Following the commissioning in 2008 of a new IBA (Belgium) 18/9 cyclotron along with a 2-meter external beam line, we were able in 2011 to purchase a fully automated solid targetry facility for the production of $^{124}$I, $^{64}$Cu, $^{89}$Zr and $^{86}$Y. Our aim was the implementation of a safe and cost effective system utilizing commercial equipment from manufacturers who were able to demonstrate convincing data for the production of the intended radionuclides.

**Choosing the right equipment**

**SOLID TARGET:** Two commercial solid target systems were readily available to plug onto our external beam line: Comecer ALCEO Solid Target and IBA NRTA Solid Target. Although the IBA system was significantly dearer, its irradiation station appeared more versatile using simple coin sized disks, with production data available for all 4 proposed radionuclides.

**HOTCELLS:** Several hotcell manufacturers responded to our tender; however TEMA Sinergie (Italy) was the only one who proposed a customized design to precisely fit our requirements, such as internal/external dimensions, appropriate functionalities to operate enclosed processing modules and computer monitoring with GMP compliance for Audit Trail & Alarm Log File.

**TRANSFER SYSTEM:** No Solid Target Transfer System (STTS) was readily available on the market. After discussing our requirements with manufacturers, TEMA Sinergie agreed to design and build such a system. This includes a docking station, which inserts the irradiated disk into a shuttle, a pneumatic transfer system and a disk recovery system for processing in side hotcell.

**PROCESSING MODULES:** A few radiochemistry processing modules exist on the market, but again only IBA provided strong data supporting the successful commercial processing of $^{124}$I (TERIMO system) as well as the evidence of the design of a versatile module (Pinctada Metal system) compatible for the dissolution/purification of a variety of metallic targets.

The IBA NIRTA Solid Target allows the loading of up to 3 target disks into a charger for sequential irradiation without re-entering the vault. Although the installation of the NIRTA Solid Target was straightforward and took less than a day, optimization of the beam shape with homogeneous distribution onto the target disk required significantly more work, including the physical re-alignment of the 2 meter beam line.

The three TEMA hotcells were installed side by side separated at the back from the target vault wall by an 800mm technical corridor. The hotcell dedicated to $^{124}$I is shielded with 100mm of lead and equipped with two tele-manipulators as well as a shielded drawer for insertion/extraction of small items. The adjacent 2 hotcells dedicated to $^{64}$Cu, $^{89}$Zr and $^{86}$Y are 75mm thick and equipped with a Capintec ionisation chamber, a manual teletong, a drop-vial with independent lead pot extractor and a shielded drawer for insertion/extraction of small items. All hotcells feature a touch screen display for control of air flow and radiation monitoring, providing air tightness to Class II and GMP Class C environment.

The IBA Pinctada Metal module is a closed system allowing the clamping of the target disk and hot acidic etching as well as ion exchange separation/purification of the radionuclides. The TERIMO module is a closed system with an integrated charcoal filter. The system allows for the baking of $^{124}$TeO$_2$ powder into the target disk cavity, as well as distillation at 78$^\circ$C for recovery of $^{124}$I into an alkaline solution post irradiation.

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The TEMA STTS is operated from a touch screen display conveniently located on the front of one of the hotcells and features safety software interlocks between the IBA irradiating station and TEMA processing hotline. The loading of the target disk into the shuttle as well as pneumatic transfer from the irradiating station to the dedicated hotcell is fully automated.

The TERIMO module is a closed system with an integrated charcoal filter. The system allows for the baking of $^{124}$TeO$_2$ powder into the target disk cavity, as well as distillation at 78$^\circ$C for recovery of $^{124}$I into an alkaline solution post irradiation.

The IBA Pinctada Metal module is a closed system allowing the clamping of the target disk and hot acidic etching as well as ion exchange separation/purification of the radionuclides. In conclusion, a fully automated solid target facility was successfully installed at Austin Health. Batch productions of $^{124}$I & $^{64}$Cu are in accordance with theoretical calculations (see other poster from Poniger, Tochon-Danguy, Panopoulos, O’Keefe, Peake, Scott).

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