DISCUSSION

Methods developed to separate ^{99m}Tc from ^{99}Mo were recently reviewed by Dash et al. (*12*). In this study, we showed that ChemMatrix resins were efficient at selectively trapping ^{99m}Tc without retaining molybdenum in the presence of 4N NaOH, with quantitative elution using water. The overall $Na^{99m}TcO_4$ purification was implemented using a compact commercial automated synthesis system designed for use with disposable kits. We achieved high trapping efficiency with reproducible results using cyclotron-produced ^{99m}Tc. It should be noted that as the counts in the waste solution were not corrected for the presence of isotope contaminants that are known to occur with cyclotron-produced technetium (such as ^{99}Mo and ^{95}Nb) and were effectively separated from ^{99m}Tc, the recovery percentage of ^{99m}Tc was likely slightly underestimated. Because of the experimental design using cyclotron-produced pertechnetate, we did not evaluate the fraction of molybdenum recovered in the waste vial after technetium extraction by the ChemMatrix resin. Although molybdenum is not retained in high-pH, high-salt solutions by biphasic exchange chromatography, the determination of precise recovery yields will require further studies by testing this system with low-specific-activity ^{99}Mo solutions that are quantified before and after purification.

The entire process is amenable to meeting good manufacturing practice–compliant production. This method is applicable for separation of $^{99m}TcO_4^-$ from any solution containing excess molybdate ions and should be suitable for use with low-specific-activity ^{99}Mo, with minor modifications to recirculate the ^{99}Mo solution for daily reuse.

CONCLUSION

Cross-linked PEG beads were highly effective at separating and purifying ^{99m}Tc from low-specific-activity molybdate solutions, with quantitative trapping and elution of ^{99m}Tc. ^{99m}Tc-pertechnetate was purified in high yields using a simple disposable kit system.

DISCLOSURE

The costs of publication of this article were defrayed in part by the payment of page charges. Therefore, and solely to indicate this fact, this article is hereby marked "advertisement" in accordance with 18 USC section 1734. This work was supported by the Natural Sciences and Engineering Research Council, the Canadian Institutes of Health Research, and Natural Resources Canada. A provisional application for a patent was filed for some of the material presented in this article. No other potential conflict of interest relevant to this article was reported.

REFERENCES

1. Asif M, Mushtaq A. Evaluation of highly loaded low specific activity Mo-99 on alumina column as Tc-99m generator. *J Radioanal Nucl Chem.* 2010;284:439–442.
2. Chattopadhyay S, Das SS, Das MK, Goomer NC. Recovery of ^{99m}Tc from $Na_2[^{99}Mo]MoO_4$ solution obtained from reactor-produced (n,gamma) ^{99}Mo using a tiny Dowex-1 column in tandem with a small alumina column. *Appl Radiat Isot.* 2008;66:1814–1817.
3. Beaver JE, Hupf HB. Production of ^{99m}Tc on a medical cyclotron: a feasibility study. *J Nucl Med.* 1971;12:739–741.
4. Pillai MR, Dash A, Knapp FF Jr. Sustained availability of ^{99m}Tc: possible paths forward. *J Nucl Med.* 2013;54:313–323.
5. Rogers RD, Zhang J. Effects of increasing polymer hydrophobicity on distribution ratios of TcO_4^- in polyethylene/poly(propylene glycol)-based aqueous biphasic systems. *J Chromatogr B Biomed Appl.* 1996;680:231–236.
6. McAlister DR, Philip Horwitz E. Automated two column generator systems for medical radionuclides. *Appl Radiat Isot.* 2009;67:1985–1991.
7. Morley TJ, Dodd M, Gagnon K, et al. An automated module for the separation and purification of cyclotron-produced $^{99m}TcO_4$. *Nucl Med Biol.* 2012;39:551–559.
8. García-Martin F, Quintanar-Audelo M, Garcia-Ramos Y, et al. ChemMatrix, a poly(ethylene glycol)-based support for the solid-phase synthesis of complex peptides. *J Comb Chem.* 2006;8:213–220.
9. Huddleston J, Griffin S, Zhang J, Willauer H, Rogers R. Metal ion separations in aqueous biphasic systems and with ABEC resins. In: Hatti-Kaul R, ed. *Aqueous Two-Phase Systems: Methods and Protocols.* Totowa, NJ: Humana Press; 2000:77–94.
10. Bénard F, Buckley KR, Ruth TJ, et al. Implementation of multi-curie production of ^{99m}Tc by conventional medical cyclotrons. *J Nucl Med.* 2014;55:1017–1022.
11. Celler A, Hou X, Benard F, Ruth T. Theoretical modeling of yields for proton-induced reactions on natural and enriched molybdenum targets. *Phys Med Biol.* 2011;56:5469–5484.
12. Dash A, Knapp FF Jr, Pillai MR. ^{99}Mo/^{99m}Tc separation: an assessment of technology options. *Nucl Med Biol.* 2013;40:167–176.

Erratum

In the article "Preclinical Evaluation of 3-^{18}F-Fluoro-2,2-Dimethylpropionic Acid as an Imaging Agent for Tumor Detection," by Witney et al. (*J Nucl Med*. 2014;55:1506–1512), reference to part D of Figure 1 is missing from the legend. The legend for part D is as follows: "(D) Effect of exogenous ^{19}F-FPIA and ^{19}F-FAC on intracellular metabolite concentrations of acyl-carnitine esters as analyzed by liquid chromatography–mass spectrometry ($n = 4$)." We regret the error.