Hodgkin's Disease Staging by FDG PET/CT in a Pregnant Woman

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A 26-year-old pregnant woman was referred to our center for scleronodular Hodgkin's disease (SHD). Due to clinical aggravation, the medical staff decided to perform ^{18}F -FDG positron emission tomography/computed tomography (FDG-PET/CT) at 26 weeks of amenorrhea, with the patient's agreement. In case of advanced stage disease, a medical interruption of pregnancy and aggressive chemotherapy would have been performed [1]. The risk of a mistaged lymphoma appeared greater than the fetal risk of an optimized low-dose PET/CT procedure at this conception age.

FDG activity was decreased to 3 MBq/kg and CT parameters locked at 80 kV and 80 mAs without intensity modulation (which could have induced a dose increase due to the larger abdominal attenuation compare to the rest of the body). The calculated fetal dosimetry result was 4.1 mSv from FDG PET and 3.2 mSv from CT [2, 3]. Total fetal irradiation was ten times less than

the 100 mSv malformative risk limit described by the International Commission on Radiological Protection [4, 5]. Depending on the FDG PET/CT procedure and fetal age, the fetal estimated dose ranged between 1.01 and 21.9 mGy in the 12 other published cases of FDG PET/CT carried out during pregnancy that we found in the literature (Table 1) [5–11].

The FDG PET/CT demonstrated a stage IIIA lymphoma (Figs. 1 and 2) and led to treating the patient with corticotherapy as long as the SHD was free of progression. Fetal ultrasonography follow-up remained normal, and a healthy child was born via caesarean section at 36 weeks of amenorrhea. The patient received chemotherapy the day after delivery.

In conclusion, use of FDG PET/CT is conceivable during pregnancy for malignant lymphoma staging on medical decision, with an optimized low-dose protocol and with patient agreement.

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Fig. 1 A: FDG PET/CT fusion MIP (maximum intensity projection) shows intense uptake within lymph nodes on both sides of the diaphragm and the fetal skeleton (white arrow). B, C and D: FDG PET without attenuation correction or coregistered CT. E, F and G: Coregistered FDG PET/CT with attenuation correction. Coregistered CT allowed excluding

pulmonary, costal (B and E) and gastric (C and F) lesions and confirmed supradiaphragmatic and infradiaphragmatic lymph node involvement. These findings and the possibility of quantification emphasized the added value of coregistered CT. Hypermetabolism located in the lower part of the fetal mediastinum was related to myocardial uptake (D and G)

Fig. 2 FDG PET/CT fused VRT (volume-rendering technique) shows hypermetabolism related to myocardial uptake. There was no other uptake by the fetus, in particular in the brain and kidneys

Table 1 Other published cases of FDG PET/CT carried out during pregnancy

	Indication	Term	Injected dose (MBq)	CT absorbed dose (mGy)	PET absorbed dose (mGy)	Total absorbed dose (mGy)	¹⁸ F-FDG fetal uptake
Townson (Eur J Nucl Med 2004)	Glioma	26 WG	188	0	3.2	3.2	NA
	Hodgkin's disease	22 WG	355	6	6.4	12.4	NA
Hove (Haematol Hematol J 2008)	Hodgkin's disease	24 WG	NA	NA	NA	NA	Myocardium
Zanotti (J Nucl Med 2008)	Hodgkin's disease	10 WG	320	8.3	10.6	18.9	NA
Zanotti (J Nucl Med 2008)	Hodgkin's disease	10 WG	296	10	11.8	21.8	NA
Takalkar (J Nucl Med 2011)	Lung cancer	6 WG	583	0	9.04	9.04	NA
	Cervix cancer	28 WG	174	0	1.01	1.01	NA
	B-cell non-Hodgkin lymphoma	30 WG	229	0	2.43	2.43	Myocardium
	B-cell non-Hodgkin lymphoma	18 WG	200	0	1.43	1.43	NA
	B-cell non-Hodgkin lymphoma	25 WG	337	0	2.1	2.1	NA
	Cervix cancer	23 WG	181	0	1.1	1.1	NA
Hsieh (Clin Nuc Med 2012)	Breast cancer	26 WG	370	3.6	6.29	9.89	Myocardium and kidneys
Zanotti (Health Phys 2012)	Pheochromocytoma	21 WG	181	3.6	5	8.6	Brain

Conflict of interest Jérémie Calais, Sebastien Hapdey, Hervé Tilly, Pierre Vera and Mathieu Chastan declare that they have no conflict of interest.

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