Dementia scale. They did not reveal any symptom of aphasia, hemiparesis or other dyskinesia; only memory problem and/or disorientation were present. In such patients, we could not find any asymmetric reduction, and the frontal reduction in cerebral blood flow was not observed.

2. We were previously unaware of the abstracts and paper. However, the paper does not discuss the differentiation of the patterns of regional reduction in cerebral blood flow among Alzheimer's disease, senile dementia Alzheimer type and multi infarct dementia. Also, our report appears original in the correlation between reduction in regional cerebral blood flow and degree of dementia in each demented group.

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Radiation Exposure by Technitium-99m MAG_3

TO THE EDITOR: According to Taylor and colleagues (*1*) the radiation exposure by technetium-99m (^{99m}Tc) MAG_3 for the kidneys of normal volunteers is 0.018 rad/mCi; the dosimetry calculations have been only briefly described (*2*). This value is 50% higher than the former given by this same team (0.012 rad/mCi) (*3*), that was not discussed in this paper.

Mallinckrodt Diagnostica (Netherlands) B.V., the commercial producer of [Tc]MAG_3 for Europe, indicates in the European Registration File an organ dose for the kidneys of 0.062 rad/mCi, that means the 3.4-fold (*1*) or 5.2-fold (*3*) value (all calculations followed standard MIRD methods). Surprisingly, there are no major differences between the analogous results for iodine-123 (^{123}I) and iodine-131 (^{131}I) orthoiodohippurate (OIH), respectively, by Taylor et al. and the European reference values (*4*). In comparison with [^{123}I]OIH (0.020 rad/mCi) (*4*) Taylor et al. found significantly lower while Mallinckrodt found distinctly higher values for [^{99m}Tc]MAG_3. These differences are considerable and should be proved by more related measurements with detailed information about technique and methods of calculation.

Our theoretic estimate showed the following results: the effective half-lives of the radiopharmaceuticals mentioned above at normal renal function are approximately equivalent (*1,5*) and the absorbed energy fraction of the gamma radiation is nearly the same for both nuclides. Furthermore, the part of nonpenetrating conversion electrons additionally generated during decay is comparable, too. But because of the essentially higher blood concentration of [^{99m}Tc]MAG_3 compared with [^{123}I]OIH (*1,5*), the activity level of ^{99m}Tc in the kidneys is higher than of ^{123}I resulting in a higher organ exposure by [^{99m}Tc]MAG_3 in normal functioning kidneys. In severely reduced renal function the radiation exposure may be less by [^{99m}Tc]MAG_3 than by [^{123}I]OIH because of the distinctly shorter physical half-life of ^{99m}Tc compared with ^{123}I.

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REPLY: We appreciate Dr. Bubeck's letter regarding radiation dosimetry and especially his request for "more related measurements with detailed information about technique and methods of calculation."

Dr. Bubeck's letter focuses on the estimated dose to the kidneys from [^{99m}Tc]MAG_3 and notes that our estimates (*1, 3*) are one-third to one-fifth the estimate reported by Mallinckrodt Diagnostica (Netherlands) B.V. in the "European Registration File." Our lower estimate was based on the kinetics of high performance liquid chromatography purified [^{99m}Tc]MAG_3 while the higher estimate was based on the kit formulation. The kinetics are slightly different (*2,4*). Probably more important than the kinetic differences are differences in the assumptions and the methods of calculation used in the two studies. These are briefly outlined below.

The MIRD method is quite universally adopted for dosimetry calculations and is probably applied correctly by all parties. The MIRD method requires, however, an estimate of the amount of activity in the source organ as a function of time and herein lies the challenge and potentially large discrepancies. When estimating the dose to the kidney, the radiation to the kidney from the bladder and other organs is practically insignificant compared to the radiation to the kidney from the kidney itself; for this reason we have to focus on the amount of activity in the kidney as a function of time. The estimates we reported (*1–4*) were based on Anger camera images acquired posteriorly over the kidneys and stored in a mini-computer at 20 sec per frame for 20 min. The activity in both kidneys as a function of time was estimated from regions of interest over the kidneys. The system was calibrated by imaging a kidney phantom (Alderson Research Laboratories) in a water bath with the center of the phantom at depths ranging from 5 to 8 cm. The calibration factor for each volunteer depended on his own kidney depth as estimated by the formulas of Tonnesen et al. (*5*). We note that the formulas of Tonnesen were supported by Tanasescu et al. (*6*) by comparison to ultrasound. We feel that this method of estimating the activity in the kidney is probably accurate to within 15%, especially when averaged over ten volunteers (as was done for our dose estimation). The weakness of this method is that Anger camera images were not extended beyond 20 min and the longer term activity in the kidney can be significant. In