

EDITORIAL

Caffeine, health and commercial interests

Public awareness of scientific evidence of the hazards of cigarette smoking is said to have been a decisive factor in tobacco use being identified as a "social problem" (Troyer & Markle, 1984). As such, the scientific community can claim to have had a major role in events leading to the introduction of social policies aimed at limiting tobacco use (e.g. mandatory health warnings on packaging, restrictions and bans on cigarette advertising). Similarly, recognition of caffeine consumption as a social problem will depend on whether caffeine foods and beverages are understood by the general public to have been identified by the scientific community as threatening to health. Tobacco manufacturers, motivated by the desire to maximize profits, are well-known to have committed considerable resources to counter public awareness of scientific evidence of the hazards of smoking (e.g. Houston, 1991; Samuels & Glantz, 1991). Thus the question arises as to what, if anything, is being done by commercial interests to influence awareness of scientific evidence of the harmful effects of caffeine.

Caffeine and health

Caffeine is the most widely consumed psychoactive substance in the world (Gilbert, 1984). In commercial terms, coffee alone is among the world's most widely traded commodities (Canel, 1983; Viani, 1986). Tea is consumed in even greater quantities than coffee, but qualifies as the second major source of caffeine because tea beverages generally contain less caffeine than coffee (Graham, 1984). While global consumption of soft drinks is more difficult to establish, there seems to be little doubt that soft drinks are an increasingly important source of caffeine, especially for the young. Gilbert (1984) found that per capita consumption of soft drinks in the United States increased by 231 per cent

between 1960 and 1982, and that the intake of caffeine from soft drinks in that country was comparable to the consumption of caffeine in tea. Considering the ubiquity of caffeine, it is imperative that its impact on health be thoroughly investigated.

Scientific interest in caffeine has existed for more than 170 years, and has resulted in a large and diverse body of knowledge. However, systematic study of the potential health consequences of habitual caffeine consumption has been sporadic, and remains at a relatively early stage of development. As such, it would be inappropriate to speculate about the possible overall impact of caffeine on population health. Nevertheless, it is well to remember that even if the direct deleterious effects of caffeine on the health of individual consumers was found on average to be a fraction of that caused by smoking (the major preventable cause of mortality and morbidity in developed countries), the number of people potentially at risk is far greater for caffeine than smoking because global per capita exposure to the former is far greater than the latter. Moreover, notwithstanding the need for further extensive research, evidence of caffeine-induced hazards has strengthened progressively over the past 30 years (James, 1991).

Threat to cardiovascular health resulting from caffeine-induced increases in blood pressure has emerged as a major area of concern (e.g. James, 1994a). In addition, there are strong grounds for concern over increased risk of intrauterine growth retardation associated with caffeine consumption during pregnancy (Fortier, Marcoux & Beaulac-Baillargeon, 1993). Furthermore, there is solid evidence of adverse interactions between the concurrent use of caffeine and other drugs, particularly prescribed medications (e.g. Carbó *et al.*, 1989; Roache & Griffiths, 1987). While these three areas do not exhaust the potential harmful effects of caffeine, each one alone pro-

vides strong grounds for public concern. Such concerns are further heightened by the "addictive" potential of caffeine, as evidenced by the physical dependence that accompanies regular use. Typically, abrupt abstinence after a period of sustained use results in headache and other dysphoric symptoms such as sleepiness, irritability and lethargy (e.g. Hughes *et al.*, 1991; Silverman *et al.*, 1992; van Dusseldorp & Katan, 1990). These symptoms are liable to begin within about 12–16 hours after caffeine was last ingested, and may persist for as long as 1 week (Griffiths *et al.*, 1990; Hughes *et al.*, 1992).

There is evidence that increased scientific interest in caffeine-induced harmful effects may have affected (albeit temporarily) consumption trends, particularly in the United States. For example, Masterson (1983) reported that the average number of cups of coffee consumed per day in the United States declined by 39 per cent (the approximate equivalent of two cups per day) during the 20 years from 1962 to 1982. However, there has been little systematic investigation of the causes of these declining consumption trends, which could well have been due to a host of factors other than concerns about health (e.g. changing economic circumstances, fluctuations in consumer prices for caffeine products). Whatever the reasons for the significant decline in coffee consumption in the United States during the 20 years between the mid-1960s and mid-1980s, there is no doubt that the coffee industry believed, and continues to believe, that public awareness of harmful effects can damage business (Heuman, 1994a, b; Richards, 1994). By the early 1980s, the caffeine industry had developed a well-coordinated international campaign to counter threats to its commercial interests arising from scientific evidence of the hazards of caffeine.

The caffeine lobby

Following passage by the United States Congress of new laws on foods and drugs in 1958, a list was compiled of some hundreds of additives, including caffeine, that were generally recognized as safe (GRAS). Subsequent revisions of GRAS compounds conducted by the United States Food and Drug Administration (FDA) threatened removal of caffeine from the list. Industry bodies countered this threat by supporting a range of activities conducted under the

auspices of the International Life Sciences Institute (ILSI). While the name of this organization gives the impression of a society of disinterested scholars, ILSI is an industry organization developed to serve commercial interests. In the early 1980s, ILSI coordinated a major response to a proposal by the FDA to regulate caffeine. ILSI's success may be measured in part by the fact that caffeine has retained its GRAS classification.

Information dissemination

Drawing on its experience with the FDA, ILSI sponsored the production of a well-known text which purported to overview scientific knowledge about caffeine (Dews, 1984). This edited book covers a wide range of issues concerning the physiology, pharmacology and toxicology of caffeine, and is indicative of ILSI's success as an industry lobby. Sections of the book, especially those that deal with issues of basic science, are erudite and scholarly. However, in the sections that deal with possible adverse effects of caffeine, the available evidence is consistently interpreted in a way that is favourable to the interests of the book's sponsors. By juxtaposing balanced works on basic science with less-balanced accounts of issues pertinent to health, the latter are given greater credibility by association with the former. Whatever the intention of individual contributors, the book stands as a formidable statement supporting the interests of the caffeine industry.

This subtle and pernicious manipulation of knowledge is not an isolated instance. For more than a decade, ILSI has hosted "scientific" meetings at diverse locations around the world. Attendance at the meetings is by invitation to selected scientists, and the resulting proceedings have generally characterized caffeine as an enjoyable and benign substance (e.g. Dews *et al.*, 1984; Leviton, 1988; Vandongen, 1988). Proceedings are published, and the information is transmitted to the public arena by way of information "updates" to industry bodies and press releases to international media networks (who, it should be remembered, derive income from advertisements of caffeine products).

Caffeine research

As well as manipulating the dissemination of scientific knowledge, the caffeine industry has also sought to influence the course of scientific

research on caffeine by becoming directly involved in the conduct of research. It should not be surprising to discover that the tactics used are similar to those which the tobacco industry began employing several decades ago (e.g. Warner, 1991). The tobacco industry policy of supporting research through industry bodies such as the Council for Tobacco Research was described by one United States Senator as "a stroke of ingenuity" (Neuberger, 1963). In essence, the strategy involves the selective provision of support for tobacco projects that are essentially unrelated to questions of health. The mere act of supporting research has provided credibility to industry claims of concern for the public interest. More importantly, by advertising its support for research, the tobacco industry has succeeded in creating doubt in the general community about the severity of the hazards of smoking when no such doubts exist in the scientific community (Warner, 1991).

Public relations and obfuscation

Like the tobacco industry before it, the caffeine industry appears to have discovered that the allocation of funds for research which is essentially health neutral represents a good investment in public relations, while also promoting confusion about potential hazards. Good examples of "safe" research which the industry actively supports are studies of compounds in coffee other than caffeine. The chemistry of coffee is complex (e.g. Macrae, 1985), and detailed basic research on compounds other than caffeine could occupy a substantial number of dedicated scientists for decades. However, the major constituents of coffee are already known to be present in larger amounts in other foods or to be present in the human body as endogenous metabolites (e.g. various minerals, vitamins, carbohydrates, lipids and amino acids). Indeed, research supported by the industry has already led to the conclusion that coffee has no important physiological effects other than those attributable to caffeine (Viani, 1988). Thus, under the guise of public interest, the industry activity supports continuing research on non-caffeine constituents of coffee, knowing fully that nothing untoward (and nothing of particular interest to the public) is likely to be revealed.

Recent caffeine consumption trends

The industry strategies outlined above have been in operation for more than a decade, and it is pertinent to ask what has been the effect. While objective analyses of causes and effects would be very difficult to conduct in this area, the industry apparently believes that its efforts to counter public concern about the hazards of caffeine have been successful and that this success in changing public perceptions has resulted in increased business (Heuman, 1994a, b; Richards, 1994). Trade literature indicates that in the late 1980s the industry experienced a halt to the preceding many years of declining coffee consumption, with 1993 being heralded as a "banner year for coffee" and "the beginning of an up-trend" (Heuman, 1994a, p. 5). Similarly, record tea sales have been achieved in successive years since 1990, at least in the United States (Richards, 1994). According to authoritative industry insiders, these improvements in sales are directly attributable to the industry's campaign to counter scientific evidence of caffeine-induced adverse effects on health (Heuman, 1994b; Richards, 1994).

Perhaps encouraged by success in subverting evidence of hazards, unfounded claims of positive benefits arising from caffeine use are now commonplace in industry literature. A plethora of "fact" sheets, available from coffee and tea associations around the world, proclaim the benefits of caffeine products. Contrary to such propaganda, which is used to respond to queries from the public and to brief news media, there are no demonstrated benefits of habitual caffeine intake for healthy consumers. Even the more modest claims arising from industry-supported research purporting to demonstrate improvements in psychomotor performance and alertness are unfounded (see James, 1994b). It is evident, however, that the industry has little or no intention of supporting dispassionate scientific efforts to establish the facts about caffeine and health. On the contrary, alert to tobacco industry experience arising out of public awareness of the hazards of smoking, the caffeine industry is committed to action which, in its own words, is designed "to counter evidence that coffee is harmful" (Lee, 1993, p. 6).

Conclusion

Motivated by concern over loss of profits arising

from public awareness of the hazards of caffeine (Heuman, 1994a, b; Richards, 1994), industry sources have sought to manipulate both the dissemination of scientific knowledge and the direction of scientific research. In turn, by undermining the integrity of the scientific process, the caffeine industry has succeeded in subverting the public interest. This success is evidenced by increased sales of caffeine products (Heuman, 1994a; Richards, 1994) in the face of increased evidence of the hazards of caffeine (James, 1991). Unlike the caffeine industry, which is well organized to protect its commercial interests, the scientists upon whom the public interest depends remain poorly organized. In contrast to the countless cancer societies, heart foundations and other public and private consumer organizations actively engaged in trying to reduce the prevalence of smoking, there is virtually no organized discouragement in relation to the consumption of caffeine beverages (with the possible exception of the proscription on caffeine imposed by some religious minorities). The well-orchestrated activities of the caffeine industry have created a pressing need for countervailing action from the scientific community to help safeguard the public interest.

JACK E. JAMES
*School of Behavioural Health Sciences,
 La Trobe University, Melbourne,
 Victoria 3083, Australia*

References

- CANNELL, M. G. R. (1983) Coffee, *Biologist*, 30, pp. 257-263.
- CARBO, M., SEGURA, J., DE LA TORRE, R., BADENAS, J. M. & CAMI, J. (1989) Effect of quinolones on caffeine disposition, *Clinical Pharmacology and Therapeutics*, 45, pp. 234-240.
- DEWS, P. B. (Ed.) (1984) *Caffeine: Perspectives from Recent Research* (Berlin, Springer-Verlag).
- DEWS, P., GRICE, H. C., NEIMS, A., WILSON, J. & WURTMAN, R. (1984) Report of Fourth International Caffeine Workshop, Athens, 1982, *Food and Chemical Toxicology*, 22, pp. 163-169.
- FORTIER, I., MARCOUX, S. & BEAULAC-BAILLARGEON, L. (1993) Relation of caffeine intake during pregnancy to intrauterine growth retardation and preterm birth, *American Journal of Epidemiology*, 137, pp. 931-940.
- GILBERT, R. M. (1984) Caffeine consumption, in: SPILLER, G. A. (Ed.) *The Methylxanthine Beverages and Foods: Chemistry, Consumption, and Health Effects*, pp. 185-214 (New York, Alan R. Liss).
- GRAHAM, H. N. (1984) Tea: The plant and its manufacture; chemistry and consumption of the beverage, in: SPILLER, G. A. (Ed.) *The Methylxanthine Beverages and Foods: Chemistry, Consumption, and Health Effects*, pp. 29-74 (New York, Alan R. Liss).
- GRIFFITHS, R. R., EVANS, S. M., HEISHMAN, S. J., PRESTON, K. L., SANNERUD, C. A., WOLF, B. & WOODSON, P. P. (1990) Low-dose caffeine discrimination in humans, *Journal of Pharmacology and Experimental Therapeutics*, 252, pp. 970-978.
- HEUMAN, J. (1994a) A look back on 1993, *Tea and Coffee Trade Journal*, 166, pp. 5-7.
- HEUMAN, J. (1994b) Inside trade associations, *Tea and Coffee Trade Journal*, 166, pp. 5-7.
- HOUSTON, T. P. (1991) Official misuse of tobacco industry propaganda: report of a Trojan Horse [Letter], *Journal of the American Medical Association*, 266, p. 2702.
- HUGHES, J. R., HIGGINS, S. T., BICKEL, W. K., HUNT, W. K., FENWICK, J. W., GULLIVER, S. B. & MIREAULT, G. C. (1991) Caffeine self-administration, withdrawal, and adverse effects among coffee drinkers, *Archives of General Psychiatry*, 48, pp. 611-617.
- HUGHES, J. R., OLIVETO, A. H., HELZER, J. E., HIGGINS, S. T. & BICKEL, W. K. (1992) Should caffeine abuse, dependence or withdrawal be added to DSM-IV and ICD-10? *American Journal of Psychiatry*, 149, pp. 33-40.
- JAMES, J. E. (1991) *Caffeine and Health* (London, Academic Press).
- JAMES, J. E. (1994a) Chronic effects of habitual caffeine consumption on laboratory and ambulatory blood pressure levels, *Journal of Cardiovascular Risk*, 1, pp. 159-164.
- JAMES, J. E. (1994b) Does caffeine enhance or merely restore degraded psychomotor performance? *Neuropsychobiology*, 28, pp. 124-125.
- LEE, S. (1993) Carcinogens and mutagens, *Tea and Coffee Trade Journal*, 165, pp. 5-6.
- LEVITON, A. (1988) Current controversies about health effects of caffeine, *Food Technology in Australia*, 40, pp. vii-viii.
- MACRAE, R. (1985) Nitrogenous components, in: CLARKE, R. J. & MACRAE, R. (Eds) *Coffee. Volume 1: Chemistry*, pp. 115-152 (London, Elsevier Applied Science).
- MASTERTON, J. (1983) Trends in coffee consumption, *Tea and Coffee Trade Journal*, 155 pp. 24-25.
- NEUBERGER, M. B. (1963) *Smoke Screen: Tobacco and the Public Welfare* (Engelwood Cliffs, Prentice-Hall).
- RICHARDS, G. (1994) Tea in 1993, *Tea and Coffee Trade Journal*, 166 pp. 42-50.
- ROACHE, J. D. & GRIFFITHS, R. R. (1987) Interactions of diazepam and caffeine: Behavioral and subjective dose effects in humans, *Pharmacology, Biochemistry and Behavior*, 26, pp. 801-812.
- SAMUELS, B. & GLANTZ, S. A. (1991) The politics of local tobacco control, *Journal of the American Medical Association*, 266, pp. 2110-2117.
- SILVERMAN, K., EVANS, S. M., STRAIN, E. C. & GRIFFITHS, R. R. (1992) Withdrawal syndrome after the double-blind cessation of caffeine consumption, *New England Journal of Medicine*, 327, pp. 1109-1114.