



GRANTS:

1. *Doc. dr hab. A. Cebulka-Wasilewska*

Environmental Studies:

- a) PECO 10964 CIPDCT 925100 (Joint Research CEC Project)
- b) WEST/EAST Grant PECO ERB3510PL920811

Radiobiology:

- a) PECO 2992 CIPDCT 925008 (Joint Research CEC Project)
- b) ERBCIPDCT 930110 (Joint Research CEC Project)

2. *Dr B. Lazarska*

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OVERVIEW:

Year 1994 might be called the "Comet Year". It resembles the picture of DNA damage, seen in a fluorescent light under the microscope in a COMET assay. The brightest aspects of the year were: numerous scientific events partly reflected in the pages to follow, a strong will to maintain research standards equal to those of highly advanced partners in Europe, minds filled with new ideas and big hopes for modernization. There were also other features of this year reminding a comet: hopes fading fast because of hard financial circumstances, and a long tail behind created by the work still to be done.

We devoted year 1994 mainly to the activities concerning the following goals:

- a) fulfilling the requirements and expectations of CEC in the issues of three research projects,
- b) modernization of our methodology,
- c) participation in an effort to firm up future applications of neutrons and protons to cancer therapy.

Perceiving the research as our primary duty, we were very busy both in the environmental and radiobiology fields. We have successfully completed all parts of field research on the genotoxic damage caused by benzene related compounds and early markers of cancer diseases. The research was sponsored and supported by CEC. A part of the samples of biological material collected was transferred to the laboratory of BIBRA in Carshalton, UK, for further studies on presence of ras oncogene proteins. Cytogenetics studies on those samples are performed in our laboratory, and the first results of our measurements are presented here.

In the radiobiology field, our research involved two ongoing CEC projects affiliated to the CLINCT Programme. This programme is aiming at the application of fission neutrons to cancer therapy. We finished comparative studies on neutron efficiency to induce mutations and chromosomal damage. With the use of our best bioassays, gene mutations in TSH-assay and chromosome aberrations, we have established good dose-response curves for X-ray, and 5.6 MeV neutrons from our U-120 cyclotron. Our first attempt to compare experimentally the biological effectiveness of fission and fast neutrons resulted in a dose-response relationship for chromosome aberrations induced in human lymphocytes by neutrons from HFR JRC reactor in Petten (EC-NICE), the Netherlands. In cooperation with the Radiobiology Group from Petten we performed another irradiation exposure and now we are improving the statistics in cytogenetic measurements for dose-response curve for fission neutrons. We are still working on finding the formula for alteration of the repair process observed in case of gene mutations in TSH assay. We have

also paid a significant amount of time and effort in order to establish new methods for more accurate measurements of molecular and cellular damage caused by radiation and environmental agents. We are approaching that goal hoping that our new research tools could combine value, modernity and economy. Now we are almost sure that the "Comet assay" will at least partly fulfill our expectations in terms of detection of DNA damages. We hope to develop another method for cytogenetics studies. The third part of our effort concerned possible improvement in the applications of different radiation sources to clinical cancer therapy. We wish success to our colleagues from the Health Physics Laboratory who have attempted to obtain financial support to get a new cyclotron working. We are keen on doing our best to help them. In the meantime, we continued our work on the old U-120 performing irradiation of patients from the Oncological Centre in Cracow. Year 1994 was also very attractive in the sense of many interesting visits of important people to our Department. We were honoured to host Dr Diana Anderson from BIBRA International, Carshalton, UK. We hope that her visits will become a habit, of great value for both our friendship and programmes. We were also excited by the visits of Prof. S. Tano from JAERI, Japan and Dr Jim Kyu Kim from KAERI, South Korea. We are looking forward to continuing our collaboration with those groups. That could bode well for the years to come.

Doc. dr hab. Antonina Cebulska-Wasilewska

REPORTS ON RESEARCH:

Biomonitoring of Human Population Exposed to Petroleum Fuel with Total Consideration of Benzene Genotoxic Component

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A. Cebulska-Wasilewska, E. Kasper, L. Koziara*, B. Pałka, and A. Wierzewska

Radiation and Environmental Biology Department, INP, 31-342 Cracow,

*Refining Plant, Trzebinia.

The paper presents the preliminary data from CEC collaborative research programme CIPDCT 925100 aimed to investigate the relationship between the exposure to genotoxic chemicals and the induction of genetic damage in human cells and living organisms. The development, evaluation and application of biomonitoring procedures were planned for environment exposed to genotoxic substances that result from petrochemical combustion or processing. Blood sampling strategies were discussed and tested. Questionnaires considering health conditions, types of genotoxic risk and lifestyle have been correlated with interviews of other contractors in the project, and with the sociologists from the Cracow School of Economy. Two petroleum plants in central and southern parts of Poland that differ in the total amount of production (Table 1) were chosen for blood sampling of two groups exposed (Table 2: codes 1 and 2). The second plant is in the area close to the most polluted region, under the studies reported in Nature [1]. Two groups of unexposed controls (Table 2: codes 3 and 4) were taken:

a) from the region of southern Poland selected on the basis of low level of pollution (3), and low level of total cancer cases (4), and no reported exposures to benzene related compounds,