ESRF	**Experiment title:** Determination of chromium tissue and cell distributions using µ-SXRF imaging	**Experiment number**: ls-1552
Beamline: ID-21	**Date of experiment**: from: march 1st 2000 to: march 6th 2000	**Date of report**: August 28th 2000
Shifts: 15	**Local contact(s)**: Dr. Jean Susini	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

***ORTEGA Richard**, CNRS UMR 5084 - BP 120 Le Haut Vigneau 33175 Gradignan France
***SUSINI Jean**, ESRF - ID-21 - BP220 - Grenoble Cedex 09 - France
***BONNIN-MOSBAH Michelle**, Laboratoire Pierre Süe - CEA/CNRS - CE Saclay - 91191 Gif sur Yvette - France
***SALOME Murielle**, ESRF - ID-21 - BP220 - Grenoble Cedex 09 - France
***DEVES Guillaume**, CNRS UMR 5084 - BP 120 Le Haut Vigneau 33175 Gradignan France
KASPRZAK Kazimierz, Laboratory of Comparative Carcinogenesis - National Cancer Institute - Building 538 - Frederick - MD 21702 - USA

Report:

The specific aim of this experiment was to determine the tissue distribution of chromium in male reproductive tissue sections from mice exposed to 1 mmol/kg $CrCl_3$, using µ-SXRF imaging at ID-21 beamline.

Preconception exposure of male rodents to Cr(III) increases risk of tumors in offspring and a similar phenomenon is suspected in humans. The mechanisms leading to increased neoplasms in offspring after preconception exposure of parents are still unknown. Cr(III) is usually very poorly transferred across biological membranes and not considered as direct carcinogen. One objective of this experiment was to determine whether Cr(III) could penetrate within reproductive tissues of male mice exposed to $CrCl_3$ by intraperitoneal injection.

Using scanning synchrotron radiation X-ray microanalysis with a 1 µm x 3 µm beam at Cr absorption energy edge 6.13 keV, we were able to detect Cr in various compartments of the animal tissues (Fig 1 and 2). The results clearly shown that chromium was detected within the tunica albuginea, the envelope that supports the seminiferous tubules, and interestingly, within individual cells of the interstitial tissue inside the reproductive tissue. However, no chromium could be detected within the seminiferous tubules, where the spermatogonia occurs.

The chromium localization, into interstitial cells, in the close vicinity to seminiferous tubules suggest a distant, and indirect, toxic action of Cr(III) on reproductive cells. However, the diffusion of Cr, with time, into the neighboring seminiferous tubules is an other possible mechanism. In addition preliminary results on Cr intracellular distributions in cultured cancer cells exposed to Cr(VI) were obtained confirming the

suitability of µ-SXRF with ID-21 experimental setup for intracellular element mapping of carcinogenic metals (data not shown).

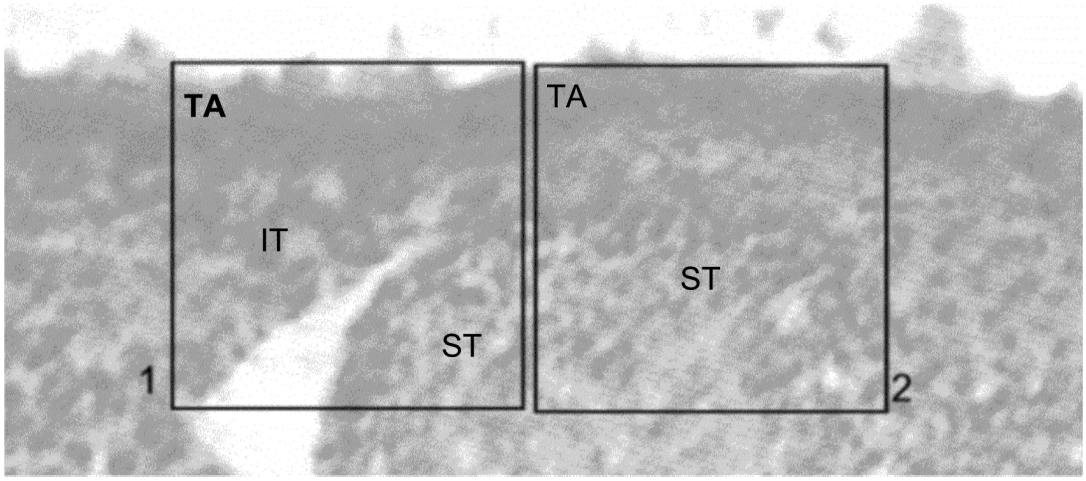

Fig. 1. Photomicrograph of a cross-section of seminiferous tubes from the testes of mice exposed to 1 mmol/kg $CrCl_3$ (intraperitoneal injection).
TA : Tunica Albuginea
IT : Interstitial Tissue
ST : Seminiferous Tube

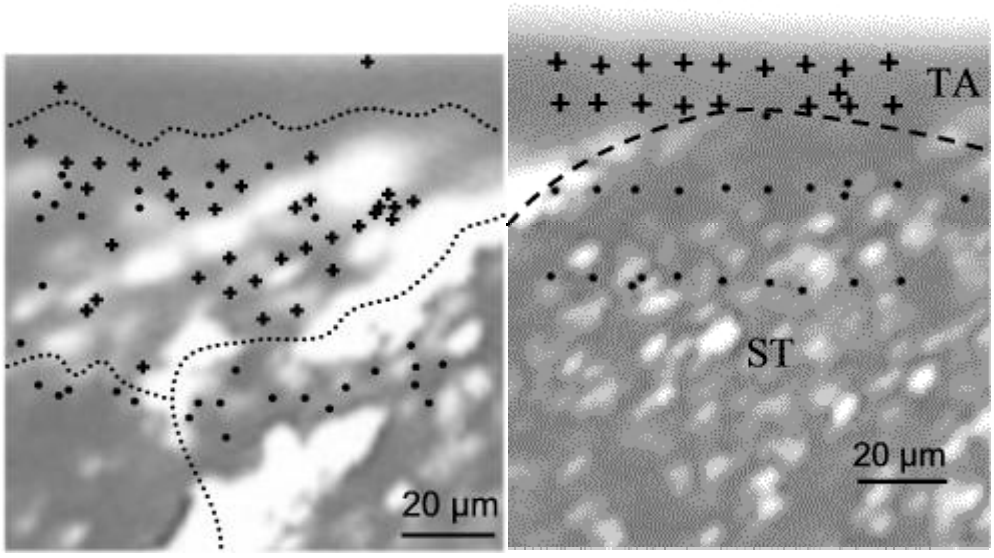

Fig. 2. Point analyses of zones 1 & 2, where chromium was detected (crosses), or not (dots). Note the presence of Cr only within the tunica albuginea and interstitial tissue, but not within the seminiferous tubes. Beam size: 1 µm x 3 µm. Energy: 6.13 keV.