of soyfoods by selectively citing the literature, and displays a bias against the promotional efforts of the soy industry that is similar to that which she accuses this industry of utilizing.<sup>3</sup>

In her discussion of the literature, Dr. Azevedo fails to differentiate human from non-human research and omits relevant research. For example, in commenting about isoflavones causing thyroid dysfunction, a 1991 article published in Japanese is cited but not a 2006 review<sup>8</sup> that evaluated this study along with 13 other clinical trials, nor a subsequently published 3-year trial,<sup>4</sup> both of which demonstrate that isoflavones do not adversely affect thyroid function in euthyroid individuals.

Similarly, two of three references cited on the effects of isoflavones on the synthesis of estradiol and other steroid hormones are animal studies and there is no mention of 2009 systematic review and meta-analysis that included 47 clinical studies. This analysis of human data concluded that soy/isoflavones exert only very modest effects on hormone levels, and that clinical implications of these effects, if any, are unclear.<sup>7</sup>

Regarding recent research associating high soy consumption in men with infertility and dementia in the elderly, the group responsible for the dementia finding did not confirm their initial epidemiologic observation

in follow-up research.<sup>6</sup> And the infertility finding, which comes from a pilot epidemiologic study that found soy intake was associated with a decrease in sperm concentration, contrasts with the results of three clinical studies that found no effect of high isoflavone exposure on sperm or semen parameters (see reference for a discussion of these studies).<sup>9</sup>

The paper’s analysis of soy consumption in Asia is also misleading. Noted soy historian William Shurtleff, who is cited by Dr. Azevedo, provides clear documentation that unfermented soybeans and tofu have been consumed in China for at least 2,000 and 1,000 years, respectively, which is in direct contrast to the author’s conclusions about the role of unfermented soyfoods in these countries. Today in Japan, approximately half of the soy consumed is in unfermented form<sup>11</sup> whereas in China, Singapore and Hong Kong, it is nearly all unfermented.<sup>12</sup>

The claim that the increase in the amount of invisible (hidden) soy in foods is a result of a strong marketing strategy targeting health-conscious consumers is without foundation. The food industry began exploiting the functional properties of soy protein—such as moisture retention and shelf life extension—long before the current scientific interest in the health benefits of soyfoods. That soy in these foods is invisible indicates that its use is not part of a marketing strategy aimed at promoting the health benefits of soyfoods. Furthermore, the amount of soy used for functional purposes is too small to have relevant nutritional consequences.

Regarding industry funding of the 1995 meta-analysis conducted by Anderson et al,<sup>1</sup> which demonstrated the

hypocholesterolemic effects of soy protein, the critical issue is not funding source but the quality of the science, the merits of which can be and are debated. This particular research survived a rigorous peer-review process that allowed it to be published in a journal with an extremely high impact factor. (An updated meta-analysis by Anderson confirms the hypocholesterolemic effects of soy protein).<sup>2</sup> In 1999, the U.S. Food and Drug Administration (FDA), based on its own independent review, approved a health claim for soyfoods and coronary heart disease. It is not unexpected or unusual, given the diversity of opinion that exists in all research areas, that a few experts voiced opposition to approval of the health claim during the public comment period. As is usual for health claims, the FDA considered all comments and rejected some on their merits, and did so in a completely transparent manner.

While the International Symposium on the Role of Soy in Preventing and Treating Chronic Disease is supported by industry, an independent advisory board determines the agenda of the meeting without regard to the possible implications of the findings for soy consumption. In fact, much of the research that Dr. Azevedo cited as evidence of the possible harmful effects of soyfoods has been presented at these symposia. It is noteworthy that this symposium was cited by one of the leading U.S. food industry critics in her book *Food Politics* as an industry-sponsored event that maintains its scientific integrity.<sup>10</sup>

In contradiction to the author's claim, funds raised through the Soybean Promotion and Research Order go overwhelmingly toward research unrelated to the consumption of soyfoods. Since 1987, the U.S. government has funded more than 1,500 research projects related to soy and soy isoflavones, which represents a research allocation of several hundred million dollars.

The limited dollars allocated by soy organizations for health research are dwarfed by the amount allocated by other commodity groups in the United States to promote their products and by the amount contributed by governmental organizations. The allocation of funds by soybean producers is not surprising given that more than 90% of all soybeans grown in the United States (and the vast majority of soybeans grown worldwide) are used for animal feed.

The small proportion of soybeans grown for human food consumption also undermines the legitimacy of efforts to link soyfood consumption to the environmental impact of soybean production. In fact, most evidence indicates that plant food consumption is environmentally advantageous.<sup>5</sup> Given the worldwide need for high-quality protein, from a strictly environmental perspective, producing soybeans for soyfoods should be encouraged.

Finally, while industry influences are an important factor in how health attributes of foods are perceived, so is the growing impact of non-experts who influence opinions through a variety of high-profile platforms on the internet and in print publications. In fact, Dr. Azevedo contributes to this problem by twice citing a reference published in a magazine that describes itself as an alternative news magazine covering health breakthroughs, suppressed news, free energy, conspiracy, unidentified flying objects, paranormal and the unexplained. This issue is of particular relevance to soy nutrition since much of the misinformation about soyfoods derives from those who have considerable reach and impact, despite a poor understanding of nutrition science. By neglecting to address this, Dr. Azevedo failed to consider the most important factors that contribute to societal understanding about concepts of healthy foods.

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Conflict of interests: Dr. Messina regularly consults for companies that sell and/or manufacture soyfoods and/or soy supplements.

## AUTHOR'S REPLY

Dourados, Aug 24<sup>th</sup> 2011.

Dear editors,

I thank Dr. Messina for his criticism of my article,<sup>1</sup> which provides an opportunity to deepen understanding of the article's sociological suppositions, strengthening the objective to establish the power relationships involved in defining healthy food, and demonstrates the risks and controversies involved in this construction. Such an analysis illustrates the complexity of the scientific network in Nutrition, contextualizes the role of different actors and demonstrates that not only science is involved in the task of defining concepts.

The results align with the premises of Environmental Sociology and the Sociology of Scientific Knowledge that guided the study, which was not a systematic review of the research about soy and health (and additionally which would have failed if performed in this manner, as demonstrated by Dr. Messina).

The methodological strategies most utilized in research about Nutrition and health are evidence based research and review studies. Many of these are performed in animals and the results, when convenient, are extrapolated to human beings. Nonetheless, within a sociological context, the political, social and economic influences are emphasized and become particularly clear when scientists defend a non-consensus point of view.

The Sociology of Scientific Knowledge is not concerned with determinism or veracity of scientific research, but instead analyzes how truths attain their status and interprets the active process by which scientists give meaning to risks. The process of social construction in science considers the relationships between scientists, as well as the manner in which scientists select specific

areas as essential topics of research.<sup>5</sup> A constructivist approach to science recognizes that scientific risks and controversies are the result of a dynamic social process of definition, negotiation and legitimization that occurs in public and private spaces and involve activists, scientists and specialists, companies and industries, governmental actors, the press and media, the public, and the funding institution that confers legitimacy and continuity for the problem.<sup>4</sup>

The demand for the demonopolization of the role of experts is gaining force and should not be seen as a problem, as detected by Dr. Messina in reference to the use of an alternative magazine. The time where public concern over risks were dismissed has passed and been replaced by dialogue, which translates into greater engagement of common citizens with science and technology.<sup>6</sup> Therefore, in the social construction of healthy food it is important to include all the actors involved, including those previously prohibited from entering the restricted universe of scientific publications. By accepting references of non-academic journalists that write about Nutrition, such as Sally Fallon (author of the article in question) and Michael Pollan, the Revista de Saúde Pública situates itself as a journal in sync with the contemporary processes of popularization and democratization of science.

It is also important to recognize the role of critics and activists unaffiliated with a scientific institution, since they tend to be less committed to corporate interests. This affirmation becomes sociologically relevant if we consider the professional affiliations of Dr. Messina, who in addition to a university professor, works as a speaker devoted to the theme of health benefits from soy and as a scientific adviser to Archer Daniels Midland

Company and United Soybean Board.<sup>a</sup> After he worked in the National Cancer Institute, in 1990, the institute allocated three million dollars for research about soy and cancer.<sup>b,c</sup> This fact, as well as the importance given to the symposiums organized by the researcher, illustrate the potential of corporate funds in this field of research, emphasizing their role in the construction of the concept of soy as a health food. Without questioning the scientific integrity of these events, this is the reason these issues were mentioned in the article.

Irwin<sup>5</sup> defends a view of science without a monopoly on rationality that is reflexive and attuned to redefinition and includes scientific rationality, institutional deliberation and new efforts of political and environmental organization.

This perspective defines the importance that the article gives to the political, social and environmental context of soy cultivation, which is far from the notion of a quality vegetable protein that is environmentally beneficial. Considering the fertile interdisciplinary discussions between Nutrition and Agriculture, the world does not need vegetable protein as a form of commodities, but needs food without chemical contamination produced through the perspective of sustainable development, which promotes human health, environmental conservation and nutritional and food safety. Without denying the need to review the exaggerated consumption of animal protein, it is necessary to overcome the narrow view of vegetable protein as environmentally beneficial and to defend an agricultural food system dedicated to health, a challenge that soy production, in general, has not met.

In regards to the mention of an incorrect use of historical data, I reaffirm that different authors<sup>7,9</sup> demonstrate that soy moved from a nitrogen-fixing grain to a food, first in the form of dry grain and green beans, and subsequently fermented. The substitution of traditional consumption of fermented soy to inhibit its anti-nutritional factors is not surprising, given that other unhealthy habits have been adopted in contemporary diet.

Returning to the article, it presents a juxtaposition of technical analysis and analysis offered by other interested parties, demonstrating that the interpretation and construction of risks are able to be contested and are frequently partisan, since various groups use the language of science to defend their interests. From this perspective, more research does not always resolve controversies. In

truth, more science can sometimes exacerbate existing disagreements without resolving impasses.

Scientific controversy about soy reflects the political power of interested parties that compete in this arena. This agrees with Nelkin,<sup>8</sup> for who the rational disagreement of experts, based on scientific data and supposedly neutral and objective, does not substantially resolve this type of controversy.

As in the case of other Nutrition controversies, the scientific evidence that defines soy as a (healthy or risky) food is characterized by uncertainty and indetermination, despite the efforts of some specialists to decrease such controversy. There remains no consensus in this area, which appears subject to great difficulty in separating the social and political from the scientific.

This finding does not constitute an anti-science attitude, nor questions the capacity or ability of scientists who should be treated as any professional, able to make correct or incorrect judgments. Science is a human activity, and it is impossible to separate it from society and human interests of institutional and financial recognition. Therefore, it is clear and understandable that the food industry uses this understanding to make their products more attractive and increase sales, since a finding about health is excellent marketing for food. It does not seem productive to judge this, but rather to understand that this is part of science where risks are part of contemporary culture.

Concerning the theme of scientific controversies to which Dr. Messina contributes by showing more studies (and more controversies), Callon<sup>2</sup> emphasizes that this contributes to discrediting the view that science and technology are free from any influence outside of intellect. The controversies are, in truth, impure and heterogeneous and to understand the whole process, all the interests and power relationships that do not stop at the laboratory door should become part of the analysis.<sup>2</sup>

The question of “who to believe?” does not lead anywhere, since it concerns only scientists (and other actors) in disagreement.<sup>3</sup> To make a decision about eating soy (or any other decision that requires scientific evidence), it is insufficient to have knowledge of technical questions that are difficult for common citizens to understand. What the laymen and specialists now need to understand in order to choose a healthy food are the private relationships in science, ignored in the analysis by Dr. Messina.

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<sup>a</sup> A council formed by 64 directors of leading soy producers in United States, who act in the name of the 680,000 producers in the country and provide funding for research and promotion of soy consumption.

<sup>b</sup> Soy Nutrition Institute. Northridge; 2011 [cited 2011 Aug 22]. Available from: <http://www.soyconnection.com/soynutritioninstitute/advisors.php>

<sup>c</sup> Messina MJ. Nutrition: soy and menopausal health. New York: interMDnet Corporation; 2003 [cited 2011 Aug 22]. Available from: <http://www.thedoctorwillseeyounow.com/content/nutrition/art2045.html>

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