



Under administration of colony-stimulating factors (CSFs) there is an increased uptake of fludeoxyglucose ( $^{18}\text{F}$ ) in the bone marrow and the spleen for several days. This must be taken into account for the interpretation of PET imaging. Separating CSF therapy from PET imaging by an interval of at least 5 days may diminish this interference.

The administration of glucose and insulin influences the influx of fludeoxyglucose ( $^{18}\text{F}$ ) into the cells. In the case of high blood glucose levels as well as low plasma insulin levels, the influx of fludeoxyglucose ( $^{18}\text{F}$ ) into organs and tumours is reduced.

No formal studies on the interaction between fludeoxyglucose ( $^{18}\text{F}$ ) and any contrast for computed tomography have been performed.

#### 4.6 Fertility, pregnancy and lactation Women of childbearing potential

When an administration of radiopharmaceuticals to a woman of childbearing potential is intended, it is important to determine whether or not she is pregnant. Any woman who has missed a period should be assumed to be pregnant until proven otherwise. If in doubt about her potential pregnancy (if the woman has missed a period, if the period is very irregular, etc), alternative techniques not using ionising radiation (if there are any) should be offered to the patient.

**Pregnancy:**  
Radionuclide procedures carried out on pregnant women involve radiation doses to the foetus.

Only essential investigations should therefore be carried out during pregnancy, when the likely benefit far exceeds the risk incurred by the mother and foetus.

**Breastfeeding:**  
Before administering radiopharmaceuticals to a mother who is breast-feeding, consideration should be given to the possibility of delaying the administration of radionuclide until the mother has ceased breast feeding, and to what is the most appropriate choice of radiopharmaceuticals, bearing in mind the secretion of activity into breast milk. If the administration is considered necessary, breast feeding should be interrupted for 12 hours and the expressed feeds discarded.

Close contact with infants and young children should be restricted during the initial 12 hours following injection.

**Fertility**  
No studies on fertility have been performed.

#### 4.7 Effects on ability to drive and use machines Not relevant.

**4.8 Undesirable effects**  
Exposure to ionising radiation is linked with cancer induction and a potential for development of hereditary defects. As the effective dose is 7.6 mSv when the maximum recommended activity of 400 MBq is administered, these adverse events are expected to occur with a low probability.

**Reporting of suspected adverse reactions**  
Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions.

Within the Republic of Ireland please report any suspected adverse reactions via HPRa Pharmacovigilance, Earlsfort Terrace, IRL - Dublin 2; Tel: +353 1 6764971; Fax: +353 1 6762517. Website: www.hpra.ie; E-mail: medsafety@hpra.ie.

For suspected adverse reactions within the United Kingdom please report via the Yellow Card Scheme at: www.mhra.gov.uk/yellowcard

**4.9 Overdose**  
In the event of administration of a radiation overdose with fludeoxyglucose ( $^{18}\text{F}$ ) the absorbed dose to the patient should be reduced where possible by increasing the elimination of the radionuclide, from the body by forced diuresis and frequent bladder voiding. It might be helpful to estimate the effective dose that was applied.

### 5 PHARMACOLOGICAL PROPERTIES

**5.1 Pharmacodynamic properties**  
Pharmacotherapeutic Group: Diagnostic radiopharmaceuticals ATC code: V091 X04

**Pharmacodynamic effects**  
At the chemical concentrations used for diagnostic examinations, fludeoxyglucose ( $^{18}\text{F}$ ) does not appear to have any pharmacodynamic activity.

#### 5.2 Pharmacokinetic properties Distribution

Fludeoxyglucose ( $^{18}\text{F}$ ) is a glucose analogue which is accumulated in all cells using glucose as primary energy source. Fludeoxyglucose ( $^{18}\text{F}$ ) is accumulated in tumours with a high glucose turnover.

Following intravenous injection, the pharmacokinetic profile of fludeoxyglucose ( $^{18}\text{F}$ ) in the vascular component is biexponential. It has a distribution time of 1 minute and an elimination time of approximately 12 minutes.

In healthy subjects, fludeoxyglucose ( $^{18}\text{F}$ ) is widely distributed throughout the body, particularly in the brain and heart, and to a lesser degree in the lungs and liver.

**Organ uptake**  
The cellular uptake of fludeoxyglucose ( $^{18}\text{F}$ ) is performed by tissue-specific carrier systems, which are partly insulin-dependent and thus can be influenced by eating, nutritional condition and the existence of diabetes mellitus. In patients with diabetes mellitus a reduced uptake of fludeoxyglucose ( $^{18}\text{F}$ ) into the cells occurs due to a changed tissue distribution and glucose metabolism.

Fludeoxyglucose ( $^{18}\text{F}$ ) is transported via the cell membrane in a similar fashion to glucose, but only undergoes the first step of glycolysis, resulting in the formation of fludeoxyglucose ( $^{18}\text{F}$ ) -6-phosphate, which remains trapped within the tumour cells and is not further metabolised. Since subsequent dephosphorylation by intracellular phosphatases is slow, fludeoxyglucose ( $^{18}\text{F}$ )-6-phosphate is retained in the tissues over several hours (trapping mechanism).

Fludeoxyglucose ( $^{18}\text{F}$ ) passes the blood-brain barrier. Approximately 7% of the injected dose is accumulated in the brain within 80-100 minutes after injection. Epileptogenic foci exhibit a reduced glucose metabolism in the seizure-free phases.

Approximately 3% of the activity is taken up by the myocardium within 40 minutes. The distribution of fludeoxyglucose ( $^{18}\text{F}$ ) in normal heart is mainly homogenous, however, regional differences of up to 15%

are described for the interventricular septum. During and after a reversible myocardial ischaemia, an increased glucose uptake occurs into the myocardial cell.

0.3 and 0.9-2.4% of the injected activity is accumulated in the pancreas and lungs respectively.

Fludeoxyglucose ( $^{18}\text{F}$ ) is also bound to a lesser extent to ocular muscle, pharynx and intestine. Binding to muscle may be seen following recent exertion and in the event of muscular effort during the examination.

**Elimination**  
The elimination of fludeoxyglucose ( $^{18}\text{F}$ ) is chiefly renal with 20% of activity being excreted in urine in the two hours following injection.

Binding to renal parenchyma is weak, but because of renal elimination of fludeoxyglucose ( $^{18}\text{F}$ ) the entire urinary systems, particularly the bladder, exhibits marked activity.

**5.3 Preclinical safety data**  
Toxicological studies with mice and rats have demonstrated that with a single intravenous injection of 0.0002 mg/kg no deaths were observed. Toxicity with repeated administration was not performed because fludeoxyglucose ( $^{18}\text{F}$ ) is administered in a single dose. This medicinal product is not intended for regular or continuous administration.

Mutagenicity studies and long-term carcinogenicity studies have not been carried out.

**Environmental Risk Assessment (ERA)**  
The relevant guideline states that carbohydrates are exempted from the requirements for ERA because they are unlikely to result in significant risk to the environment. The potential entry of fludeoxyglucose ( $^{18}\text{F}$ ) to the environment from the administration to patients will be very small and is not of immediate risk to the environment. The half life of 110 minutes means that there will be no cumulative effect on the environment.

**6 PHARMACEUTICAL PARTICULARS**  
**6.1 List of excipients**  
Sodium chloride  
Water for Injections  
Sodium dihydrogen phosphate dihydrate

**6.2 Incompatibilities**  
This medicinal product must not be mixed with other medicinal products except those mentioned in section 12.

**6.3 Shelf life**  
12 hours.

The shelf-life after the first dose has been withdrawn is 4 hours. The expiry time and date are stated on the label of each vial.

**6.4 Special precautions for storage**  
Do not store above 30°C.

The vial does not contain a preservative agent. If the product is for multiple use, then each dose must be prepared under aseptic conditions.

Storage of radiopharmaceuticals should be in accordance with national regulations concerning radioactive materials.

**6.5 Nature and contents of container**  
Type 1 (Ph. Eur.) glass vial (maximum size 11 ml) closed with either a bromobutyl or ETFE-coated chlorobutyl rubber stopper and sealed with an aluminium crimp cap. The vial is shielded by a lead container within a sealed outer container.

One vial contains 1-10 ml of solution, corresponding to 110 to 50,000 MBq at calibration time.

**6.6 Special precautions for disposal and other handling**  
**General warning**  
Radiopharmaceuticals should be received, used and administered only by authorised persons in designated clinical settings. Their receipt, storage, use, transfer and disposal are subject to the regulations and/or appropriate licences of the competent official organisation.

Radiopharmaceuticals should be prepared in a manner which satisfies both radiation safety and pharmaceutical quality requirements. Appropriate aseptic precautions should be taken.

The administration of radiopharmaceuticals creates risks for other persons from external radiation or contamination from spills of urine, vomiting, etc. Radiation protection precautions in accordance with national regulations must be taken.

Any unused product or waste material should be disposed of in accordance with local requirements.

**7 MARKETING AUTHORISATION HOLDER**  
Curium Pharma Ireland Ltd  
Blackrock Clinic, Blackrock, Dublin, Ireland  
Tel: 00353 1-206-4266. E-mail: info.ie@curiumpharma.com

**8 MARKETING AUTHORISATION NUMBER**  
PA 1125/002/001 PL 32203/0003

**9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**  
Date of first authorization: 27<sup>th</sup> February 2015

**10 DATE OF REVISION OF THE TEXT**  
25<sup>th</sup> March 2021

### 11 DOSIMETRY The data listed below are from ICRP 106 publication.

Organ	Dose absorbed per unit of activity administered (mGy / MBq)				
	Adults	15 year old	10 year old	5 year old	1 year old
Adrenals	0.012	0.016	0.024	0.039	0.071
Bladder	0.130	0.160	0.250	0.340	0.470
Bone surfaces	0.011	0.016	0.022	0.034	0.064
Brain	0.038	0.039	0.041	0.046	0.063
Breasts	0.0088	0.011	0.018	0.029	0.056
Gall bladder	0.013	0.016	0.024	0.037	0.070
<b>Gastrointestinal tract:</b>					
Stomach	0.011	0.014	0.022	0.035	0.067
Small intestine	0.012	0.016	0.025	0.040	0.073
Colon	0.013	0.016	0.025	0.039	0.070
Upper large intestine	0.012	0.015	0.024	0.038	0.070
Lower large intestine	0.014	0.017	0.027	0.041	0.070
Heart	0.067	0.087	0.130	0.210	0.380
Kidneys	0.017	0.021	0.029	0.045	0.078
Liver	0.021	0.028	0.042	0.063	0.120
Lungs	0.020	0.029	0.041	0.062	0.120
Muscles	0.010	0.013	0.020	0.033	0.062
Oesophagus	0.012	0.015	0.022	0.035	0.066
Ovaries	0.014	0.018	0.027	0.043	0.076
Pancreas	0.013	0.016	0.026	0.040	0.076
Red marrow	0.011	0.014	0.021	0.032	0.059
Skin	0.0078	0.0096	0.015	0.026	0.050
Spleen	0.011	0.014	0.021	0.035	0.066
Testes	0.011	0.014	0.024	0.037	0.066
Thymus	0.012	0.015	0.022	0.035	0.066
Thyroid	0.010	0.013	0.021	0.034	0.065
Uterus	0.018	0.022	0.036	0.054	0.090
Remaining organs	0.012	0.015	0.024	0.038	0.064
<b>Effective dose (mSv/MBq)</b>	<b>0.019</b>	<b>0.024</b>	<b>0.037</b>	<b>0.056</b>	<b>0.095</b>

The effective dose resulting from the administration of a maximal recommended activity of 400 MBq of fludeoxyglucose ( $^{18}\text{F}$ ) for an adult weighing 70 kg is about 7.6 mSv.

For an administered activity of 400 MBq, the radiation doses delivered to the critical organs, bladder, heart and brain are respectively 52 mGy, 27 mGy and 15 mGy.

### 12 INSTRUCTIONS FOR PREPARATION OF RADIOPHARMACEUTICALS

**Method of preparation**  
The package must be checked before use and the activity measured using a radioactive calibrator. The medicinal product may be diluted with sodium chloride 9 mg/ml solution for injection.

Withdrawals should be performed under aseptic conditions. The vials must not be opened before disinfecting the stopper, the solution should be withdrawn via the stopper using a single dose syringe fitted with suitable protective shielding and a disposable sterile needle or using an authorised automated application system.

If the integrity of the vial is compromised, the product should not be used.

**Quality control**  
The solution should be inspected visually prior to use, using appropriate protective shielding. Only clear solutions, free of visible particles should be used.



# Essentra Packaging Ireland Ltd.

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Item No.	PKFDG02-6	Size	296 x 250mm	Proof No:	2
Colours	Black			Pharmacode	N/A

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