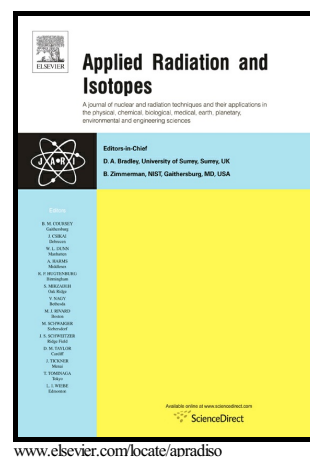


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Quantitative imaging, dosimetry and metrology;  
where do national metrology institutes fit in?

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**Quantitative imaging, dosimetry and metrology; where do national metrology institutes fit in?**AJ Fenwick<sup>1,2</sup>, JL Wevrett<sup>1,3,4</sup>, KM Ferreira<sup>1</sup>, AM Denis-Bacelar<sup>1</sup>, AP Robinson<sup>1,5,6</sup><sup>1</sup>NPL, Hampton Road, Teddington, UK<sup>2</sup>Cardiff University, Cardiff, UK<sup>3</sup>University of Surrey, Guildford, UK<sup>4</sup>Royal Surrey County Hospital, Guildford, UK<sup>5</sup>The University of Manchester, Manchester, UK<sup>6</sup>The Christie NHS Foundation Trust, Manchester, UK**Abstract**

In External Beam Radiotherapy, National Metrology Institutes (NMIs) play a critical role in the delivery of accurate absorbed doses to patients undergoing treatment. In contrast for nuclear medicine the role of the NMI is less clear and although significant work has been done in order to establish links for activity measurement, the calculation of administered absorbed doses is not traceable in the same manner as EBRT. Over recent decades the use of novel radiolabelled pharmaceuticals has increased dramatically. The limitation of secondary complications due to radiation damage to non-target tissue has historically been achieved by the use of activity escalation studies during clinical trials and this in turn has led to a chronic under dosing of the majority of patients. This paper looks to address the difficulties in combining clinical everyday practice with the grand challenges laid out by national metrology institutes to improve measurement capability in all walks of life. In the life sciences it can often be difficult to find the correct balance between pure research and practical solutions to measurement problems, and this paper is a discussion regarding these difficulties and how some NMIs have chosen to tackle these issues. The necessity of establishing strong links to underlying standards in the field of quantitative nuclear medicine imaging is highlighted. The difficulties and successes of current methods for providing traceability in nuclear medicine are discussed.

**1 Introduction**

One of the key roles of a National Metrology Institute (NMI) or a Designated Institute (DI, hereafter included in discussion of NMIs) is to provide a link between fundamental research and industrial applications for all forms of measurement. NMIs have a unique position providing access to both

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