News

Hazardous chemicals from cigarette flavourings identified in tobacco smoke

A new study in the United States shows that smokers inhale hazardous chemicals that originate from compounds used to flavour cigarettes from tobacco smoke (*Journal of Agricultural Chemistry*, 2000, **48**: 1298–1306). Flavourings are used in certain brands of cigarettes to enhance the taste experienced by smokers. The tobacco industry declares that most of the additives it uses are "generally recognized as safe". However, most flavour additives tested are classified as safe when they enter the human body through the ingestion of food and not through inhalation. Moreover, flavour-related compounds present in cigarette tobacco are transformed by burning cigarette coal to alkenylbenzenes. Combustion products of additives are not safe simply because the original materials are classified as being without risk.

For the first time, scientists have now measured flavour-related alkenylbenzenes in tobacco smoke particulate by a very sensitive method (selected ion monitoring gas chromatography–mass spectrometry). In the past, the measurement of flavour-derived alkenylbenzenes required as much as 1 kg of smoke condensate, which is equivalent to the smoke from 50 000 cigarettes. Stephen B. Stanfill and David L. Ashley from the Centers for Disease Control and Prevention, Atlanta, Georgia, USA have developed a method than can detect alkenylbenzenes in the mainstream smoke particulate of a single cigarette in the low nanogram range. The findings are not only important in understanding the composition of tobacco smoke, but will also be useful in showing if these compounds have a role in smoking-related pathology after repetitive long-term inhalation.

Five alkenylbenzene compounds were identified and quantified in the smoke particulate from eight brands of cigarettes currently on the market in the United States. The brands had mean levels of alkenylbenzenes in the range 6.6–4210 ng per cigarette. The complete blocking of ventilation holes in the cigarette filter increased the transfer of alkenylbenzenes from tobacco to the particulate fraction of mainstream smoke 2–7-fold. Over a 30-year period, a two-pack-a-day smoker who is exposed to a seemingly small amount of alkenylbenzenes on a per cigarette basis, could inhale up to milligram amounts of alkenylbenzenes from smoke particulate alone.

Research data on the acute toxic properties of alkenylbenzenes are available. For methyleugenol, carcinogenic and mutagenic effects have been demonstrated in rodents; for myristicin and elemicin, genototoxic and halucinogenic effects have also been established.

Dr John Slade, Head of the Program in Addictions at the University of Medicine and Dentistry of New Jersey, New Brunswick, NJ, said that these results "point to some of the information that regulatory agencies should require cigarette makers to disgorge: what are all the desired functions that each additive and its combustion products play in manufactured cigarettes and what is known about adverse effects or potential toxicities of each additive and its combustion products in manufactured cigarettes? He added: "Regulatory agencies need to understand these products well enough to regulate them intelligently." ■

Tudor Toma, *London*

Oral AIDS vaccine to be tested in the Republic of Uganda

Researchers at the Institute of Human Virology in Baltimore have announced plans to begin human tests of an oral vaccine for acquired immunodeficiency syndrome (AIDS). The vaccine is produced by an innovative approach that uses engineered salmonella bacteria to deliver genetic material encoding vaccine DNA to human cells.

The vaccine is being developed at the Institute of Human Virology at the University of Maryland headed by virologist Robert Gallo. Although Gallo himself cautioned that the vaccine is still untested in humans, Dr. Francis Omaswa, Uganda's Director of Health Services, said plans are already set for the first clinical trials. The trials, which will be conducted on volunteers, could begin within 18 months.

Uganda is the only African nation to implement aggressively a significant range of AIDS prevention services. 1.5 million people in Uganda are already infected with the AIDS virus, and more than a million children have already become orphans as a result of the epidemic. Recently, a new international forum to promote the development of an AIDS vaccine was announced by the World Health Organization (WHO) and the Joint United Nations Program on HIV/AIDS (UNAIDS). In a statement issued in Geneva, the forum stated that the HIV Vaccine Initiative aims to increase international cooperation in the development of AIDS vaccines in the face of the epidemic's rapid spread in developing countries. The forum's coordinator, Jose Esparza, said the large number of HIV strains and the number of potential vaccines being tested made it imperative to coordinate research efforts.

The AIDS vaccine being developed by Gallo's team is the first designed to be taken orally as a pill. In contrast with vaccines that must be injected, the pills would be inexpensive to manufacture and easy to distribute widely. They would also be easily and safely administered by community health care workers, who would need little or no medical training.

Dr. Anthony Fauci, one of the US government's leading AIDS researchers and Director of the National Institute of Allergy and Infectious Diseases, said that the vaccine developed by Gallo's team is "theoretically the right approach." But, like Gallo, he warned, "We've been fooled so many times about new vaccines that I've hesitated to talk about this one until now, but I really like it."

Development of the vaccine at the Institute of Human Virology at the University of Maryland is being supported by a 4-year-old not-for-profit organization called the International AIDS Vaccine Initiative. The initiative — which is largely funded by the Rockefeller Foundation, the William H Gates Foundation and other UN agencies — engages in what it calls "social venture capitalism." Money is funneled to researchers who guarantee that their vaccines, if successful, will be produced cheaply and be readily available to developing countries.

Although many drug companies have developed potential AIDS vaccines, neither they nor federal agencies have earmarked a significant part of their research money for testing in clinical trials. None has focused on an oral vaccine, and only one, AIDSVAX,