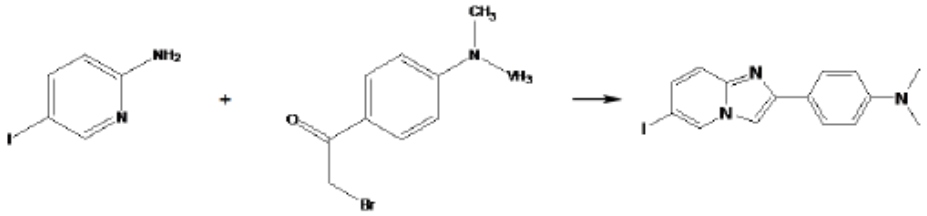
田育彰 教授

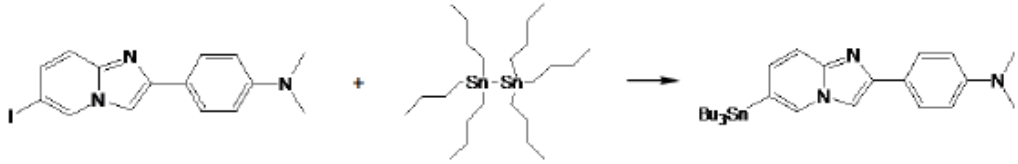
健康科學學院/醫學影像暨放射學系

本研究以碘原法（Iodogen method）將 IMPY（2-(4'-dimethylaminophenyl)-6-iodo-imidazo[1,2-a]pyridine）高效率標記上放射性碘 ^{125}I，達到 96.52% 的放射化學產率並展現優異穩定性，證明此方法為最佳標記策略。由起始物合成 IMPY 借由 Sn 取代形成中間產物 SnMPY，再將同位素碘標誌成為 ^{125}I-IMPY。研究進一步探討 ^{125}I-IMPY 於神經母細胞瘤（SH-SY5Y）中的追蹤與治療潛力，結果顯示其細胞攝取率顯著高於正常細胞（HaCaT），且隨劑量增加，神經母細胞瘤細胞活力顯著下降、細胞凋亡比例提升，並伴隨 DNA 損傷標誌 γ-H2AX 表現上升。綜合以上，^{125}I-IMPY 不僅具備優異的腫瘤追蹤能力，也展現放射治療效應，具有成為神經母細胞瘤潛在 theranostic（診療合一）放射性藥物的發展價值。

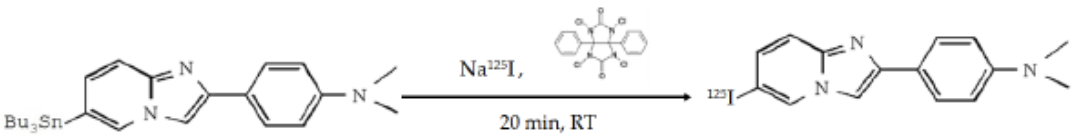
(1) IMPY:



(2) SnMPY:



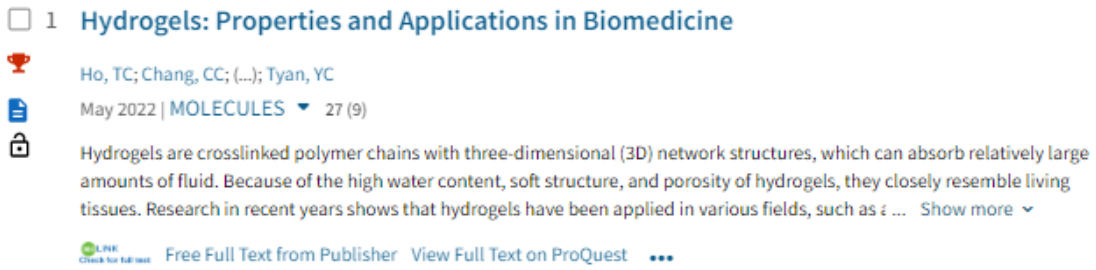
(3) Iodogen method:



【具體成果】

- **學術成就**

高被引用論文



- **獲獎**

1. 2025 年第 18 屆醫學影像暨放射科學國際研討會海報論文競賽第二名：Development the potential of bioactive peptides as regenerative medicine therapies: Applications in the Retinal Ganglion Cells Protection and Optic Nerve Regeneration.
2. 中華民國核醫學學會 2025 年會暨國際學術研討會口頭論文佳作：
   放射性碘 125 標誌 GPC-3 抗體奈米微胞作為肝癌標靶治療之藥物制放研究

【研究團隊】

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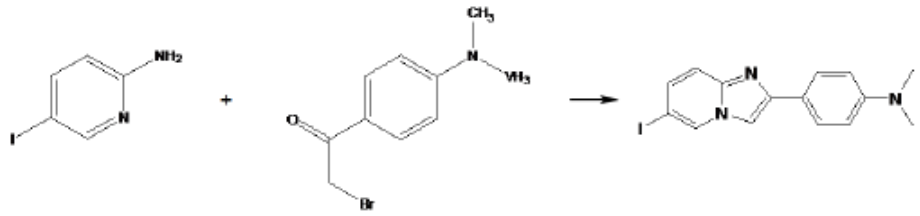
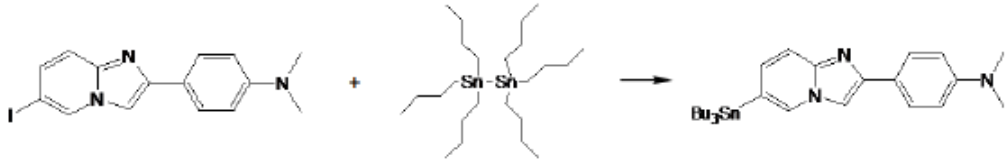
This study labeled IMPY (2-(4'-dimethylaminophenyl)-6-iodo-imidazo[1,2-a]pyridine) with radioactive iodine-125 using the Iodogen method, achieving a high radiochemical yield of 96.52% and excellent stability, confirming this approach as the optimal labeling strategy. IMPY was synthesized from the starting material via a tin-substitution reaction to form the intermediate compound SnMPY, followed by radioiodination with iodine-125 to yield ^{125}I-IMPY.The investigation further evaluated the tracking and therapeutic potential of ^{125}I-IMPY in neuroblastoma (SH-SY5Y) cells. The results demonstrated significantly higher cellular uptake in neuroblastoma cells compared to normal HaCaT cells, along with dose-dependent reductions in cell viability, increased apoptosis, and elevated expression of the DNA damage marker γ-H2AX. In summary, ^{125}I-IMPY not only exhibits strong tumor-tracking capability but also demonstrates radiotherapeutic effects, indicating its promising potential as a theranostic radiopharmaceutical for neuroblastoma.

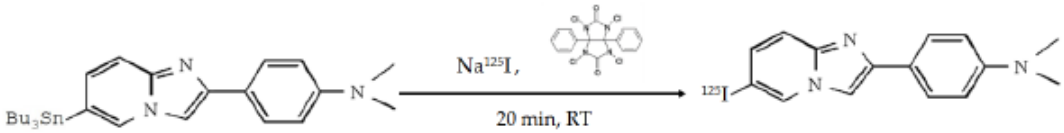
(1) IMPY:



(2) SnMPY:



(3) Iodogen method:



【Concrete Results】

- **Awards**

1. **Second Place Award, Poster Presentation Competition**,
   2025 INTERNATIONAL SYMPOSIUM ON MEDICAL IMAGING AND RADIOLOGICAL SCIENCES
   Title: *Development of the Therapeutic Potential of Bioactive Peptides as Regenerative Medicine Therapies: Applications in Retinal Ganglion Cell Protection and Optic Nerve Regeneration.*
2. **Outstanding Oral Presentation Award**,
   2025 ANNUAL CONFERENCE OF SOCIETY OF NUCLEAR MEDICINE
   Title: *Development of radioactive iodine-125-labeled GPC-3 antibody nanocells as targeted therapy for liver cancer*

【Research Team】

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