

	Experiment title: Effect of synchrotron radiation on image quality and dose in mammography	Experiment number: LS-1543
Beamline BM05	Date of experiment: from: 02 feb 2000 to: 06 feb 2000	Date of report: 29 august 2000 <i>Received at ESRF:</i>
Shifts: 1 2	Local contact(s): A. Souvorov	
Names and affiliations of applicants (* indicates experimentalists): * R. Moeckli, Institut de Radiophysique Appliquée, Lausanne F.R. Verdun, IRA, Lausanne J.-F. Valley, IRA, Lausanne * S. Fiedler, ESRF, Grenoble C. Hessler, Service de Radiodiagnostic, CHUV, Lausanne J.-F. Le Bas, Unité IRM, CHU, Grenoble * M. Pachoud, IRA, Lausanne A.-M. Charvet, ESRF, Grenoble H. Elleaume, ESRF, Grenoble		

Objective comparison of image quality and dose between conventional and synchrotron radiation mammography

Raphaël Moeckli[†], Francis R. Verdun[†], Stefan Fiedler[‡], Marc Pachoud[†],
Pierre Schnyder[§] and Jean-François Valley[†]

[†]Institute of Applied Radiophysics, Grand-Pré 1, CH - 1007 Lausanne, Switzerland

[‡]European Synchrotron Radiation Facility, BP 220, F - 38043 Grenoble, France

[§]Department of Radiodiagnostic and Interventional Radiology, Centre Hospitalier Universitaire Vaudois,
CH - 1011 Lausanne, Switzerland

Abstract. The shape of the energy spectrum produced by an X-ray tube has a great importance in mammography. Many anode - filtration combinations have been proposed to get the most effective spectrum shape for the image quality - dose relationship. On the other hand, third generation synchrotrons like the European Synchrotron Radiation Facility in Grenoble are able to produce high flux of monoenergetic radiation. It is thus a powerful tool to study the effect of beam energy on image quality and dose in mammography.

An objective method was used to evaluate image quality and dose in mammography with synchrotron radiation and to compare them to standard conventional units. It was performed systematically in the energy range of interest for mammography through the evaluation of a global image quality index and through the measurement of the mean glandular dose. Compared to conventional mammography units, synchrotron radiation shows a great improvement of the image quality - dose relationship, which is due to the beam monochromaticity and to the high intrinsic collimation of the beam which allows to use a slit instead of an anti-scatter grid for the scatter rejection.

Paper accepted in Physics in Medicine and Biology