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REACTS

newsletter

REAC/TS Staff Members Assist Brazilians in Goiania Accident

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BOX No. 3 of 6

FOLDER BRAZIL 87 GOIANIA
CESIUM-137

The Radiation Emergency Assistance Center/Training Site (REAC/TS) is operated by Oak Ridge Associated Universities for the U.S. Department of Energy under contract number DE-AC05-76OR00033.

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A tragic series of events began last September in Goiania, Brazil, when workers in a junkyard broke open a lead-shielded container of cesium-137. Ultimately, four people would die, dozens more would be seriously contaminated.

The cesium was the source from a radiation therapy machine that had been abandoned when a Goiania cancer therapy center was moved to another location. Scavengers had sold the device to the junkyard.

The workers who opened the capsule, unaware of what was contained inside, spread the contamination to friends and family. Some family members, fascinated by the fluorescent powder, rubbed the substance on their bodies; some ingested significant amounts. In the first two days after the accident was discovered, medical responders began triage on the approximately 25,000 persons who would eventually come for treatment. Two hundred forty-four persons were found to be externally contaminated, and the 54 most seriously injured were hospitalized. The physicians in charge of patient care in Goiania were Drs. Alexandra Rodriguez Olivera and Nelson Valverde.

For assistance with responding to this accident, Dr. Rex Nazare Alves, director of the Brazilian Nuclear Energy Commission (CNEN) in Rio de Janeiro, called the International Atomic Energy Agency (IAEA), specifically requesting the assistance of REAC/TS staff members Drs. C.C. Lushbaugh and Robert C. Ricks, along with assistance from specialists from Argentina, West Germany, and the Soviet Union. REAC/TS works in conjunction with the U.S. Department of Energy and the State Department to respond to requests such as this under a World Health Organization/IAEA agreement.

In a telephone conversation with Brazilian occupational health physician Dr. Nelson Valverde, on staff at the Brazilian public utility FURNAS, REAC/TS learned that 10 patients were hospitalized in Goiania and that the 10 most seriously injured patients had been moved to the Marcilio Dias Naval Hospital in Rio de Janeiro. Valverde,

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International Symposium on Nuclear Emergencies Held in Rome

An International Symposium on Nuclear Emergencies, sponsored by the Italian National Tumor Registry (INTR) Institute, was held in Rome, Italy, in October. The primary emphasis of the symposium was to

- 1) discuss late effects of the Chernobyl reactor accident;
- 2) explore the relationships between radioactive contamination and carcinogenesis;
- 3) review planning procedures for emergency response, such as civil protection, following severe reactor incidents and in medical assistance; and
- 4) stress the importance of providing satisfactory and reliable information to the public in cases of nuclear incidents.

Participating in this symposium on behalf of REAC/TS was Dr. Robert C. Ricks, REAC/TS director, who presented a lecture entitled "Planning for Civil Protection in Case of Nuclear Incidents." In addition to his lecture, Ricks, who had recently returned from assisting in the Brazilian accident,

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Brazil Accident *continued from page 1*

an IAEA fellow who studied at REAC/TS last year, had been flown to the scene of the accident to work with Olivera to assess the situation and initiate medical and health physics response and was, by the time of the phone conversation, serving as an advisor to the Brazilian Navy. Valverde indicated that some supplies for treating patients were needed, including bone marrow aspiration needles, the drug Prussian Blue for removing cesium from the bowel, and topical agents for treating local radiation injuries; REAC/TS provided these supplies.

The five-member international response team was assembled in Brazil three days after the call for assistance was placed to the IAEA. The team, consisting of Drs. Ricks and Lushbaugh, along with a biophysicist skilled in radiation dosimetry, a radiation environmentalist, and a Soviet hematologist who had helped treat patients after the Chernobyl disaster, complemented the highly skilled medical staff already at work on the cases.

For the next several days, both Brazilian physicians and the response team monitored patients and held regular staff meetings to evaluate progress in each case. Ricks and Lushbaugh advised Brazilian doctors on radiological monitoring and treatment for radiation skin injuries. They also advised the Brazilians on cytogenetic dosimetry procedures and standards for estimating the amount of radiation exposure for the patients.

Before leaving Brazil after a week-long stay, Ricks and Lushbaugh met with Dr. Alves, CNEN director, and Dr. Luis Arrieta, CNEN deputy director, and made some recommendations based on what had been learned from the experience. One recommendation involved modifying existing counting capabilities in the Nuclear Medicine Department at the Marcilio Dias Naval Hospital. Ricks and Lushbaugh also emphasized the importance of continuing environmental surveillance and clean-up operations to remove any remaining low-level contamination and a 10-year or longer follow-up period for persons contaminated who did not require hospitalization.

Another topic of discussion involved the importance of documenting the events of this accident and the treatments used. In a few days after the accident, the Brazilian response team had accumulated more experience with the use of Prussian Blue for systemic cesium decontamination than any other group in the world. Careful documentation of the treatment protocols and results will be invaluable in any future cesium accidents.

Finally, Ricks collected blood samples from seven patients at the Marcilio Dias Naval Hospital for cytogenetic dosimetry estimates at REAC/TS in Oak Ridge. Radiation-induced chromosome aberrations in cultured lymphocytes were evaluated under the direction of Dr. Gayle Littlefield. It was estimated that the minimum whole-body doses received by these persons ranged from 28 to greater than 430 rad. Four persons received more than 240 rad.

Drs. Ricks and Lushbaugh returned to Brazil in December, again at the request of the Brazilian government. They were accompanied on this trip by Dr. Erwin Hirsch of Boston City University Hospital. Hirsch, an expert in radiation burns and trauma surgery, complemented the REAC/TS staff members' abilities to advise the Brazilians during this visit, as three of the most severely injured patients were believed by the Brazilians to require surgical intervention for their radiation injuries.

According to Ricks, Dr. Olivera, who continued to manage patient care in Golanía, "had assembled an excellent team of physicians, nurses, health physicists, and technical support staff who were working with the 15 patients who remained hospitalized in Golanía.

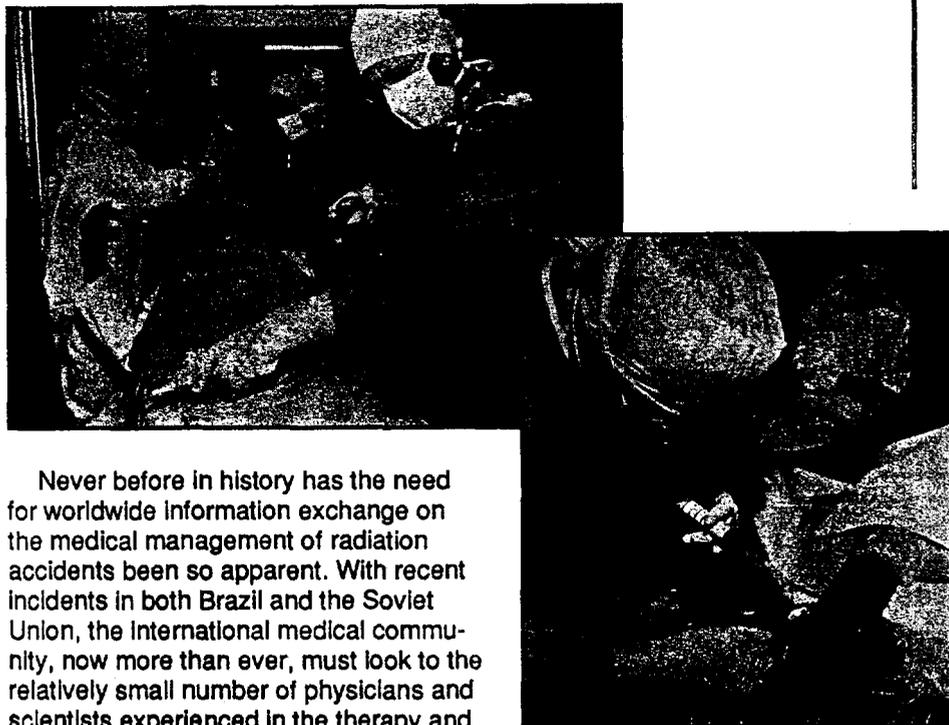
"In addition," reported Ricks, "complete whole-body counting capabilities for assessing internal cesium-137 burdens were in place." This had been

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one of REAC/TS' recommendations to the Brazilians in October.

One major purpose of the return visit was to assist Brazilian officials in establishing a medical surveillance program to assess the long-term health effects on persons exposed. In addition, with help from Dr. Nelson Valverde, Ricks and Lushbaugh conducted a short course on "Medical

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Never before in history has the need for worldwide information exchange on the medical management of radiation accidents been so apparent. With recent incidents in both Brazil and the Soviet Union, the international medical community, now more than ever, must look to the relatively small number of physicians and scientists experienced in the therapy and medical management of patients with radiation-induced injuries.

On October 20-22, 1988, REAC/TS will present

The Medical Basis for Radiation Accident Preparedness II

This second international conference is sponsored by ORAU and the U.S. Department of Energy. The conference will bring together scientists and physicians from around the world with firsthand experience and the latest information in the treatment and long-term follow-up of persons involved in radiation accidents and in planning medical responses to radiation emergencies that have the potential to involve large numbers of persons.

Since REAC/TS presented the first international conference in 1979, a number of serious accidents have indicated the continuing need to plan for medical management. During the conference, serious accident history and related follow-up; new approaches to diagnosis and therapy; and preparedness and planning will be reviewed. Emphasis will be directed to the accidents in Chernobyl, USSR, and Goiânia, Brazil. Conference proceedings will be published and available to order at the meeting. □

REAC/TS Announces International Conference

For more information about this conference and to obtain registration materials, contact:

REAC/TS International Conference

Oak Ridge Associated
Universities
P. O. Box 117
Oak Ridge, TN 37831
Attn: Linda Hackett
Registrar

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Rome Symposium

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shared information regarding steps taken by the Brazilian Nuclear Energy Commission to protect citizens and to mobilize medical/health physics support in the September 1987 Goiania accident. While in Rome, Ricks visited with Dr. Giuliano Quintarelli, director of the Division of Experimental Oncology at the INTR Institute, who indicated the need for radiation accident management training in Italy. Ricks assured Quintarelli that REAC/TS would be pleased to work with the Italians through the International Atomic Energy Agency and the World Health Organization to provide training in the area of medical management for radiation accidents. □

Brazil Accident continued from page 3

Planning and Care in Radiation Accidents" in Rio de Janeiro attended by 18 physicians, two nurses, and one health physicist. These course participants represented CNEN, FURNAS, and the City of Rio de Janeiro Fire Corp. The course, which had been scheduled before the Goiania accident, included a simulated radiation accident conducted at the ANGRA Reactor Site south of Rio. The drill, a first for most of the course participants, was video taped so that instructors and participants could critique the response during a review session after the exercise.

Finally, the REAC/TS staff members met with representatives of the Brazilian Institute of Radiation Protection and Dosimetry to discuss cytogenetic findings and the effectiveness of Prussian Blue. Differing preliminary cytogenetic dose estimates made in Brazil, in the United Kingdom, and in the United States at REAC/TS indicate the need to work together to enhance understanding of human radiosensitivity.

At the end of February, Ricks learned that only one patient remained hospitalized in Goiania. The others had been released as outpatients. REAC/TS has also learned that the Brazilian Navy plans to dedicate an issue of its monthly periodical to the naval involvement in the Goiania accident.

In March, 1988, Dr. Alvez reported that decontamination operations were concluded. More than 3,000 m³ of waste were removed to a temporary storage site about 20 km from Goiania. In addition, a revised estimate of 1266 ± 274 Ci for the source term was reported. The Brazilian CNEN estimates that less than 1 Ci of cesium-137 remains residually spread in the soil. A final radiometric evaluation of all areas was carried out following completion of the decontamination work. This evaluation indicated that the equivalent doses for dwellers living inside a 50 m radius around previously contaminated areas would be less than 300 mrem/yr.

Publications in the scholarly literature that result from the experiences gained from the response to the Brazil accident will add much to the body of knowledge on human radiobiology. In addition, the upcoming international conference, **The Medical Basis for Radiation Accident Preparedness II** (see page 3), will provide an opportunity for the medical community to share information learned from this accident that will aid in dealing effectively with any similar tragedies. □

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