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EEC WORKSHOP
IDENTIFICATION AND CHARACTERIZATION OF BIOLOGICAL TISSUES BY NMR

Istituto Superiore di Sanità, Rome, 18 – 20 May 1983

Proceedings by **F. Podo** *(a)* and **J. S. Orr** *(b)*

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FOREWORD

NMR methodologies are demonstrating today their great potentiality in providing soft tissue information not always available by other technical approaches. For these reasons NMR is definitely attracting the interest of the biomedical Community, as also indicated by the conspicuous number of scientific Meetings and Symposia organized in these days in several Countries.

The Workshop on "Identification and Characterization of Biological Tissues by NMR", held at the Istituto Superiore di Sanità (May 18–20, 1983) on behalf of the EEC Working Group on Biomedical Engineering (SWG–BME) differed from many other Meetings on medical applications of NMR, since its objectives were not restricted to discussing diagnostic potentialities and clinical significance of the various approaches, but were also oriented towards the definition of a sound and realistic basis for a common European cooperation in this field of interest.

The Workshop was organized by Dr. F. Podo for our Institute, who prepared the Programme in collaboration with Prof. J. S. Orr (London), Prof. K. H. Schmidt (Tübingen) and Ir. A. L. Luiten (Eindhoven), and with the advice of Prof. J. P. Morucci (Toulouse) and Prof. A. Ermans (Bruxelles), members of the SWG–BME. The success of this Workshop, due to the wonderful collaborative efforts of all its partecipants has represented the basis for the subsequent preparation of a proposal for the performance of a Concerted Research Project on "Identification and Characterization of Biological Tissues by NMR", to be carried out under the auspices of the Commission of the European Economic Community. This programme, coordinated by Dr. F. Podo, will start in 1984.

It is a pleasent opportunity to express my best wishes for a fruitful work to the Project Leader, to the Project Management Group and to all the partecipants in this Concerted Action.

Prof. Francesco Pocchiari
Director General
Istituto Superiore di Sanità

Rome, December 15th, 1983

PREFACE

NMR has recently been revealed as offering a non–invasive *in vivo* approach for assessing physiological and pathological properties of tissues and organs. The technological developments of the last decade have opened new perspectives in the use of NMR methodologies in the field of tissue identification and characterization. This purpose is additional and supplementary to that of anatomical imaging, which is rapidly advancing. Tissue characterization has previously formed a subsidiary aspect of most other medical imaging methods, such as ultrasound reflection, CT X–ray scanning and molecular medicine, but its promise has not been fully realised in these methods.

NMR offers, in the complex proton relaxation properties of biological tissues, a unique and potentially highly powerful tool. A considerable body of evidence has suggested that NMR relaxation properties can be meaningful parameters for detecting and monitoring the existence of pathological conditions in tissues. However the present studies of proton NMR relaxation properties with a view to tissue discrimination have been almost entirely empirical. The difficulties encountered in comparing the results from various laboratories have also made it difficult for the clinical and biomedical potentialities of NMR to be properly expressed in the field of tissue characterization. Although NMR spectroscopy on samples *in vitro* has widely expanded understanding of molecular biochemistry, new approaches are needed for the non–invasive characterization of heterogeneous tissues *in vivo*.

The present issue of this Journal contains the Proceedings of the Workshop on *Identification and Characterization of Biological Tissues by NMR*, held at the Istituto Superiore di Sanità (May 18–20, 1983), on behalf of the Working Group on Biomedical Engineering of the Committee on Medical and Public Health Research, Commission of the European Economic Community.

The structure of the Workshop was inspired by the belief that practical solutions to the problems of tissue characterization by NMR could only be envisaged by joining together, in a collaborative working plan, multidisciplinary efforts and specific expertise in physics, engineering, biophysics, physical chemistry, biochemistry, physiology and medicine.

The Sessions and Working Panels of the Workshop consisted of general and specific contributions, followed by plenary discussions. The scientific papers were prepared in advance by the contributors, and circulated among the participants at the Meeting. The papers were accepted as submitted. The discussion, recorded at the Meeting, were transcribed by Ms. Ruth Dombey and then sent to the participants for revision. The resulting texts were later revised by the Editors, who tried their best to preserve the lively style of the debates and some of the idiomatic style of English used.

The Editors wish to express their deep gratitude to Prof. K. Schmidt and to Ir. A. Luiten for their collaboration in preparing the scientific programme of the Workshop: to Prof. A. Ermans, Prof. J. P. Morucci, Prof. A. Sargentini, members of the EEC BME Group and to Dr.W.Skupinsky of the EEC Commission for their many, precious suggestions; to Prof. F. Pocchiari, Director General of the Istituto Superiore di Sanità and Prof. G. D'Agnolo, Director of the Laboratory of Cell Biology for their constant encouragement and advice; to Prof. A. Cassone, the Editor-in-Chief of the *Annali dell' Istituto Superiore di Sanità* for having enthusiastically agreed to reserve a special issue of the Journal to the publication of these Proceedings.

The Editors are also pleased to acknowledge the collaboration of Dr. G. Carpinelli and Dr. G. Maddaluno in the editorial revision of some manuscripts; the invaluable and untiring assistance of Ms. Caterina Tripodi in the preparation of the Proceedings; and the skillful and experienced contribution by the staff members of the Editorial Section of the ISS Library to the completion of this publication.

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The Editors