

ent on the use of turmeric as a healing agent prompts us to take steps in protecting traditional knowledge from being used for corporate profit. This case brings out the importance of proper documentation and public availability of records of traditional knowledge in a systematic manner. Normally a patent is granted for an invention if it fulfills the criteria of novelty, non-obviousness and utility. The patent on turmeric was revoked on the basis of novelty.

The fact remains that foreign patenting cannot be challenged if a written/published credible document is not available. We should, therefore collect and classify all documents bearing our traditional knowledge and wisdom on medicinal and other plants as well as our biological resources. These can be made available to US and European patent offices in the form of CD ROMs, an electronic form of Gadgil's People's Biodiversity Register<sup>2</sup>, minimizing the chances of biopiracy. India has been elected the first Chairperson of the Standing Committee recently set up by the World Intellectual Property Organisation (WIPO) on Information Technology in relation to IPRs. All the 165 members of the WIPO and intergovernmental organizations like European Patent Office would pay attention to strength to IPRs in developing world. The Government of India has through a Gazette notification of 2 December 1998, promulgated the rules for filing patent applications under the PCT and

the rules have become effective from 7 December 1998. The Patent (Amendment) Ordinance issued on 8 January 1998, does not allow Indian Medicine System Patentable. Currently traditional knowledge systems fall under public domain and are not included in the Indian system of medicine. India should, therefore, include medicinal plants used by the tribals and indigenous community under Indian Medicine Central Council Act, 1970. In the 4th Conference of Parties (COP) to the CBD held in Bratislava recently, the focus was on the sharing of benefits derived from biological resources with indigenous and traditional communities. An *ad hoc* working group has been constituted to study Article 8 (J) and present a report before the next COP.

The Government of India is under obligation to the WTO – Trade Related Intellectual Property Rights (TRIPS) Article 70(8) and (9) to amend its patent act of 1970 so that it can meet international requirements. The Patent Amendment Bill of 1995 was a step in this direction. Having failed to amend the Patent Law, the US took India to the Dispute Settlement Body (DSB) for non-compliance of TRIPS agreement. India had to oppose the adoption of a panel report by the WTO's DSB in July 97, according to which India had failed to establish a mechanism in respect of obligations for product patents in Pharmaceuticals and Agriculture Chemicals. In response, India asked the WTO's

appellate body to review issues of law covered by the panel and interpretations developed by it relating to the establishment of a mailbox and the granting of exclusive marketing rights<sup>3</sup>. India should therefore, take necessary action to amend its Patent Law. We should also forge strategic R&D alliances with companies highly skilled in floating tradable goods. R&D institutions should encourage filing of patents. Currently India's share of the world patent is only 0.25%, while Japan has 25% followed by the US with 12%. Filing of patents in India has drastically improved recently. Currently 8,000 to 12,000 patents are being filed annually of which 80 to 90% are from abroad. India should adopt the policy of selective prioritization of research and scientific screening of plant products/natural resources-based products as the world market for pharmaceuticals, agrochemical and seeds exceeds \$250 billion.

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3. *Indian Express*, New Delhi, 23/24 October 1997.

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## Banana and hypertension

I read with interest the comments by Balaram in the 'In this issue' section (*Curr. Sci.*, 1999, 76, 4) and the paper entitled 'Angiotensin converting enzyme inhibitors from ripened and unripened bananas' by Rao *et al.* (*Curr. Sci.*, 1999, 76, 86–88). I have certain reservations about the comments made in the 'In this issue' section that hormonal regulation of blood pressure is well understood. It should be noted that essential hypertension is still considered as a multifactorial polygenic disease without the shape. The statement that

the renin angiotensin system occupies centre stage is not strictly true. All hypertensives taken together are divided into low, normal, and high renin hypertensive groups. ACE inhibitors are effective in the hypertensive population because of their additional effects on other systems including local pressure peptide hormones in the endothelial and neuronal cells in the central nervous system. There are several metals which inhibit the ACE (Puri, V. N., *Biochem. Pharmacol.*, 1992, 44, 187–188). I do not know the elemental profile of a banana. It may

be possible that metals or some chemical constituents may be responsible for the weaker inhibitions of ACE. Banana is known to have high contents of 5-hydroxytryptamine.

Rao *et al.* have tested captopril as reference standard and 10  $\mu$ M dose level in the method has blocked 99% of ACE. However, it is well-known and established that captopril *in vitro* blocks the ACE in nano molar concentration and  $IC_{50}$  is determined and the comparison is made on molar dose to dose basis. Such data have not been reported and

thus it is incorrect to interpret that bananas will be able to produce significant inhibition in clinical situations. Rao *et al.* have not shown data on blood pressure pattern of normotensive or hypertensive rat models. The effect of 2 bananas on the blood pressure of normotensive volunteers mentioned in the article is an example of very poor clinical pharmacological reporting. Neither the time course of blood pressure lowering nor its correlation with serum ACE in those volunteers is described. Recently, an 'International Update on Hypertension' was held, where a lot of emphasis was laid on proper blood pressure recording. This paper in the *Current Science* emphasizes the fact that cardiovascular research in this country needs support and that there is a need to establish a center of excellence in cardiovascular sciences so that best from both allopathic and alternative system of medicine could be extracted.

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### Response:

The central role of renin angiotensin system in blood pressure regulation is well established<sup>1</sup>. Though the causes for essential hypertension are not clear, ACE inhibitors have been used in the treatment of all types of hypertension – high, normal, moderate to severe including essential hypertension and their other beneficial effects have been proved<sup>2-4</sup>. Of course there are other lines of treatment for hypertension. To

the best of our knowledge, cadmium is not present in bananas<sup>5,6</sup>. Dialysis effects suggested that banana ACE inhibitors may not be small metal ions<sup>7</sup>. 5-HT is indeed present in banana pulp (20 µg/g)<sup>5,6</sup> but any relation between ACE and 5-HT needs to be established.

Captopril is one of the several competitive inhibitors of ACE design based on active site model. These competitive inhibitors show near complete inhibition of ACE at a much higher concentration compared to IC<sub>50</sub> values<sup>8</sup>. For example, IC<sub>50</sub> of captopril for sheep serum ACE was 15.85 nM but 99% of ACE inhibition occurred only at a concentration close to 1 µM (ref. 8). Captopril concentration used in banana ACE inhibition assay was around 4 µM when adjusted to sheep serum ACE assay<sup>8</sup>. Further, substrate concentration used in banana ACE inhibition was two times higher compared to substrate concentration used in sheep serum ACE assay<sup>7</sup>. Hence, high captopril concentration (4 µM) was used to get 99% of ACE inhibition. Since the presence of ACE inhibitors in bananas was unknown at the initial stage of work only approximate captopril concentration was used. Further, there was no intension at that time to do or to calculate effective dose of bananas required to lower blood pressure in humans. Unless the molecular weight of ACE inhibitory principle is established, IC<sub>50</sub> value for banana ACE inhibitors is impossible to calculate. Decrease in serum ACE activity (10%) in volunteers after consumption of bananas for a week suggests *in vivo* inhibition of ACE<sup>9</sup>.

Studies made so far suggest that consumption of bananas can be benefi-

cial to antihypertensive individuals because serum ACE activity as well as systolic blood pressure decreased (10%) in cold stress induced hypertension individuals after consumption of bananas for a week<sup>9</sup>. Many aspects of antihypertensive action of bananas require further intensive studies. Collaboration from interested scientists is most welcome. Since hypertension and other cardiac diseases like CHD affect more than 15% of the population, there is need to have a centre of excellence in cardiovascular diseases.

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3. Campbell, D. J., *J. Clin. Invest.*, 1987, **79**, 1–6.
4. Oates, J. A. and Wood, A. J. J., *N. Engl. J. Med.*, 1988, **319**, 1517–1525.
5. *The Wealth of India* (ed. Sastri, B. N.), CSIR, New Delhi, 1962, vol. VI, p. 464.
6. *Banana in India*, CFTRI Monograph, Mysore, 1989, pp. 18–20.
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8. Udupa, E. G. P. and Rao, N. M., *Indian J. Biochem. Biophys.*, 1997, **34**, 524–528.
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## NEWS

### DAE–Solid State Physics Symposium 1998 – A report

The annual Solid State Physics Symposium (SSPS), sponsored by Board of Research for Nuclear Science, Department of Atomic Energy (DAE) was held this year in Kurukshetra University, Kurukshetra.

There were 304 papers scheduled to be presented. These included 22 invited talks. A seminar on nano-phase materials and two tutorial sessions, on Experimental Techniques, Data Processing and Scientific Visualization were

scheduled. Out of the 257 contributed papers, 18 were chosen for oral presentation and the rest were posters. Fifteen theses were selected for presentation (oral + poster) out of which 10 were presented.