

## Study of the physicochemical stability of HMPAO-Techetium (99mTc)

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### Background and Objective:

99mTc-labeled hexamethylpropylene amine oxime (HMPAO) is used in cerebral perfusion scintigraphy. The manufacturer recommends its utilization within 30 minutes after preparation. Each reconstituted vial allows us to perform 2 scintigraphic scans. However, some circumstances (preparation of patient, duration of acquisition per patient, availability of the  $\gamma$ -camera), make the use of the 99mTc-labeled HMPAO within 30 minutes hard to reach.

Our aim is to study the stability of this product beyond the period of use recommended by the manufacturer.

### Methodology:

We used Ceretec® as cold kit and a fresh eluate of 99mTc (Ultratechnekow® generator).

The preparation was carried out under the direct control of the radiopharmacist, respecting the manufacturer's instructions. The control of Radiochemical Purity (RCP) was made by thin layer chromatography (TLC) from the 30th minute of reconstitution.

We used a silica plate (Macherey-Nagel®) as stationary phase and two types of solvents (methyl ethyl keton, sodium chloride 0.9%) as mobile phase in order to separate respectively: free-99mTc ( $[\text{TcO}]_{-4}^-$ ) and reduced-99mTc associated with a secondary complex 99mTc-HMPAO ( $[\text{TcO}]_{-2}+\text{CII}$ ). The TLC plates were read by  $\gamma$ -camera (Ecam®).

### Results and Discussion:

We carried out quality controls on several HMPAO preparations at times:  $t_0=30$  min;  $t_1=60$  min;  $t_2=90$  min.

At  $t_0$ , the average of the RCP was 86.5% (average of the impurities  $[\text{TcO}]_{-4}^- = 4\%$ ,  $[\text{TcO}]_{-2}+\text{CII} = 11\%$ ).

For  $t_1$ , there was an increase in the percentage of the mixture ( $[\text{TcO}]_{-2}+\text{CII}$ ) from 11% to 16.5%, resulting in a decrease in the average of the RCP (82%).

After 90 min, the RCP further decreased to an average of 76% ( $[\text{TcO}]_{-4}^- = 4.5\%$ ,  $[\text{TcO}]_{-2}+\text{CII} = 19.5\%$ ).

According to the manufacturer's recommendations, the preparation of 99mTc-HMPAO can only be used if the RCP  $\geq 80\%$ .

### Conclusion:

The stability study showed that the 99mTc HMPAO is stable beyond 30 min up to 60 min after preparation.

Thus, the product is stable for 60 min allowing flexibility of use.

Further tests are needed to validate these results.

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