CRI/ICEIT NEWSLETTER
VOL. 5 NO. 3 – July 1995
ISSN 0858-2793
BANGKOK, THAILAND

Chulabhorn Research Institute

INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND INDUSTRIAL TOXICOLOGY (ICEIT)

CRI's ICEIT has been designated as a "UNEP Centre of Excellence for Environmental and Industrial Toxicology".

Chulabhorn Research Institute Hosts Asia-Pacific Workshop on Safety in Biotechnology

The Asia-Pacific workshop on safety in biotechnology was held in Bangkok from 6 to 8 March 1995 as a follow-up to actions called for in Agenda 21 adopted at the 1992 United Nations Conference on Environment and Development with regard to the environmentally sound management of biotechnology.

The workshop was organized by the Chulabhorn Research Institute and the National Centre for Genetic Engineering and Biotechnology, Thailand, with the Department of the Environment of the UK, in collaboration with the Department of the Environment of the Netherlands.

67 participants attended the workshop, including international experts from Argentina, Australia, Cambodia, China, India, Indonesia, Japan, Korea, Lao PDR, Malaysia, Pakistan, Philippines, Singapore, Socialist Republic of Vietnam, Thailand, the Netherlands, USA, UK, Zimbabwe and the United Nations.

The aim of the workshop was to contribute to international cooperation on safety in biotechnology, with specific attention to national implementation, regional and international co-operation and harmonisation.

During the workshop, participants made draft recommendations for taking forward safety in biotechnology in the Asia-Pacific region. These draft recommendations were further considered in a meeting of government designated experts convened by UNEP immediately following the workshop.

Representing Her Royal Highness Princess Chulabhorn at the opening of the workshop, Professor Wichit Srisa-an, Vice-President of the Chulabhorn Research Institute stated: "This Asia Pacific Workshop has a most significant role to play in determining the basis for

(Continued on page 2)

Chulabhorn Research Institute Hosts Asia-Pacific Workshop on Safety in Biotechnology

(Continued from page 1)

Dr. Nay Htun

national and international agreements on safety in biotechnology. The deliberation during the workshop will greatly facilitate the formulation of regional approaches to biosafety with regard to technical aspects of risk assessment and risk management, and the mechanisms for cooperation."

In his opening keynote address, Dr. Nay Htun, Former Deputy Executive Director UNEP and Director of Programmes/ Special Advisor UNCED, and currently Assistant Administrative and Regional Director, UNDP, New York, noted that UNCED's Agenda 21, Chapter 16, on Environmentally Sound Management of Biotechnology recognized that biotechnology can make significant contributions to sustainable development in increasing the availability of food, feed and renewable raw materials, and enhancing protection of the environment. Biotechnology also offers opportunities for new global partnerships especially between those countries that are rich in genetic resources, primarily the developing countries, and those countries in the developed world that are more advanced in the technology. Dr. Nay Htun emphasized that isolated research will probably not bring about the changes needed in agricultural research in the developing world. Hence, the importance of international collaboration and the high priority that should be given to the adaption and application of biotechnologies to meet the urgent needs of developing countries.

With regard to the main task set by the workshop, the drawing up of draft recommendations on safety in biotechnology relevant to the Asia-Pacific region, Dr. Nay Htun stated: "Irrespective of the socio-economic implications of biotechnology, there is need for a good set of technical tools that can be used to help assess and manage the risks. Such tools should not impede the further development, testing and application of biotechnology, or the eventual creation of a legal protocol. They should be a flexible set of guidelines that represent a step in ensuring that potential impacts of biotechnology on the environment and human health are being adequately addressed using the best available knowledge. Like any other tool, these guidelines should be modified with the increase in knowledge and experience."

During the course of the workshop, the editor spoke with some of the participants to get their views on the socio-economic implications of development in biotechnology.

Mr. H. Zedan, Representative of UNEP Nairobi, the agency responsible for organizing the consultative meeting of government designated experts which was held immediately following the workshop, commented that the country papers presented by participants from the Asia-Pacific region showed many areas of common regional concern in the development of biotechnology. He believed it was important for countries to gain experience in this exciting area of scientific and technological endeavour and carry out their own developments in this new area. "We

Environmental and Dietary Estrogens and Human Health

Recent reports have suggested that organochlorine pesticides and other environmental and dietary estrogens may be associated with increased incidence of breast cancer in women and decreased sperm concentrations and reproductive problems in men.

However, the proposed linkage between polychlorinated biphenyls (PCBs) and 1, 1-dichloro-2, 2-bis (*p*-chlorophenyl) ethylene (DDE) and breast cancer is questionable for the following reasons:

- Most studies with PCBs indicate that these mixtures are not estrogenic, and the weak estrogenic activity observed for lower chlorinated PCB mixtures may be due to their derived hydroxylated metabolites;
- *p,p'*-DDE, the dominant persistent metabolite of 1, 1, 1-trichloro-2, 2-bis (*p*-chlorophenyl) ethane (*p,p'*-DDT), is not estrogenic, and levels of *o,p'*-DDT, the estrogenic member of the DDT family, are low to nondetectable in most environmental samples;

The second major link between environmental and dietary estrogens and human disease involves the hypothesis that increased estrogen exposure may be responsible for falling sperm counts and disorders of the male reproductive tracts. Again, the basis for the hypothesis has been questioned and the claim that environmental estrogens including organochlorine chemicals are possible etiologic agents is highly debatable.

A recent analysis of this controversy published in the April issue of Environmental Health Perspectives concludes that humans are exposed to both natural and industrial chemicals which exhibit estrogenic and antiestrogenic activities. For example, bioflavonoids, which are widely distributed in foods, and several industrial compounds, including organochlorine pesticides and various phenolic chemicals, exhibit estrogenic activity. Humans are also exposed to chemicals which inhibit estrogen-induced responses such as the aryl hydrocarbon receptor (AhR) agonist 2, 3, 7, 8-tetrachlorodibenzo-*p*-dioxin and related chlorinated aromatics, polynuclear aromatic hydrocarbon combustion products, and indole-3-carbinol, which is found in cruciferous vegetables. Many of the weak estrogenic compounds, including bioflavonoids, are also antiestrogenic at some concentrations. A mass balance of dietary levels of industrial and natural estrogens, coupled with their estimated estrogenic potencies, indicates that the dietary contribution of estrogenic industrial compounds is 0.0000025% of the daily intake of estrogenic flavonoids in the diet. Moreover, dietary levels of antiestrogen equivalents (industrial or natural) are significantly higher than the estrogen equivalents of organochlorine pesticides. The suggestion that industrial estrogenic chemicals contributed to an increased incidence of breast cancer in women and male reproductive problems is not plausible.

Epidemiology studies of individuals occupationally exposed to relatively high levels of DDT or PCBs do not show a higher incidence of breast cancer; and no single class of organochlorine compounds was elevated in all studies, suggesting that other factors may be critical for development of breast cancer.

Source: Environmental Health Perspectives, Vol. 103, No. 4, April 1995.

should perhaps not overemphasize biosafety at this stage. Overawareness of the risks without opportunities to develop the new technology is likely to be counterproductive." Mr. Zedan likened the process of risk awareness to the training of a pilot to fly a sophisticate jet airliner. If someone has no training as a pilot, he will consider that flying a plane is a highly dangerous activity. However, the trained pilot learns the nature of the risks and how to cope with risk as part of his training. Without the opportunities to develop and use new technology there will be a persistent and debilitating lack of confidence.

Dr. Zhang Liang Chen of the National Laboratory of Protein Engineering and Plant Genetic Engineering, College of Life Sciences, at Peking University, Beijing, spoke with great enthusiasm of applications of biotechnology in China, where the production of transgenic plants has become an important means of improving agricultural production.

However, the gap between developed and developing countries in the production of GMO seed is considerable. *Dr. L. Val Gidding*, Chief of Science and Policy Coordination of the Biotechnology, Biologics and Environmental Protection, Animal and Plant Health Inspection Service of the United States Department of Agriculture and a delegate at the Rio Earth Summit who contributed to UNCED's Agenda 21, Chapter 16, on Environmentally Sound Management of Biotechnology, recounted that his office had received 3500 requests for review activities related to plant products alone in the last 10 years and that the number had increased exponentially in recent years. 85 per cent of requests information come from industry compared with 15 per cent from academe.

In a paper delivered at the workshop, *Dr. Susono Saono*, Director of the Research and Development Centre for Biotechnology at the Indonesian Institute of Sciences at Bogor, Indonesia, and currently Chairman of the ASEAN subcommittee on Biotechnology made the point that: "While not as advanced as in developed countries, with the rapid development in genetic engineering technology, there is a high concern on the issues of biosafety in ASEAN countries. The program area in biotechnology aspires for regional co-operation on health-care biotechnology in the area of development of drugs, diagnostics and vaccines; agricultural biotechnology, with regard to quality improvement and production of plants and animals as well as their products; industrial biotechnology, namely production of selected biomaterials, pilot plant design, and computer control of bioreactors; and environmental biotechnology, that is environment and biodiversity conservation. As yet, most ASEAN countries do not have any field releases of genetically engineered organisms, but some of them have active research programs and a number of engineered plants in the pipeline."

Thailand is one of the ASEAN countries that has already developed biosafety guidelines for laboratory and field releases. The guidelines are in use under the direction of the National Biosafety Committee that was established in 1993. The guidelines are intended to be used by any institution conducting experiments with organisms of novel genotypes produced by genetic manipulation which are either unlikely to occur in nature, or likely to pose a hazard to public health or to the environment. *Dr. Sakarindr Bhumiratana* of the National Biosafety Committee stressed that any institution that requests support from the committee is required to follow the safety guidelines. Requests received to date have been for support for research, advice and recommendations on the importation of GMO seed; applications for field trials for male sterile corn, and application for viral resistant melon. In Thailand, the Institute of Biosafety acts as secretariat of the National Biosafety Committee and in this capacity assists government departments and ministries, for example, the Ministry of Agriculture, in providing technical advice and recommendations. The main emphasis of the institute's work is still promotion and regulation. It aims to create dynamism in biotechnology in both the government and private sectors.

At the close of the workshop, *Dr. Skorn Mongkolsuk*, member of the National Committee for Biosafety in Thailand and Head of the Laboratory of Biotechnology at the Chulabhorn Research Institute, put the following questions to Dr. Norman J. King of the UK Department of Environment, the agency which took the lead role in organising the workshop.

Dr. Mongkolsuk: Would you give us your view on the way the workshop has been conducted and what it has achieved.

Dr. King: I think it has been very successful. I had hoped at the beginning of the workshop that we would achieve four goals. The first was a good exchange of views, information and experience; and I think we have achieved that with the presentations of papers from countries in the region and the discussions on the papers. These will be recorded in the workshop proceedings. Secondly, the identification of regional needs and priorities; and I think the set of recommendations that we finished with at the end of the workshop have achieved that goal.

Then, I was looking to feed into future regional meetings the experience of this one. we shall have the opportunity to do this later in the year with the meeting in Central and Eastern Europe.

The fourth goal was to contribute to discussions in the wider international forums, such as the UNEP consultation on technicaly guidelines which is to take place immediately after this workshop.

These were very much the goals we hoped to achieve, and I think we have achieved all of them.

Dr. Mongkolsuk: What would you say have been the most interesting points raised by the workshop?

Dr. King: I was very impressed by the complete consensus on the importance of biotechnology and its potential for aiding development. But I think all countries realized that one needs to balance possible risks against the likely benefits. I was very impressed by the sensible approach that all countries wished to adopt. I noted the strong feeling of cooperation that exists among all the countries in the region. They all seemed to wish to share their experience. They didn't want to duplicate work which had already been done elsewhere, but rather to work together on new developments and new problems. I was also interested by the generally and strongly expressed need for information, so that there would be an informed basis for decisions that had to be made.

Dr. Mongkolsuk: The United Kingdom, and the Netherlands, have been very generous in their support for regional workshops on biosafety, Would you like to comment on the UK's interest in international collaboration in this area?

Dr. King: That's a very interesting question. We've been convinced for several years now that the industries based on biotechnology needed to develop within a framework of safety, In the past, industries have suffered greatly from things going wrong, and biotechnology is too important a technology to allow that to happen. So, we hold very strong views that each country needs a national framework which, in the case of the United Kingdom, must be part of a broader European one. Our framework is based on sound science and on risk assessment. However, we believe that we cannot ensure safety by national controls alone. We are, for example, a large importer of food. Some of that food will be produced by biotechnology in the future. We have no means of controlling this at a national level and therefore we wish to ensure that countries that are exporting to us do have in place effective safety mechanisms so that we can be confident of the products we import. I think the Netherlands, in some ways, is approaching this question from another direction. They are great exporters of food and plant materials generally, and they are very keen to operate within a safety system. This means there is a complementary interest between the two countries. We are also very longstanding friends, and so it is easier to work together than to work separately. This is why our endeavours at regional levels have been very much a partnership. We have taken the lead in Thailand for the Asia-Pacific workshop but our Netherlands colleagues are, of course, here helping us; and we do the same when the Netherlands organises a workshop.

(Continued on page 8)

UNEP

Consultative Meeting...

At a meeting convened by UNEP immediately following the Asia-Pacific Workshop on Safety in Biotechnology on 8 March 1995 government designated experts from the Asia Pacific countries represented at the workshop proposed a list of recommendations with specific reference to national implementation, regional and international cooperation and harmonisation for taking forward safety in biotechnology in the region, as follows:

- Building on existing structures, establish a regional forum, which should include scientists, representatives from the private and public sector, environment and public interest groups, to make recommendations at a high level, including recommendations on the following points, and to provide direct advice on safety in biotechnology.
- Promote harmonised or equivalent approaches to risk assessment and risk management at the regional and international level.
- Promote the adoption of guidelines and/or the amendment of existing legislation if appropriate, taking account of knowledge gained and bearing in mind the need for these to be readily adapted in light of experience.
- Ensure that sound scientific principles, good scientific information and all relevant experience underlie risk assessment and management.
- Ensure that appropriate information is provided to national authorities about organisms derived from modern biotechnology and the potential receiving environment.
- Promote the development of mutually acceptable data.
- Promote the identification of organisms derived from modern biotechnology which are of low risk and therefore require no further risk assessment.
- Recognise the importance of socio-economic and ethical aspects of biotechnology applications, and when considering these, take into account the scientific information about risk.
- Promote information exchange at the regional level, recognising the need to protect commercial interests, but ensuring that members of the regional forum have access to agreed data relevant risk assessment.
- Promote an effective and attractive information programme on safety in biotechnology for dissemination to the public.
- Promote capacity building, including training programmes and workshops in specialist areas at national and regional level, using appropriate expertise from elsewhere as required.
- Promote links between countries, regions, and international organisations, and between centres of excellence, by establishing contact points which can also serve for the exchange of information on activities, including the marketing of products, in different countries and regions.
- Promote access to, and the use and maintenance of, regional and international databases, including a database of scientists, and administrators who can assist in the review of proposed contained uses and deliberate releases, taking into full account the need to ensure that they are precise, accurate and up-to-date.
- Promote biotechnology research and development and industrial applications, with due attention to safety.
- Encourage collaborative research on specific issues in risk assessment and management relevant to the region, including the promotion of regional and international research projects where appropriate.

Scientific Research on the Internet

Among the scientific network activities are two promising "virtual laboratories" – cyberspaces where scientists from remote locations meet to conduct research, discuss data, and reach conclusions. These Internet tools, called collaboratories and BioMOOs, are made possible by interconnected computer networks.

The mention of a collaboratory, a "center without walls," was first made in 1989. That initial computer network collaboration led to the creation of TCP/IP, a set of data communications protocols that serve as the critical foundation of the Internet. Through advances in computer network technology, accelerated by the productive use of the Internet among scientists, researchers, and engineers, this vision of 21st century science conducted in a laboratory without physical limits is nearing reality.

One example of a collaboratory is the Environmental and Molecular Sciences Laboratory (EMSL) program at the Pacific Northwest Laboratory (PNL) in Richland, Washington. This project will bring together nearly 250 experts from many scientific disciplines to help solve the US environmental problems. The site of the collaboratory will contain advanced equipment allowing scientists to perform research and development activities on contaminated soils and groundwater; waste analysis, processing, and storage; and human and ecological health effects. The data gathered in the EMSL will then be shared electronically with national and international scientific communities.

The collaboratory represents an opportunity to remove academic isolation and replace it with a teamwork approach to problem solving.

To connect to a collaboratory, a researcher requires Internet link-up, which can be purchased at comparatively minimal cost. Many institutions, including universities and government laboratories, enjoy high-speed connections which allow the movement of audio and video as well as text data to occur almost spontaneously with commands for their retrieval.

The BioMOO, a virtual biology center that originated at the Weizmann Institute of Science in Israel, represents a different approach to scientific collaboration. Less resource-intensive, BioMOOs originally relied on communications using a specific type of Internet connection called telnet and a program based on MUDs (multiple user dimensions) and MOOs (multiple user dimensions, object oriented). Basically, MOO is a computer program that allows numerous users to connect simultaneously and interact personally and with the program.

The BioMOO was developed by Gustavo Glusman, a graduate student at the Weizmann Institute. BioMOO was opened to the scientific community in November 1993 as a virtual meeting place and has now attracted over 700 registered members worldwide. According to the Weizmann Institute, a growing number of biologists from four continents regularly visit the site to meet colleagues. Among the subjects of their real-time discussions are new ways of fighting disease and hunger, protecting the environment, and harnessing alternative sources of energy. According to the BioMOO FAQ (frequently asked questions, an electronically accessible document containing a series of basic questions and answers for the new user), BioMOO is now connected to the Globewide Network Academy and allows biologists to meet colleagues and brainstorm, hold colloquia and conferences over the Internet, and explore the serious side of this new medium.

Users access the BioMOO via the Internet by making a telnet connection to bioinfo.weizmann.ac.il 8888 (URL:telnet://bioinfo.weizmann.ac.il:8888/). Upon entering the system, you must register either as a guest or with your name and a password, given at your initial visit. Once inside, the emphasis is on exploring by issuing commands; for example, "help" returns an index of topics. You can pause to view the BioMOO 24-hour Poster Session. This represents a new addition to the original BioMOO, with the conversational MOO now tied to a World Wide Web server – a Web-MOO link- that allows the presentation of high-resolution still images, movies, and sounds.

On the web server at the California Institute of Technology, where images for use in BioMOO can be housed, is the image of a biologist attaching images to BioMOO objects in order to present a fullcolor slide presentation to colleagues at remote locations.

The sophisticated program is surprisingly user friendly. To see the room you are in, type the work "look." To receive information about the objects around you, type "look" and the name of the object, such as "table". To get more details, you would type "examine." To learn the identity of others connected, you would type "who." Finally, to leave the system, you type "@quit."

Researchers are rapidly adapting BioMOO as a tool for their own specific studies. For example, researchers can send gene sequence data to major sequence databases to search for matches; a colony of virtual mice is being developed that can be anesthetized, dissected, and inspected; and electronic poster sessions with working models on topics such as gene transcription, DNA replication, and other cell functions are being developed. Glusman's latest project is the establishment of the GNA-Lab, a MOO dedicated to the development of the tools needed to create a virtual campus for the Globewide Network Academy.

Source: Abridged from Environmental Health Perspectives, Vol. 103, No. 2, February 1995.

Turning a Global Problem into a Global Resource: the Uses of CO_2 in Chemical Processes

Systematic monitoring of the level of CO_2 in the atmosphere began in 1958 and a reasonably comprehensive picture of recent trends has emerged. Since the levels of emissions of atmospheric carbon dioxide, methane and other greenhouse gases continue to rise, concern about their climatic effects is growing.

The build-up of CO_2 in the atmosphere in recent years is believed to be caused by an excess of man-made emissions mainly in fossil fuel combustion. Globally, industrial CO_2 emissions have tripled since 1950 and are currently about 22×10^{12} t/a in the atmosphere.

The United Nations Convention on Climate Change, an agenda of UNCED (Rio Conference), developed a framework that has begun to address the stabilisation of emissions of greenhouse gases at levels that will prevent future human activities from creating a danger to the global climate system, which could seriously affect natural ecosystems, agricultural production and ocean levels.

One of the proposed measures involves developing, using and transferring technologies that directly reduce emissions. This measure specifically applies to atmospheric CO_2, which can be used to produce fuels, chemicals and materials.

The impact of successful CO_2 use would be felt most directly by the chemical industry which would use new chemical and biochemical processes for producing high-value chemicals while substantially reducing CO_2 emissions into the atmosphere.

A conservative estimate indicates that CO_2 usage could easily be expanded ten fold if new or improved processes could be developed, and several countries have recently proposed carbon taxes that would make CO_2 recovery and use attractive economically.

The chemical industry currently uses CO_2 as a feedstock in several commercial processes. Methanol (10Mt/a) is produced from synthesis gas (carbon monoxide and hydrogen) and/or CO_2 using a copper-based catalyst at moderate temperatures and high pressures (250°C and 80 atm). Urea, (80Mt/a) used in making resins, polyurethanes, and thermosetting materials, is commonly produced by reacting ammonia and CO_2 over a zinc catalyst at moderate temperature and high pressure. Salicylic acid (25,000t/a) is produced when CO_2 is added to a phenol derivative. Other processes incorporate CO_2 into polycarbonates, a versatile material that is used in compact disc and container manufacturing. All of these processes can be generalised to form similar types of chemicals and materials.

A newly-developed pigment process, which directly uses CO_2, also reduces toxic by-products. This process reacts CO_2 with lime to form precipitated calcium carbonate (PCC) particles, which are used to replace titanium dioxide (TiO_2) as a paper whitener and as a paint pigment.

Although TiO_2 is widely used, its high price and the environmental pollution associated with its manufacture make it an attractive target for replacement with alternative pigments. One advantage of the PCC process is that it avoids forming the toxic by-products associated with TiO_2 synthesis. In addition, $CaCO_3$, unlike TiO_2, can be directly precipitated in the paper fibres, which exhibit stronger wear and abrasion properties.

Biologically, CO_2 has been used to produce fats from algae for biodiesel fuels and the antioxidant vitamin B-carotene. Though algae-derived biodiesel has only been produced in laboratory scale quantities and B-carotene production worldwide is only 10t/a, such biological systems, if developed, have the potential to produce many different oxygenated chemicals from CO_2.

Other chemical processes being developed in laboratories include the direct reaction of CO_2 to form polycarbonates with superior properties compared with material produced with current methods.

One major constraint to finding new methods of using CO_2 is catalyst development. Identifying new catalysts for CO_2 conversion has not received much emphasis in comparison with the large quantity of work performed with CO (syngas) catalysts; thus, looking at modifying CO activation catalysts may provide a promising area to begin the search for new CO_2 catalysts.

However, the potential economic advantages of using chemical processes based on CO_2 should spur future developments, an important by-product of which will be a reduction in CO_2 emissions to the atmosphere. The economic and environmental benefits of a CO_2-based industry could be considerable. Avoiding the use of toxic feedstock, future CO_2 emissions and hazardous by-products are compelling environmental drivers. Already, CO_2 has been incorporated into pharmaceuticals, fuels, chemicals, and into known and new materials of new or better qualities.

Source: Chemistry and Industry, Dec. 1994.

Pesticides in the Home

There are strong reasons for having household pesticides readily available. Fleas, ticks and mosquitoes, common pests found in the home, are potential vectors of a wide range of diseases including bubonic plague, lyme disease, and malaria.

However, studies of the immunological effects of common anticholinesterase pesticides, ranging from organophosphates like dichlorvos to carbamates like carbaryl, carried out by the Eppley Research Institute of the University of Nebraska, suggest that low acute toxicity pesticides also carry health risks.

Anticholinesterase pesticides inhibit breakdown of the neurotransmitter acetylcholine by inhibiting acetylcholinesterase, a serine hydrolase enzyme. However, what is commonly overlooked is the possibility that carbaryl and other anticholinesterase insecticides may impair immune processes dependent on serine hydrolase activity.

At the Eppley Research Institute, Assistant Professor G. Casale and co-workers have demonstrated that

Maternal and Umbilical Cord Blood Lead Levels in Thai Women

A recent study conducted at Ramathibodi Hospital, Bangkok, Thailand,[1] evaluated the lead concentrations in umbilical cord blood, the relationship between maternal and umbilical cord blood concentration of lead, the factors that may be related to lead concentration in maternal blood, and the relationship between lead concentration in maternal blood and the outcome of pregnancy in Thai women.

Lead toxicity in pregnant women results primarily from occupational or environmental exposure through inhalation. Pulmonary deposition of 30-50 percent of the lead in the atmosphere occurs and absorption is almost 100 percent. Smelter and other industrial emissions contain larger lead particles which tend to be deposited in the upper respiratory tract. Mucociliary action passes these particles up to the oral cavity where they are swallowed and absorbed by the gastrointestinal tract. Lead contamination in food and beverages is an additional source of lead intake.

The level of gastrointestinal absorption of lead from diets ranges from 10 to 15 percent in adults and 40 percent in children. Iron and calcium deficiency in pregnancy facilitates the lead absorption. Absorbed lead enters the bloodstream. Over 90 percent of blood lead is inert and bound to red blood cells, and only free or unbound lead crosses the placenta to the fetus.

Blood lead levels are influenced not only by past and present exposures, but also by the rate of urinary lead extraction. Because of the increase in blood volume, kidney perfusion and glomerular filtration rate and increased urinary extraction of lead during pregnancy, blood lead levels in pregnant women are lower than in nonpregnant women. Blood lead level is the most commonly used indicator for the assessment of lead exposure and of pregnancy risks.

The Ramathibodi Hospital study covered 500 pregnant women and their newborn babies. It was found that 5.2 percent of the mothers and 2.4 percent of the newborn babies had lead levels higher than the safe standard of 10µg/dl. This level compared favourably with a previous study conducted at another Bangkok hospital, before the introduction of unleaded gasoline, in which the very high mean blood lead level of up to 18.5 µg/dl was recorded.[2]

The Ramathibodi Hospital study revealed higher blood lead levels in women who worked outdoors and had lived in Bangkok for more than ten years. This reflects the impact of chronic exposure to lead from a polluted environment.

The study has implications for the prevention and management of high blood lead levels in women of child bearing age. Modern industrial and environmental precautions, including the reduction of lead in gasoline, canned goods, and tap water, can significantly decrease exposure to lead. Women at risk of lead exposure in the workplace should be monitored for blood lead level before becoming pregnant. Increasing iron and calcium intake and avoidance of cigarettes and alcohol can reduce the absorption of lead. Women who are chronically exposed to lead with blood lead levels of 10-25 µg/dl should be moved from the source of exposure and monitored for blood lead levels periodically every 3 to 6 months. Pregnancy should be postponed until the level is less than 10 µg/dl. The use of chelation therapy during pregnancy is controversial. Chelating agents are teratogenic in rats. Thus, their use is indicated only in acute lead poisoning with blood lead levels above 25 µg/dl. Moreover, chelation therapy does not decrease lead levels in the fetus because the drug does not cross the placenta.

---

[1] Winit Phuapradit. Lead and Pregnancy, Ramathibodi Medical Journal, Vol. 18 No. 1, January-March 1995.

[2] Punnakanta L. Lead Intoxication and National Human Resources. National Defence College of Thailand Document 1989, P. 10-13.

Source: Remathibodi Medical Journal, Vol. 18, No. 1, January-March 1995.

carbaryl and other common anticholinesterase insecticides inhibit serine hydrolase-dependent immune processes, such as interleukin 2(IL-2) signalling.

The next research step is to develop a whole-organism model to determine where at the cellular level the pesticide is affecting the immune system. Neither the kind of esterases inhibited by carbaryl and other anticholinesterase pesticides nor the actual esterase targets have yet been identified. Scientists do not know why carbaryl, despite its exceptionally low acute toxicity to the nervous system, is more toxic to the complement system than paraoxon, the primary metabolite of the more acutely toxic pesticide parathion.

Much of the work on the immunological effects of pesticides is difficult to interpret, and there is little in the way of controlled studies in humans. John Bucher of the toxicology branch of the Environmental Toxicology Program at the US National Institute of Environmental Health Sciences (NIEHS) has stated: "We could be missing the boat on the potential effects on the immune system. What we see is an increasing number of reports on multiple chemical sensitivity, which anecdotally has been set off by one large exposure to a pesticide or multiple pesticides". He believes that there is some immune system involvement in multiple chemical sensitivity and that the role of pesticides needs further study.

Source: Environmental Health Perspectives, Vol. 103, No. 6, June 1995.

FIRST ANNOUNCEMENT

The Second International Conference on Environmental and Industrial Toxicology: Research and Its Application

* * * * *

The Second International Conference on Environmental and Industrial Toxicology: Research and Its Application has been organized to promote multidisciplinary approaches to the global environmental and human health problems that result from the use of chemicals. "Research and Its Application" has been selected as the central theme in order to focus on the link between basic research and its application to protecting human health and the environment, particularly in relation to developing countries.

The conference will provide a forum for the presentation of up-to-date information and latest developments in all aspects of toxicology and for the exchange of ideas amongst scientists from different disciplines, governmental officials and industrial personnel.

Scientific Program

The scientific program will cover many aspects of environmental and experimental toxicology including the mechanisms of toxicity, modulation of toxicity, carcinogenesis, evaluation and assessment of risk from exposure to chemicals, detection and detoxification of toxic chemicals in the environment.

The program will be organized with plenary lectures, symposia, workshops and free communications (oral presentation and poster sessions).

The following areas and topics are covered:–

I. ***Toxicology of Environmental and Industrial Chemicals and Pollutants***

- Air pollution
- Pesticides
- Water pollution
- Industrial chemicals
- Chemical mixtures

II. ***Cancer Risks by Environmental Factors***

- UV and ozone
- Chemicals
- Prevention of cancer risks

III. ***Factors Modifying Toxicity***

- Nutrition, diet and lifestyle factors
- Genetic susceptibility and other host factors

IV. ***Evaluation of Toxicity and Assessment of Risks to Human Health***

- Biomarkers for exposure and susceptibility
- Models for toxicological studies
- New techniques for detection of pollutant-induced toxicity

V. ***Detection and Detoxification of Chemicals in the Environment***

- Environmental monitoring
- Management of toxic/hazardous waste

VI. ***Risk Assessment and Risk Management***

For further information please contact:

The Secretariat – ICEIT II
The 2nd International Conference on
"Environmental and Industrial Toxicology:
Research and Its Application"
Chulabhorn Research Institute
Vipavadee Rangsit Highway
Bangkok 10210, Thailand
Tel: (66-2) 247-1900, 247-5757
Fax: (66-2) 247-1222, 574-0616

Chulabhorn Research Institute Hosts Asia-Pacific Workshop on Safety in Biotechnology

(Continued from page 3)

Dr. Mongkolsuk: Does this mean that the United Kingdom and the Netherlands would like to take a leading role in the development and harmonisation of safety guidelines?

Dr. King: Well, we have already taken a lead in developing draft technical guidelines on biosafety. We consider that we have some experience that we wish to share with others. We were also involved because of the preparations for the UN conference on the Environment and Development. We had many contacts that we had developed with countries around the world, and a knowledge of their needs as well. But there is a limit to what two countries like the United Kingdom and the Netherlands can achieve. We are in the same geographical area and have similar cultural backgrounds. For guidelines on biosafety to be truly effective internationally, they need a much wider application than we can give them. So we took the initiative to encourage the United Nations to take on board the international development of these guidelines when we had done as much as we could do as two nations. In many ways we feel we have done our job. But we stand ready, of course, to support the UN in whatever it wishes to do to continue this important endeavour.

Dr. Mongkolsuk: Dr. King, thank you very much for giving us your views on what, I think, all delegates consider to have been a highly successful workshop.

The ICEIT NEWSLETTER is published quarterly by the International Centre for Environmental and Industrial Toxicology of the Chulabhorn Research Institute. It is intended to be a source of information to create awareness of the problems caused by chemicals. However, the contents and views expressed in this newsletter do not necessarily represent the policies of ICEIT.

Correspondence should be addressed to:

ICEIT NEWSLETTER
Chulabhorn Research Institute
Office of Scientific Affairs
c/o Faculty of Science,
Mahidol University
Rama 6 Road
Bangkok 10400, Thailand
Telex: 84770 UNIMAHI TH
Telefax: (662) 247-1222
Tel: (662) 247-1900