EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF. Once completed, the original report should be sent, together with 5 reduced (A4) copies, to the User Office.

In addition, please send a copy of your file as an e-mail attachment to reports@esrf.fr**,** using the number of your experiment to name your file. This will enable us to process your report for the ESRF Annual Report.

Reports accompanying requests for additional beam time

If your report is to support **a new proposal**, the orginal report form should be sent with the new proposal form, and a copy of your report should be attached to each copy of your proposal. The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

Postal address: User Office, ESRF, B.P. 220, F-38043 GRENOBLE Cedex, France
Street address: 6 rue Jules Horowitz, F-38043 GRENOBLE Cedex
Telephone: +33 (0)4 7688 2552; Fax: +33 (0)4 7688 2020; e-mail: useroff@esrf.fr

- bear in mind that the report will be reduced to 71% of its original size. A type-face such as "Times", 14 points, with a 1.5 line spacing between lines for the text, produces a report which can be read easily.

ESRF	**Experiment title:** *Photon Activation Therapy on cells cultures with intranuclear stable iodine or platinum: dose enhancement and DNA damages measurement produced by Auger effect induced by monochromatic photons of synchrotron radiation*	**Experiment number**: LS-1698
Beamline: ID17	**Date of experiment**: from: *11/07/2001 to 17/07/2001*	**Date of report**: 01/09/2001
Shifts:	**Local contact(s)**: Tropres Irène	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Corde Stéphanie, Equipe d'accueil RSRM, UJF et CHU Grenoble, France*

Balosso Jacques, Equipe d'accueil RSRM, UJF et CHU Grenoble, France*
Elleaume Hélène, Equipe d'accueil RSRM, UJF et CHU Grenoble, France*
Estève François, Equipe d'accueil RSRM, UJF et CHU Grenoble, France*
Le Bas Jean-François, Equipe d'accueil RSRM, UJF et CHU Grenoble, France
Charvet Anne-Marie, Equipe d'accueil RSRM, UJF et CHU Grenoble, France
Joubert Aurélie, Equipe d'accueil RSRM, ESRF ,UJF et CHU, Grenoble, France

Report:

Background

Dose enhancement in human radiotherapy is a proven way to improve tumor local control, but it is limited by healthy tissue tolerance. Continuing researches are done to improve tumor lethal damages with respect of surrounding tissues (drug sensitization; contrast mediated dose enhancement, …). Two approaches are particularly attractive, the use of high relative biological effectiveness ion beams and tumor targeted irradiation sources as classical brachytherapy or metabolic radiation therapy. The Photon Activation Therapy (PAT) is a combination of these two approaches: a selective excitation of high-Z compound fixed inside DNA tumor should allow radio-toxicity enhancement, thanks to the increase of local dose deposition. Actually, photon-stimulation of these heavy elements induces ejection of an internal electron by photoelectric effect. The following electronic rearrangement may lead to Auger electrons cascades. This phenomenon, predominant with light elements, occurs with

lower probabilities with high-Z atoms; nevertheless, energies needed for their resonant excitation are higher and consequently suitable for external radiotherapy. Because of their very short range, these Auger electrons could be very toxic for tumor cells, but only if they are released in the close vicinity of their DNA.
This experiment aimed at expose cultured cells to different agents chosen as being mildly or not toxic for cells. Actually, in previous studies (LS1392 and LS1698a) we suspected that the chemotherapy (CDDP) toxicity was to high to give chance to Auger effect to be seen with survival assay.

Material and methods

We planned to expose cultured cells to chloro-terpyridine-platinum (a non toxical platinum compound), IudR and Hexabrix (non toxical vascular iodinated contrast media). These set of compounds was choosen to allow comparison in-cell and out-cell radiation enhancement effect. A wide range of energies were tuned with the tomography monochromator, according to the different K-edges of the target atoms.

Results

In spite of a nice irradiation run, we loose this experimentation due to diffuse bacterial contamination of the biological material… Should be do again.