ref. 5) found a good correlation (in adults) between kidney depth measured by lateral views (at the completion of renography) and that measured by ultrasound. It is unfortunate that Maneval et al. (*1*) were not able to include renography studies as part of their protocol, as this would have provided useful data on the accuracy of renal depth measurement derived from lateral (^{99m}Tc-DTPA) images in children.

An important factor in this debate which was not discussed by Maneval et al. (*1*) is patient positioning. It is known that kidney depth in the sitting position can vary by a centimeter or more from that in the recumbent posture (*8*); the difference in renal depth being minimized by employing supine positioning (*6,9*). There are, however, physiologic reasons for preferring the sitting position, which explains why, for patients over 4 yr of age, opinion in the U.K. is divided on this issue (supine: 56% of centers, sitting: 32%, 'other': 12%) (*10*).

In summary, we agree that it is necessary to apply a depth correction when attempting to estimate *absolute* kidney function from gamma camera renography (in adults *and* children) and that, despite the limitations mentioned, lateral views (performed with the patient in the same posture as that used for renography) provide a more accurate estimate of kidney depth than currently available empirical formulae. It is important to appreciate, however, that there are numerous sources of error in the renographic estimation of absolute function and, for some of the methods, the *overall* error in the measurement of individual kidney GFR (or ERPF) may not be significantly reduced by the use of lateral views (c.f. formula) for kidney depth estimation (their ref. 1). In general, renographic methods for estimating absolute function may be more accurate in children then adults (*2*, their ref. 1).

For *routine* renography, we concur with other workers who have concluded that the error (in the estimation of relative function) introduced by not applying a correction for differences in depth of the left and right kidney is small enough to be ignored in most adults (*11,12*) and the vast majority of children (*13*, their ref. 15); the extra work involved in routine depth correction therefore being difficult to justify. A U.K. renography survey conducted in 1987 revealed that only 2 out of 34 (6%) centers routinely performed a depth correction when estimating relative renal function (*10*).

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REPLY: We would like to thank Drs. Cosgriff and Brown for their comments on the recent publication and would like to respond to the two specific issues raised. We feel that the initial sentences of our introduction sufficiently define the context of this investigation and agree fully that the concluding sentence should not be misinterpreted to apply to the evaluation of relative renal function. Secondly, it was neither our intent nor was it possible to critically assess the accuracy of lateral measures of renal depth with the gamma camera in this retrospective study. However, we do feel that the arguments put forth in our discussion provide motivation for including lateral scintigraphy after renography for the clinical assessment of absolute renal function (e.g., GFR) in children.

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Noninvasive Imaging of Giant Hematomas

TO THE EDITOR: The paper by Lisbona et al. (*1*) on scintigraphic and ultrasound features of giant liver hemangiomas was of great interest to us. We agree with the authors that definite, noninvasive imaging of giant hemangiomas is important to avoid angiography, biopsy, or exploration laparotomy when excluding primary or metastatic malignancy. In our recent publication (*2*) in which we described 56 hemangiomas diagnosed by ^{99m}Tc-red blood cell (RBC) SPECT, we identified five cases of giant hemangiomas, which we describe below.

Our hemangiomas ranged in size between 80 and 145 mm in diameter; the ultrasound appearance was in three cases a hyperechogenic mass, in two cases a mixed hyper- and hypoechogenic mass, all sharply marginated. Bolus infusion CT was only possible in three cases; the hypodense lesions (precontrast CT) showed an initially peripheral enhancement followed by centripetal fill-in. Moreover, bolus infusion was

contraindicated because of hyperthyroid conditions, an aspect which deserves particular attention in endemic goiter on account of unknown primary thyroid autonomies (*3*). Technetium-99m-RBC scintigraphy showed an uniform fill-in in four lesions; in the largest one there was also a persisting cool center at 20 min, but likewise complete fill-in by 60 min.

Other than Grant et al. (*4*), who do not attribute any significance to color doppler sonography in the diagnosis of liver hemangiomas, Choi et al. (*5*) believe that magnetic resonance imaging might be useful in the identification of giant hemangioma architecture. Nevertheless, ^{99m}Tc-RBC scintigraphy is still the method of choice for the diagnosis of these tumors; SPECT technique does not provide additional information for tumors of this size.

As the authors pointed out, a conservative strategy should be pursued, since large space-occupying lesions of malignant origin clearly tend to be aggressive in their biological behavior.

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SELF-STUDY TEST

Radiobiology and Radiation Protection

ANSWERS

(continued from p. 1551)

ITEM 1: Stochastic Effects

ANSWER **D**

Stochastic effects are those in which the probability of occurrence of an effect, rather than the severity of the effect, is a function of dose. No threshold is postulated for stochastic effects–it is assumed that any dose, no matter how small, may increase risk. *Nonstochastic effects* of radiation, such as skin epilation, erythema, cataracts, and impaired fertility have a clear threshold below which no effects are seen. Although genetic effects and carcinogenesis are regarded as stochastic effects, only carcinogenesis shows a relationship to age.

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ITEM 2: Contribution of Background Radiation to "Spontaneous" Cancers and Genetic Mutations

ANSWER **C**

Some proportion of mutant alleles and human cancers are surely induced by background radiation. The BEIR III Committee adopted a range of 0.004–0.02 for the relative mutation risk, which implies that 1%–6% of the mutations responsible for disorders in the human population result from background radiation. The Libassi Report (the Interagency Task Force on the Health Effects of Ionizing Radiation) estimated that natural background radiation may account for 1% of the total cancer incidence.

ITEM 3: BEIR-III

ANSWER **C**

The BEIR-1980 report was intended to update the report issued by the Committee in 1972, and concentrates primarily on the long-term somatic and genetic risks to people exposed to ionizing radiation at low doses—the principal concern to large population groups. The major aspect of the 1980 report is that, wherever possible, the Committee used a *linear–quadratic* dose–response model, which they felt to be most consistent with the available epidemiologic and radiobiologic data for estimating the cancer risk from low doses of low-LET radiation. The risk estimates of human cancer induction in the BEIR-1980 report are reduced by about one-half from the BEIR-1972 estimates for low-level, low-LET radiation. The more recent BEIR report was initially released in 1979, but controversy followed, because the report appeared to some committee members to favor one method of risk estimation. A subcommittee eventually produced cancer risk estimates that were accepted by all but two of the committee members. The compromise in the BEIR report published in 1980 incorporates a range of risk estimates determined with the linear–quadratic as the preferred model; these risk estimates are intermediate between those of the linear and pure quadratic models, with the latter two defining the upper and lower limits of the estimates, respectively.

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Note: For further in-depth information, please refer to the Syllabus pages included at the beginning of *Nuclear Medicine Self-Study Program I: Part I*.