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Role of molecular imaging in the detection of neuroendocrine tumour

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Neuroendocrine tumours (NETs) have distinct biological and clinical characteristics, in particular a high density of somatostatin receptors at the cell membrane [1]. It is this property that allows the use of radiolabelled somatostatin analogues for imaging of these tumours. Importantly, somatostatin receptor PET/CT imaging (e.g. ^{68}Ga-DOTATOC, ^{68}Ga-DOTATATE, ^{68}Ga-DOTANOC) is superior to somatostatin receptor scintigraphy including SPECT/CT [2] and ^{18}F-DOPA PET/CT [3] in the detection of gastroenteropancreatic neuroendocrine tumours (GEP NETs).

NETs, however, have a wide range of cellular differentiation. ^{18}F-FDG PET/CT is of limited value in well-differentiated NETs but of high value in poorly differentiated NETs. Somatostatin receptor PET/CT shows contrary results [4]. As both ^{18}F-FDG PET/CT and somatostatin receptor PET/CT exploit distinct tumour characteristics they are complementary for tumour staging.

Small insulinomas are difficult to detect with ^{18}F-FDG PET/CT, somatostatin receptor PET/CT, ^{18}F-DOPA PET/CT and morphological imaging. Targeting of Glucagon-like peptide-1 receptors using radiolabelled exendin-4 has shown to be highly effective in the detection of these tumours [5].

Clinical studies have shown higher tumour uptake of radiolabelled somatostatin receptor antagonists than somatostatin receptor agonists [6]. As a result radiolabelled somatostatin receptor antagonists may have a significant impact on imaging of NETs.

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