

DOSE AND OPTIMISATION APPROACHES FOR NUCLEAR MEDICINE HYBRID SYSTEMS

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The ultimate goal of any type of medical imaging equipment is to obtain the best image quality while delivering the smallest radiation dose possible. The best image quality though, does not necessarily give the correct diagnosis for a given medical condition at the lowest possible dose to the patient. Additionally the vast number of alternative diagnostic modalities available today and their rapid evolution, make the choice of the most suitable modality for a particular medical condition very difficult, if dose to the patient is to be considered as a major constraint.

It is therefore very important to know the dose received by the patient from the different modalities to arrive at the same diagnostic result. This is especially important in Nuclear Medicine where the different modalities produce images of the metabolic function of the human body and they are more likely to arrive at the same diagnostic outcome.

In Nuclear Medicine a diagnostic procedure (for example myocardial perfusion) can be performed on a patient by a large combination of modalities (hybrid systems) and different radiopharmaceuticals.

At the end of the day one needs to know if the diagnostic value of the final image achieved by these combinations is different taking into account the dose received by the patient.

In order to answer the above question there is a lot of work to be done in evaluating these combinations using the same evaluation tools. These tools need to be able to combine the effects from the factors influencing the diagnostic value of the final image (modalities, radiopharmaceuticals and patient constitution) as well as the cost of purchase and maintenance of the modality and the facility in general.

This paper proposes a Dose/Benefit Analysis that takes into account the characteristics of the three main factors (modality, radiopharmaceutical, patient constitution) that can be used to evaluate the diagnostic value of the final image, produced by a Nuclear Medicine Hybrid modality, at a given dose to the patient. This will give the Utility Index (UI) for a particular Nuclear Medicine Procedure.

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