NATURAL FLUORESCENCE SPECTROSCOPY OF HUMAN BLOOD PLASMA IN THE DIAGNOSIS OF COLORECTAL CANCER: FEASIBILITY STUDY AND PRELIMINARY RESULTS

Manuela Lualdi[1], Ambrogio Colombo[1], Ermanno Leo[2], Daniele Morelli[3], Alberto Vannelli[2], Luigi Battaglia[2], Elia Poiasina[2], and Renato Marchesini[1]

[1]Medical Physics Unit, [2]Division of General Surgery B, and [3]Laboratory of Medicine, Fondazione IRCCS Istituto Nazionale Tumori, Milan, Italy

Aim and background: Fluorescence spectroscopy of biomolecules is considered a promising method to discriminate *in vivo* normal tissue from malignant tissue at various sites including breast, cervix, lung, and colon. However, only few studies have been reported on the feasibility of exploiting fluorescence spectroscopy of blood to characterize pathological changes usable in diagnostic oncology. In this study, the fluorescence characteristics of human blood plasma have been studied in the visible spectral range in an attempt to discriminate patients with colorectal cancer from subjects of a control population.

Patients and methods: The study involved 341 subjects, including 169 blood donors with no evidence of disease, 143 patients bearing colorectal adenocarcinomas (36 in the colon, 38 in the sigmoid colon and 69 in the rectum), 11 patients with local relapse, 10 patients with familial adenomatous polyposis and 8 with single adenomas. Blood samples were collected from all subjects and plasma fluorescence spectrum was analyzed using a conventional spectrofluorometer.

Results: The intensity of a fluorescence emission peak around 615-635 nm, which could reasonably be ascribed to endogenous porphyrins, was significantly different between patients bearing colorectal cancer and blood donors. The diagnostic capacity of the method was tested by ROC analysis, which resulted in an area under the curve of 0.72, close to that reported for the CEA test.

Conclusion: These results, although preliminary, suggest the potential of fluorescence measurements of blood plasma as an additional method for diagnostic application in colon cancer.

Key words: adenocarcinoma, colorectal tumors, endogenous porphyrins, fluorescence, tumor markers.