



# 18F-FDG PET reveals an adrenocortical carcinoma in a bilateral adrenal multinodular disease

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A 48-year-old man underwent an abdominal computed tomography (CT) scan for asthenia. The CT scan revealed bilateral adrenal masses. The left mass measured 47 × 27 mm with a spontaneous density (SD) of -6 Hounsfield Unit (HU), in favor of a benign adrenocortical lesion (adenoma if < 10 HU). The right adrenal presented one anterior nodule of 28 × 23 mm with a SD of -25 UH, in favor of a benign lesion and a second posterior nodule of 21 × 25 mm, with a high SD of 27 UH and an absolute washout of 55% (> 60% in case of a benign lesion), consistent with an indeterminate lesion (Fig. 1a). The patient was lost of follow-up. After 1 year, the patient was referred to our hospital for hypertension, hypokalaemia and android obesity. Hormonal investigations showed an ACTH-independent hypercortisolism (Urinary free cortisol: 373 nmol/24 h (normal values:69-248), ACTH < 2 pmol/l (normal values 2 to 13)). The CT scan showed an increase in the posterior right adrenal mass (85 × 66 mm) with multiple retroperitoneal lymph nodes. The anterior right and left adrenal masses were unchanged (Fig. 1b).

18F-FDG PET/CT scan showed a high uptake localized to the posterior right mass (SUV<sub>max</sub> = 18, adrenal/liver SUV<sub>max</sub> ratio = 8.6) without any uptake at the anterior right and left adrenal masses (Fig. 1c). The patient underwent bilateral adrenalectomy and para-aortic lymphadenectomy. Pathology showed bilateral adrenal hyperplasia associated to a right posterior adrenocortical carcinoma (ACC) and multiple metastatic lymph nodes. The ACC had a Weiss score of 7 with a high Ki67 proliferative index (30%), whereas the adrenal hyperplasia showed no Ki67 immunostaining (Fig. 1d). Positive immunostaining for

GLUT1 (Fig. 1e) and hexokinase II (Fig. 1f) was restricted to the ACC.

To our knowledge, this is the first observation of an ACC associated to a bilateral macronodular hyperplasia. Moreover, this case illustrates the rapid growth of an ACC during 1 year. Adrenocortical carcinoma is a rare disease, with an incidence of 0.7–2.0 cases/million habitants/year. The diagnosis of malignancy relies on careful investigations of clinical, biological, and imaging features before surgery and pathological examination after tumor removal. Most patients present with steroid hormone excess or abdominal mass effects, but 15% of ACC are diagnosed incidentally [1]. At initial evaluation, a careful characterization of the adrenal lesion by a CT scan is necessary, to measure the SD and calculate the washout after contrast injection [1]. This observation illustrates that in case of multiples adrenal nodules, a radiological assessment of all nodules is highly recommended. Moreover, if nodules with suspicious imaging characteristics are present, the use of 18F-FDG PET/CT may help to predict the malignancy and facilitate the disease staging. Indeed, the adrenal/liver maxSUV ratio present a high sensitivity to diagnose ACC, the risk of false-negative results is quite low, more than 95% of ACC show a high 18F-FDG uptake [2]. GLUT1 and hexokinase II are known to be the most important glucose transporter and glycolytic enzyme in cancer cells. In a previous study, ACC patients with strong GLUT1 staining showed a considerably higher overall mortality compared with patients with no GLUT1 staining [3]. Interestingly, in this case we demonstrated a GLUT1 and hexokinase II overexpression limited to the ACC, in correlation with the 18F-FDG uptake.

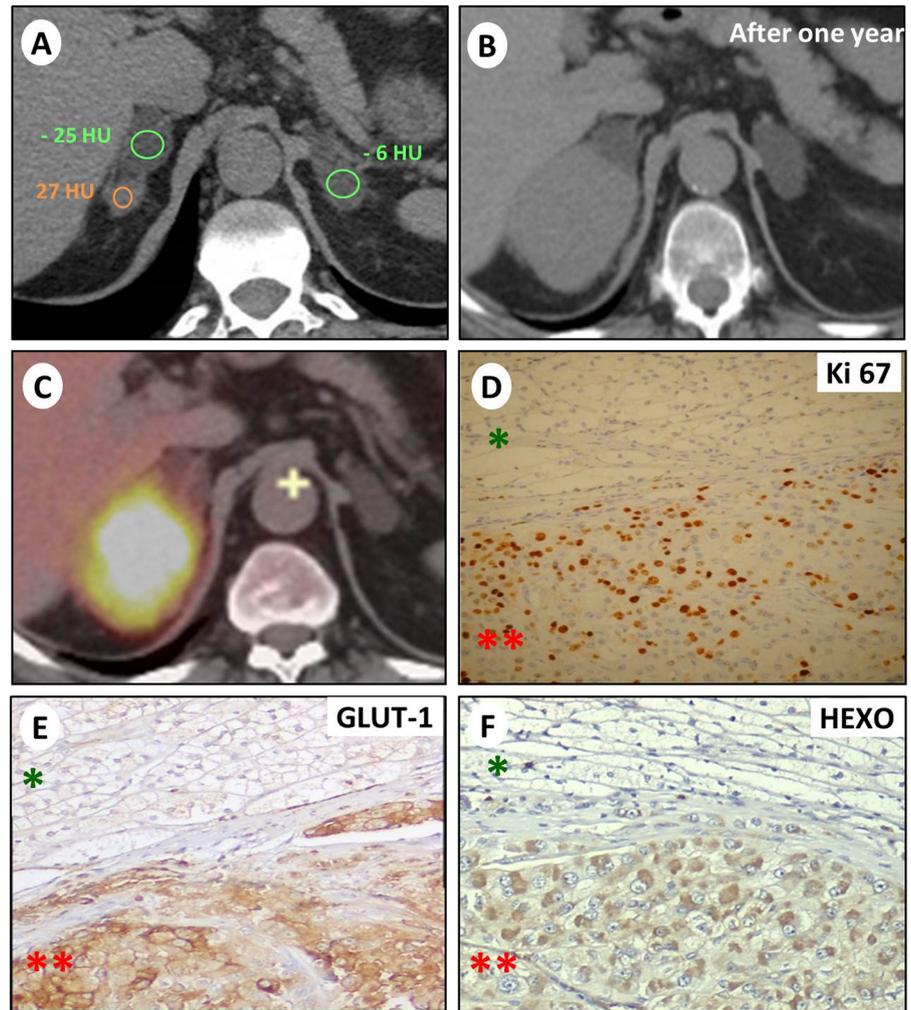
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**Fig. 1** **a** Initial axial low dose CT scan without contrast showed a left adrenal cortical adenoma and a right adrenal with an anterior mass with low SD (region of interest (ROI) in green) and a posterior mass with high SD (ROI in orange). **b** After 1 year, axial low dose CT scan without contrast showed an enlargement of the posterior right adrenal mass. **c** 18F-FDG-PET showed an increase uptake of the posterior right adrenal mass with a maximum standardized uptake value (maxSUV) of 18.1. **d** Pathology confirmed the diagnosis of an ACC (Weiss score of 7) with a high Ki67 proliferative index of 30% (\*\*) associated to a macronodular hyperplasia (absence of Ki67 positive cell) (\*). **e** GLUT1 immunostaining: positive in ACC (\*\*\*) and negative in macronodular hyperplasia (\*). **f** Hexokinase II immunostaining: positive in ACC (\*\*\*) and negative in macronodular hyperplasia (\*)



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### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Informed consent** Informed consent was obtain from the patient to publish this report

### References

1. M. Fassnacht, W. Arlt, I. Bancos et al. Management of adrenal incidentalomas: European Society of Endocrinology Clinical Practice Guideline in collaboration with the European Network for the Study of Adrenal Tumors. *Eur. J. Endocrinol.* **175**(2), G1–G34 (2016)
2. L. Groussin, G. Bonardel, S. Silvéra et al. 18F-Fluorodeoxyglucose positron emission tomography for the diagnosis of adrenocortical tumors: a prospective study in 77 operated patients. *J. Clin. Endocrinol. Metab.* **945**, 1713–1722 (2009)
3. W. Fenske, H.U. Völker, P. Adam et al. Glucose transporter GLUT1 expression is an stage-independent predictor of clinical outcome in adrenocortical carcinoma. *Endocr. Relat. Cancer* **16**, 919–928 (2009)