Solid phase approach for the radioiodination of organotin precursors for nuclear medicine applications.

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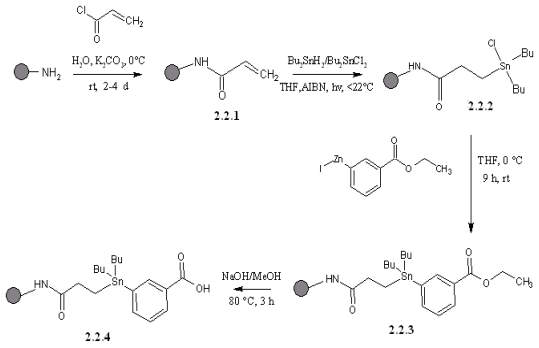
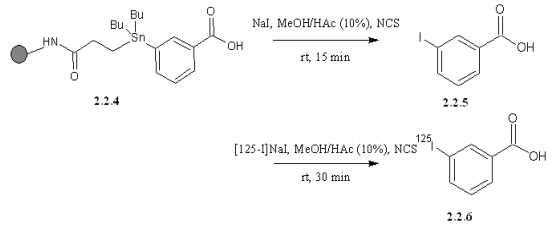
Objectives: Organotin compounds are popular as precursors for the electrophilic radioiodination and radiofluorination of aromatic compounds due to their stability in long-term storage combined with the high yields of radiolabeled product obtained. However, for nuclear medicine applications, a major drawback in using these precursors is the difficulty in fully removing the highly toxic organotin from the radiolabeled product.



Scheme 1. *Synthesis of a solid phase supported labeling precursor.*

In this study we investigated a solid phase route (scheme 1) for producing radioiodinated aromatic derivatives in which the organotin leaving group is tethered to a resin support, thus facilitating its separation from the final product (Scheme 2).



Scheme 2. *Solid phase supported iodination and corresponding ^{125}I-labeling.*

As solid support a novel totally PEG (polyethylene glycol) based resin was used with a high stability and very good swelling properties in aqueous solutions.

Methods: Tributyltin chloride in which the tin was bound to a resin support via one of the alkyl groups was prepared.
For a model compound to test radiolabeling conditions, the resin was used to prepare resin-bound tributyltin methyl benzoate. This was prepared via transmetalation and a subsequent transesterification step from a commercially available zinc precursor.

Results: Exposure of the resin-bound compound to electrophilic radioiodine (^{125}I) in the presence of an oxidant liberated free radiolabeled methyl [^{125}I]iodobenzoate in approximately 55% radiochemical yield. HPLC analysis of the released product indicated no evidence of co-release of the resin-bound organotin precursor.

Conclusions: Resin-bound organotin pre-cursor in which the compound to be labeled is tethered to the support via the tin leaving group can be used to produce radioiodine-labeled aromatic compounds in a single step and with high specific activity. This approach is thus expected to bypass the need for HPLC purification steps to remove toxic unreacted organotin compounds from the radiolabeled product prior to administration to patients.

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