the tobacco industry, and the ways individuals can break their addiction to tobacco.'

One should read the *JAMA* articles and Glantz's own narration published in *The Times Higher*, 6 September 1996, to appreciate the sad story of ill-effects of tobacco and the evidence in its support.

It may be of interest to many that the Tobacco Prevention Section of International Union Against Tuberculosis and Lung Disease, Paris, France, has published a 369-page highly informative book (1996) entitled *Educating Medical Students about Tobacco: Planning and Implementation*, edited by Robyn L. Richmond, School of Community Medicine, The University of New South Wales, Australia. Its last chapter deals with pharmacological aspects of nicotine, what makes it addictive, and pharmacological treatment of nicotine dependence.

The purpose of this article is to set the record straight about the undisputed addictive nature of nicotine much like the addiction to alcohol, opiods, or cocaine. Cultivation of a nicotine-free tobacco plant may or may not be possible but it may be stated that attempts made in the past by the cigarette industry to bring into market low-nicotine cigarettes including even the filter-tipped cigarettes have proved to be largely market strategies. I wonder if a totally nicotine-free tobacco leaf can ever be the raw material for cigarette manufacturers when their central theme is to lure youngsters to nicotine addiction.

BHARAT R. SANT

C-14/2, Kakateeyanagar,
Habsiguda,
Hyderabad 500 007, India

Transgenics, terminators and suppressors

The lead taken by *Current Science* in clarifying the technology behind transgenics and terminator seeds and its social and political implications is laudable[1–7]. The treatment of the topic by the popular press and the media has created confusion rather than dissecting out the crux of the issue[1,2]. This is evidenced by the reactions of the agitated farmers and public in many parts of the country who branded all transgenic varieties and even hybrids as terminator seeds. It was at this juncture that University of Agricultural Sciences, Bangalore organized a seminar with the participation of scientists, technocrats and policy-makers to dispel the fear and doubts regarding the introduction and experimentation of transgenic plants into our country. The speakers were eminent scientists in biotechnology and related areas.

The keynote address by Manju Sharma, Department of Biotechnology read in her absence, highlighted the efforts going on in the country to develop our own transgenic technology and noted that the guidelines prepared by the DBT for testing transgenic plants had adequate safeguards and monitoring mechanism built into them. The DBT has also taken immediate steps to disallow the patent on terminator technology in India and prevent the entry of seeds containing the terminator genes. It was also declared that the experimental trials of Bt cotton were approved by the Review Committee on Genetic Manipulation (RCGM) and is as per the laws of the Government.

G. Padmanaban (Indian Institute of Science) explained the international scenario on transgenics and said that countries like the United States, China, Argentina and Mexico are cultivating transgenic varieties on a large scale and this should give India confidence to go ahead with the adoption of the technology. Only in Europe the public opinion on the use of the technology was divided. Referring to the collaborative research programme of the IISc with the private sector, he suggested that MNCs and research institutions in India should hold joint patents so that this would safeguard the interests of the nation while reaping the benefits of a frontier technology like transgenics. He urged the scientists, enlightened administrators, progressive farmers and peoples' representatives to come together to spread the correct message about transgenic technology, so that India would not miss the boat of the transgenic revolution in agriculture.

P. K. Ghosh (Member, Review Committee on Genetic Manipulation) clarified that the Government has not yet taken any decision on whether Bt cotton would be allowed to be used by the Indian farmers or not. The final decision will be taken only after thorough scientific evaluation of the ongoing experiments. He added that the scientific data on environmental safety of Bt cotton submitted by the company and its experimental verification did not show any sign of negative impact on human beings or other organisms. He revealed that experiments conducted by the DBT have proved that the pollen grains of cotton do not spread beyond 2 m but an isolation distance of 5 m is provided around the plots where field trails are going on at 40 locations in the country.

P. S. Rao (Bhabha Atomic Research Centre) explained the importance of transgenic varieties in increasing agriculture production in terms of quantity as well as quality to meet the challenge of catering to the needs of a growing population. He was convinced that the field trial is a right step in adopting the technology and the doubts about its adverse impact on the environment were misleading. C. M. Gaind (National Research Development Corporation) spoke on patenting laws and documentation of biotech products developed through transgenic approach. He explained the efforts of the NRDC to promote, protect and support inventions by patenting in India and abroad. S. R. Rao (Department of Biotechnology) who spoke on public acceptance of biotechnology and its products said that in many developed countries like Japan, products of biotechnology are readily accepted despite all the negative propaganda.

Although the purpose of the seminar was to examine the various dimensions of the issue, all the speakers highlighted only the brighter side of the technology even concealing scientific evidence on the dangers associated with it, raising suspicion among the already cynical audience that the seminar was for the

champions of transgenic technology. Besides the resistance of scientists to answer many questions from the audience during the panel discussion, their reluctance even to acknowledge the potential risk to environmental safety left many in the audience resentful. Specific cases of published accounts of potential risks were brushed aside as being anecdotal and went to the extent of stating that every technology has a risk (!). Atleast one speaker denied the existence of scientific proof for gene escape and cross pollination with related species when infact there is evidence for intraspecific transfer of pollen from transgenic plants[8].

Even though there was strict censoring of questions submitted to organizers much before the panel discussion, the students and teachers – who defied the whip of the research administrators of the UAS against any 'personal opinion' – could raise a few questions towards the end of the session thanks to M. Sharat Chandra (Indian Institute of Science) who led the panel discussion. The audience questioned the marginalization of the national agricultural research system in the current field trials and testing of transgenic varieties, for which inadequate facilities in agricultural universities and institutes was cited as the reason. This evoked sharp criticism which led to the assurance that State Agricultural Universities will be included in future in such trials and experiments. Bypassing the established procedure of ICAR for testing any variety is akin to bypassing ICMR for clinical trials of vaccine. As a reply to a question, it was said that the officials of the DBT have so far made 17 visits to monitor field trials of Bt cotton revealing the fact that they could not visit all the 40 plots even once. This raises doubts about the authenticity of data collected from such trials. The discussion went to the extent of questioning the very purpose of organizing the seminar, pointing out the total exclusion of critics of the technology and it was alleged that the seminar was only for giving a clean chit to the MNC involved in the row. Absence of a section on socio-political and ethical issues involved in the introduction of transgenic varieties was as glaring as the mute presence of agricultural scientists from the UAS. Interestingly, the latter did not escape the notice of the panel leader Sharat Chandra.

Incidentally it may be noted that only a negligible minority of agricultural scientists of the country have come forward to fulfil their social responsibility by expressing their views on the pros and cons of transgenics. Evidently, the seminar was organized by the administrators of science – who went to the extent of suppressing all voices of dissent – to justify their own action. A seminar of this sort, that lacks objectivity and scientific temper, besides equating the scientific community with the popular media that sensationalizes and mystifies science raises many serious questions about the academic and intellectual freedom of individual scientists.

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M. JADE GOWDA
A. SURESH
K. D. PRATHAPAN

Group for Science and Society
University of Agricultural Sciences,
GKVK, Bangalore 560 065, India

A methodology for clinical evaluation of existing practice, using traditional herbal medicinal formulations

A supreme court judgement makes open clinical trial, conducted by a mutually oriented multidisciplinary group of experts including doctors of various systems of therapy, as the legal and effective method to carry out the clinical evaluation to determine the exact role of a given traditional herbal medicinal formulation (THMF) – which includes those from Ayurveda – in ameliorating a particular disease. Blind clinical trials have a place in the second phase of research when two THMFs, whose role in treating a given disease has already been confirmed, need to be compared for their efficacy. However, testing on laboratory animals prior to the human clinical trials will have to be done when the ingredients and/or vehicle of a THMF of proven value are altered to increase the latter's efficacy during the next phase of research.

Compartmentalization of medical practice in India facilitates the 'natural random allocation' of patients to conduct this study.

Patient selection will play a major role here. Eastern medicines, including Ayurveda, are more based on the response than the clinical parameters; with enough space for retrospective diagnosis. According to the theory of Prabhava, for a single THMF there could be more than one response with the same dosage. If the patient has the illness, response is thereapeutically beneficial. Hence Ayurvedic treatment is individualized in terms of therapeutic response. Let us consider the example of Thuja, in the treatment of venereal wart. As per the existing homeopathic knowledge, thuja in the potencies used for this disease will not produce any side-effects in a correctly chosen patient. Hence those patients who develop side-effects will not come under the selection criteria to use this drug. Therefore patient selection should begin after patient allocation, and is likely to be a continuous process throughout the clinical evaluation. Clinical features of these patients will become the criteria for patient selection during the repetition of clinical trial using the same