^{18}F fluorodeoxyglucose

^{18}F-FDG

1. Indications

^{18}F-Fluorodeoxyglucose (FDG) injection kit is approved for positron emission tomography imaging for detection of diseases which are indicated by a higher glucose uptake in specific organs at patients who undergo oncological diagnostic analysis.

Cardiology

At cardiologic indication the target for FDG is vital myocardium tissue with glucose uptake but also with inadequate blood flow (hypoperfusion), which had to be tested first by the right blood flow imaging techniques before.

Neurology

The determination of hypoglycose metabolism in specific brain areas is the indication on a neurological level.

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.

4. Interactions

All medications which can change the blood glucose levels are able to influence the analysis with FDG (for example: corticosteroids, valproate, carbamazepine, phenytoin, phenobarbital and catecholamines).
The administration of glucose and insulin will influence the uptake of FDG in the cells. By administration of colony stimulating factor's (CSF's) a higher uptake of FDG is measured for a couple of days in the bone marrow.

5. Adverse events

There are no FDG specific adverse events observed or reported yet.

6. Biodistribution & pharmacokinetics

^{18}F-FDG is a glucose-analogue, which is accumulated in all cells using glucose as a primary energy source. ^{18}F-FDG accumulates in tumours with a high turnover of glucose. Following intravenous injection, the pharmacokinetic profile of ^{18}F-FDG vascular compartment is bi-exponential. It has a distribution time of 1 min and an elimination time of about 12 min. The cellular uptake of ^{18}F-FDG is performed by tissue-specific carrier systems which are partly insulin-dependent and thus can be influenced by nutritional status and the presence of diabetes mellitus. In patients with diabetes a reduced uptake

of ^{18}F-FDG in the cells is measured as a result of changes in the tissue distribution and glucose metabolism. ^{18}F-FDG is transported in a similar way as glucose across the cell membrane, but undergoes only the first step of metabolism which results in ^{18}F-FDG glucose-6-phosphate, which is further broken down. Since the following de-phosphorylation by intracellular phosphatases is slow, ^{18}F-FDG-6-phosphate will be held for a number of hours in the tissue ("trapping"). In healthy subjects, ^{18}F-FDG distributed throughout the body, particularly in the brains and the heart, and to a lesser extent in the lungs and the liver. Elimination of ^{18}F FDG is primarily via renal, where 20% of activity in the two hours after injection in the urine is excreted.
The bond to the renal parenchyma is weak, but because of the elimination of FDG through the kidneys, the entire urinary system exhibits, in particular, the bladder, marked activity. ^{18}F-FDG crosses the blood-brain barrier. Approximately 7% of the injected dose is in the brains within 80-100 min after injection and accumulates. About 3% of the injected activity is taken up by the myocardium within 40 min. The distribution of ^{18}F-FDG in normal heart tissue is predominantly homogeneous. 3% and 0,9-2,4% of the injected activity are accumulated in pancreas and lung. ^{18}F-FDG also binds to a lesser degree in eye muscles, pharynx, and intestines.

7. Stability

The shelf life of the product is about 12 h after production.

8. Literature

- SmPC 18F Fluordeoxyglucose solution.