APPENDIX 3

DETECTION OF PANCREATIC NETS

1. CT technique for detection of pancreatic NETs

Optimal technique is essential for accurate detection of pancreatic NETs. The patient should be fasted to ensure that the stomach and duodenum are emptied of their contents. The stomach is distended with water, and intravenous (IV) or intramuscular (IM) hyoscine butylbromide or another anti-peristaltic agent is administered. An initial precontrast scan is performed to identify the level of the pancreas. Following IV administration of 150 ml of contrast medium at a rate of 3–5 ml/second, biphasic scanning is recommended. Late arterial-phase imaging of the pancreas should be obtained with a section thickness of 3–5 mm. In patients unlikely to have metastases (e.g. most insulinomas), the liver is not required to be included in the arterial phase, but if metastases are likely, it can be included. Portal venous phase imaging should include the entire liver and pancreas, down to the iliac crests. The section thickness should not exceed 5 mm. The images are then reconstructed to 1–2 mm in slice thickness, and coronal or sagittal reformats may be made. Images should also be viewed on narrow window settings in order to augment the difference between the enhancing tumour and the pancreas.[1]

1.1 CT appearance

Functioning tumours are usually small and subtle, with low inherent contrast between the tumour and surrounding pancreas. They are usually isodense with the pancreas on precontrast images and do not usually distort the contour of the pancreas. As in the angiography literature, the majority of islet cell tumours are hypervascular and will be best seen after intravenous injection of contrast medium. However, the best phase for demonstration of those hyperattenuating small lesions is unclear. Tumour-to-pancreas contrast is typically greatest on arterial-phase (AP) images compared to portal venous phase (PVP) imaging.[2-4] However, in some cases, PVP is significantly more helpful in identifying islet cell tumours.[1, 5] At present, therefore, biphasic imaging following IV injection of contrast medium is recommended to

optimise the sensitivity of the technique. Narrow window settings may help to improve detection.

2. MRI technique for pancreatic NETs

Patients should be fasted for at least four hours. Oral water and an anti-peristaltic agent are given. Optimal technique requires a quadrature phased-array coil. The following images should be viewed:

- Axial T1
- Axial fat-suppressed T1-weighted
- Axial and coronal fast spin-echo, T2-weighted
- Axial T2 FatSat
- Axial dynamic contrast-enhanced gradient echo sequence
- Axial diffusion-weighted (optional)

The tumours usually appear to be of low signal intensity on T1-weighted sequences and high signal intensity on T2-weighted sequences in relation to the pancreas. The tumours are often most conspicuous on the fat-suppressed T1-weighted image whether spin-echo or gradient-recalled.[6, 7] Tumours that contain high collagen or fibrous tissue content may return a low signal intensity on T2-weighted images, but this is rare.[5] Following IV gadolinium administration, there is characteristic marked homogeneous enhancement, reflecting the highly vascular nature of these tumours. Enhancement oftens renders the tumour isointense with the surrounding pancreas on the T1-fat-suppressed sequence. In cystic lesions, rim enhancement may be seen.[7]

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