Al^{18}F: A New Standard for Radiofluorination

TO THE EDITOR: ^{18}F is the most common radionuclide used in PET imaging, but its application via a rapid, simple, easily accessible labeling procedure has been challenging. We congratulate Wan et al. for their recent article appearing online on April 3 and in the printed journal in May (*1*) on the clinical validation of the Al^{18}F labeling method involving an RGD peptide labeled essentially by applying the facile, 1-step method first reported in 2009 (*2*). Subsequent improvements also have been described (*3–5*), including the first report of a kit formulation of a peptide for additional simplification and enhancement of the Al^{18}F labeling procedure (*3*). It is gratifying to read the utility of this procedure applied to a specific RGD peptide, alfatide, for successful imaging of lung cancer, confirming the Al^{18}F labeling of RGD described recently by the National Institutes of Health group, as well as Liu et al. in 2011 (*6*), Shetty et al. in 2012 (*7*), and Dijkgraaf et al. in 2013 (*8*). This technique now can be extended to other peptides for simple radiofluorination, not requiring an on-site cyclotron by using sodium fluoride commonly available for bone imaging (*3*). By translation of the Al^{18}F procedure into clinical practice, the extensive research and development conducted—which has been reviewed elsewhere (*9*)—has now been validated for the first time in humans.

DISCLOSURE

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REFERENCES

1. Wan W, Guo N, Pan D, et al. First experience of ^{18}F-alfatide in lung cancer patients using a new lyophilized kit for rapid radiofluorination. *J Nucl Med.* 2013;54:691–698.
2. McBride WJ, Sharkey RM, Karacay H, et al. A novel method of ^{18}F radiolabeling for PET. *J Nucl Med.* 2009;50:991–998.
3. McBride WJ, D'Souza CA, Karacay H, Sharkey RM, Goldenberg DM. New lyophilized kit for rapid radiofluorination of peptides. *Bioconjug Chem.* 2012;23:538–547.
4. McBride WJ, D'Souza CA, Sharkey RM, et al. Improved ^{18}F labeling of peptides with a fluoride-aluminum-chelate complex. *Bioconjug Chem.* 2010;21:1331–1340.
5. D'Souza CA, McBride WJ, Sharkey RM, Todaro LJ, Goldenberg DM. High-yielding aqueous ^{18}F-labeling of peptides via Al^{18}F chelation. *Bioconjug Chem.* 2011;22:1793–1803.
6. Liu S, Liu H, Jiang H, Xu Y, Zhang H, Cheng Z. One-step radiosynthesis of ^{18}F-AlF-NOTA-RGD2 for tumor angiogenesis PET imaging. *Eur J Nucl Med Mol Imaging.* 2011;38:1732–1741.
7. Shetty D, Jeong DS, Kim YJ, et al. Development of a bifunctional chelating agent containing isothiocyanate residue for one step F-18 labeling of peptides and applications for RGD labeling. *Bioorg Med Chem.* 2012;20:5941–5947.
8. Dijkgraaf I, Terry SYA, McBride WJ, et al. Imaging integrin alpha-v-beta-3 expression in tumors with an ^{18}F-labeled dimeric RGD peptide. *Contrast Media Mol Imaging.* 2013;8:238–245.
9. McBride WJ, Sharkey RM, Goldenberg DM. Radiofluorination using aluminum-fluoride (Al^{18}F). *EJNMMI Res.* May 8, 2013 [Epub ahead of print].

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Addendum to the Editorial "Joint Guidance on Peptide Receptor Radionuclide Therapy in Neuroendocrine Tumors"

TO THE READERSHIP: The purpose of the editorial in the May issue (*1*) was to bring to the attention of the readership a guidance document written collaboratively by 3 organizations, including the Society of Nuclear Medicine and Molecular Imaging (*2*). The decision to publish this document in the *European Journal of Nuclear Medicine and Molecular Imaging* was made collaboratively by the 3 organizations, as was the decision to publish the editorial in *The Journal of Nuclear Medicine.*

Incidentally, we described clinical trials with these agents that are getting under way in the United States. We overlooked mentioning the availability of 2 ongoing Food and Drug Administration–authorized investigational new drug (IND) trials on high-activity ^{111}In-octreotide (IND no. 72,037) (*3,4*) and ^{177}Lu-octreotate (IND no. 78,256) peptide receptor radionuclide therapies in the United States. These ongoing trials are available at the Excel Diagnostics and Nuclear Oncology Center in Houston, Texas.

REFERENCES

1. Delbeke D, Graham MM. Joint guidance on peptide receptor radionuclide therapy in neuroendocrine tumors [editorial]. *J Nucl Med.* 2013;54:663.
2. Zaknun JJ, Bodei L, Mueller-Brand J, et al. The joint IAEA, EANM, and SNMMI practical guidance on peptide receptor radionuclide therapy (PRRNT) in neuroendocrine tumors. *Eur J Nucl Med Mol Imaging.* 2013;40:800–816.
3. Delpassand ES, Sims-Mourtada J, Saso H, et al. Safety and efficacy of radionuclide therapy with high-activity In-111 pentetreotide in patients with progressive neuroendocrine tumors. *Cancer Biother Radiopharm.* 2008;23:292–300.
4. Delpassand ES, Samarghandi A, Mourtada JS, et al. Long-term survival, toxicity profile, and role of F-18 FDG PET/CT scan in patients with progressive neuroendocrine tumors following peptide receptor radionuclide therapy with high activity In-111 pentetreotide. *Theranostics.* 2012;2:472–480.

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