Safety of ^{18}F-DOPA Injection for PET of Carcinoid Tumor

TO THE EDITOR: We read with great interest the case report of Koopmans et al. (*1*) concerning the occurrence of a carcinoid crisis after injection of 6-fluoro-(^{18}F)-dihydroxyphenylanine (^{18}F-DOPA) in a patient referred for ^{18}F-DOPA PET of a metastatic carcinoid. We have been using ^{18}F-DOPA for 4 y and have performed 170 ^{18}F-DOPA PET examinations for the detection of neuroendocrine tumors, the majority being carcinoid tumors. No similar cases were observed in our PET center. A single, minor adverse effect was reported by a few patients: a light and transient burning sensation at the injection site, probably due to the acidity of the radiopharmaceutical (pH 4.5–5, controlled before each administration).

Apart from a special sensitivity of this precise patient of Koopmans et al. (*1*) to ^{18}F-DOPA, what factors might explain the lack of any detectable agonist effect or of any induction of a carcinoid crisis in our patients, in particular those referred because of a carcinoid tumor?

One hour before ^{18}F-DOPA injection, the reported patient received 150 mg of carbidopa orally to block the aromatic amino acid decarboxylase enzyme. We have not used oral premedication with the decarboxylase inhibitor carbidopa. Published studies suggest that its use before PET is far less common for neuroendocrine tumors than for brain imaging. It is nevertheless unlikely that carbidopa may have favored a carcinoid crisis, because it blocks the metabolism of ^{18}F-DOPA into active amines.

In the reported patient, 8 mL of ^{18}F-DOPA solution were administered intravenously in a few seconds. We never use direct intravenous administration of PET radiopharmaceuticals but always inject in an infusion tube connected to saline to minimize the risk of paravenous deposition, which would lead to a large local radiation dose. Furthermore, we inject the ^{18}F-DOPA, in a similar volume of around 8 mL, slowly over 1 min to diminish the burning sensation at the injection site experienced by some patients.

One important parameter to consider is the difference in specific activity between the ^{18}F-DOPA preparations. In the case report, its value was 6 GBq/mmol, whereas for IASOdopa (Iason), the preparation that we use, its value must be at least 30 GBq/mmol at calibration—that is, 5-fold greater. F_2-^{18}F gas used for the electrophilic reaction can be obtained either by bombardment of neon with deuterons or by bombardment of ^{18}O-gas with protons. The producer of IASOdopa uses the ^{18}O-gas bombardment method, which ensures much more efficient yields and results in a higher specific activity for ^{18}F-DOPA. However, we inject 5 MBq/kg of body weight—that is, 350 MBq of ^{18}F-DOPA for a 70-kg adult patient—on average 4 h after the calibration time, resulting in a mass of DOPA as carrier that is of the same order of magnitude as that injected in the reported patient.

In conclusion, we testify that ^{18}F-DOPA PET with a slow injection of the radiopharmaceutical through an infusion catheter was safe in 170 cases of endocrine tumors. The presence of DOPA as a carrier in the injection should be kept in mind, and it seems important to use a preparation with a high specific activity, particularly when injections are to be given to patients several hours after preparation. However, the amount of carrier was not greater in the patient reported by Koopmans et al. (*1*) than in our patients.

REFERENCE

1. Koopmans KP, Brouwers AH, De Hooge MN, et al. Carcinoid crisis after injection of 6-^{18}F-fluorodihydroxyphenyalanine in a patient with metastatic carcinoid. *J Nucl Med.* 2005;46:1240–1243.

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REPLY: We thank our colleagues Nataf et al. for their comments. The experience mentioned in their letter seems to confirm our opinion that the rapid injection together with the relatively low specific activity of the ^{18}F-DOPA tracer as produced by us generated a first-pass bolus effect and might have had pharmacologic activity. The catecholamine nature of this tracer then presumably caused massive release of serotonin from the metastases. Since this incident, we have performed around 100 whole-body scans using a slow injection over 3 min with saline and have not witnessed any reactions.

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CT Attenuation Correction Is Clinically Superior to Supine–Prone MPS

TO THE EDITOR: We read with great interest the paper by Nishina et al. (*1*). The authors concluded from their study that, compared with supine MPS alone, combined supine–prone quantification significantly improves the specificity of myocardial perfusion scintigraphy (MPS) in the identification of obstructive coronary artery disease. Supine acquisition is known to result in diaphragmatic attenuation of inferior wall counts. In our limited experience using the combined supine–prone imaging method, we achieved results similar to those of Nishina et al. indicating that the specificity of MPS for perfusion abnormalities in the posterior wall of the myocardium can be improved. However, we emphasize that in many patients with "true" perfusion abnormalities, cardiac symptoms develop during the stress procedure and—not only in these patients but also in obese patients—the additional prone positioning may be quite inconvenient. Therefore, with the growing number of new devices enabling attenuation correction by means of CT, we suggest that combined SPECT/CT be preferred to the combined supine–prone protocol to improve the specificity of MPS in routine clinical workups (*2–4*).