99mTc mertiatide

(MAG3®, NephroMAG®)

1. Indications

99mTc-mertiatide is a renal imaging agent for use in the diagnosis of congenital and acquired abnormalities, renal failure, urinary tract obstruction and calculi in adults and pediatric patients. This can be detected by analyzing the morphology, blood flow and function.

2. Preparation

Approved products, see summary of product characteristics (SmPC).

3. Quality control

Approved products, see summary of product characteristics (SmPC) and the European Pharmacopeia. Radiochemical purity is assessed by chromatographic methods like high pressure liquid chromatography (HPLC) or thin layer chromatography (TLC).

4. Interactions

Administration of contrast substances can influence the tubular excretion and therefore reduce the 99mTc-mertiatide clearance. Several groups of medication are used for diagnostic reasons. Angiotensin converting enzyme (ACE) inhibitors and diuretics have a specific influence on the processing of the radiopharmaceutical by the kidney. Furosemide is used when a urinary tract obstruction is suspected. Furosemide is a diuretic and alleviates functional obstruction, whereby a renogram showing excretory obstruction becomes normal. If the obstruction is mechanical, little chance in the renogram will occur after furosemide administration. In renal artery stenosis an ACE-inhibitor is used to increase the sensitivity and specificity of the dynamic renal scan. Non-steroidal anti-inflammatory drugs (NSAID's) can delay renal uptake of 99mTc-MAG3 and clearance of activity. A study with diclofenac showed non-significant changes in the renography.

5. Contraindications

There are no contraindications observed or reported yet.

6. Adverse reactions

Anaphylactic reactions are reported.
Rare: vasovagal reactions.

7. Biodistribution & pharmacokinetics

Although 99mTc mertiatide is highly protein bound following intravenous injection, the protein binding is reversible and the tracer is rapidly excreted by the kidneys via active tubular secretion and glomerular filtration. Following intravenous injection of 99mTc mertiatide in normal volunteers, 89% of the tracer was plasma protein bound.

With normal kidney function around 70% of the administered dose is excreted after 30 min, more than 95% within 3 h. It is primarily excreted by the tubulus to the extent of greater than 90%.
During labeling small amounts of impurities can be formed. These impurities accumulate in the liver and are excreted by the gall bladder. This is confirmed by the fact that neither hepatobibiliary excretion nor metabolization of HPLC-purified ^{99m}Tc-MAG3 has been observed in patients. These impurities can interfere with the late phase (after 30 min) of a dynamic study.

8. Stability

MAG3 has an expiration date of 12 month after production. After labeling the shelf life depends on the volume which is made, 4 h and 1 h for respectively 10 ml and 4 ml. The product has to be stored around 2-8°C.

9. Literature

- SmPC Tc-99m-Mertiatide, TechneScan®.
- KNMP kennisbank Technetium Tc 99m mertiatide.
- Bubeck B et al. Pharmacokinetics of Technetium-99m-MAG3 in humans. Journal of Nuclear Medicine 1990;31:1285-93.
- Mustafa S et al. Effect of the NSAID diclofenac on 99mTc-MAG3 and 99mTc-DTPA renography. J Nucl Med 2013;54:801-6.