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Closing Remarks

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Closing remarks

By P. Mansfield

Department of Physics, University of Nottingham, University Park, Nottingham NG7 2RD, U.K.

At this second Discussion Meeting on NMR imaging, we have seen a broad range of imaging and spectroscopic activities from imaging of solids, microscopic imaging, high-speed imaging and spectroscopic imaging. It has been 11 years since the first Discussion Meeting, and the object at this meeting was to review the recent developments and consider the future prospects.

We have all been amazed by the developments in solid imaging and the quality and resolution that can now be achieved by combining line narrowing methods with gradient pulsing or with gradient modulation. The future for solid imaging with its wide potential is assured.

Progress in free radical imaging using proton–electron double resonance was also briefly reviewed. Detection of natural levels of free radicals in biological tissue is some way off, but the progress with this technique is impressive.

Microscopy is still, in many ways, in its infancy. It is clearly more difficult than many of us originally thought. Problems like susceptibility artefact can be mitigated to some extent, but there still remains a major challenge in terms of spatial resolution and image contrast. Nevertheless, we have seen images with less than 5 μm resolution. Theoretical work presented showed us that 1 μm images are possible in principle. Diffusion has been identified as a major problem. This and susceptibility are the major challenges for the future.

Ultra-fast snapshot imaging has improved in quality and range of application to the point of clinical application both here in Britain and in the U.S.A. Emphasis now seems to be veering to physiological functional applications ranging from cardiac imaging in real time through gut motility studies to time-dependent contrast enhancement. Different approaches to ultra-fast imaging were presented and it remains to be seen which survives the rigours of clinical practice.

We have also been brought up to date with the developments in spectroscopic imaging. Chemical information complements morphological and physiological information by providing a direct and non-invasive means to study metabolic processes *in vivo*. We have seen applications of phosphorous, carbon and proton spectroscopy in the head, heart and liver. We have also heard about some of the problems. The major applications continue to be basic studies of disease processes. Emerging applications will include effects of therapies. Clinical application of spectroscopic imaging, as performed in NMR imaging, remains an open question, though in some specific areas like diabetes clinical imaging could be implemented.

On all fronts NMR imaging and spectroscopy continues to grow. The baby has now reached adolescence and is thriving well. The prognosis is good.

Finally, I know that everyone will want me to express our thanks to the Royal Society Hooke Committee for sponsoring this timely meeting and for providing the opportunity to bring together as a focus scientists and clinicians covering a range of

disciplines to share their ideas and experiences and to form a critical but friendly forum for discussion.

We are also grateful to the Staff and Officers of the Royal Society for the efficient and friendly way that they have made detailed arrangements.

Last, but by no means least, we are especially grateful to the speakers for their time and efforts in coming here, in some cases travelling very large distances, and to the audience who have attended in such good numbers and contributed to the stimulating discussion.

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