www.thesynapse.net | Issue 05/08

12th Anniversary Edition

NEWSPAPER POST

TheSynapse

The Medical Professionals' Network

MEDICAL IMAGING

Pancreatic Cancer

by **Pierre Vassallo**
MD PhD FACA Artz für Radiologie
Consultant Radiologist

Pancreatic cancer is the fourth leading cause of death from cancer in the developed world. It has a dismal prognosis, with a mortality rate similar to its incidence.

The overall 5-year survival rate is less than 5%. Early diagnosis and resection remain the only potential cure, but only a minority (5–30%) of tumors are detected when they are still resectable. However screening has not proved to be effective in the general population and is not recommended.

Spiral Computed Tomography (CT) is the best technique currently available for detecting and staging pancreatic cancer. MRI is useful for equivocal cases and allows better visualisation of the common bile duct through MRCP (MR Cholangio-pancreatography), which may be helpful in operative planning. Ultrasound is often the first exam to detect a pancreatic cancer in those patients presenting with jaundice, but more accurate staging with Spiral CT is required to plan treatment.

Spiral CT technology has seen major advances over the past 15 years with progress from single slice to multislice techniques and ultrashort rotation times, with the result that large areas of anatomy can be imaged with exquisite detail in a relatively short breath hold. Power injectors are now utilized to administer timed bolus injections of contrast material, which allow imaging at different phases (arterial, venous and delayed) of organ perfusion. Carefully timed scan acquisition maximizes the difference in enhancement between the neoplasm and the pancreatic parenchyma and allows accurate local and distant staging. In addition, angiographic display of the local venous and arterial anatomy and TNM staging data (not usually used in radiographic reporting) are provided by spiral CT, which are crucial to surgical planning and are important for deciding on optimal therapy and neoadjuvant therapy.

During the late arterial phase of perfusion, the normal pancreas shows marked enhancement (figure 1), and imaging during this phase maximizes attenuation differences between the hypovascular tumor and the surrounding hypervascular normal parenchyma (figure 2). Usually, the tumor can be clearly seen against the enhanced background pancreatic parenchyma.

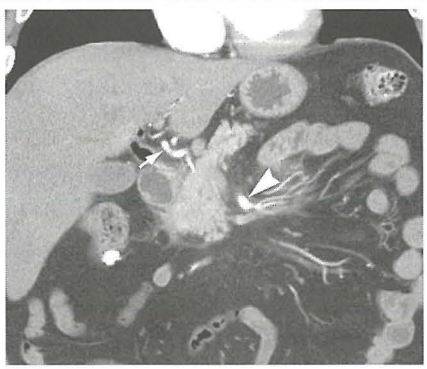


Figure 1. *Coronal reformatted pancreatic parenchymal phase image shows intense enhancement of the normal pancreas. Note the excellent enhancement of the common hepatic artery (arrow) and the superior mesenteric artery (SMA) (arrowhead).*

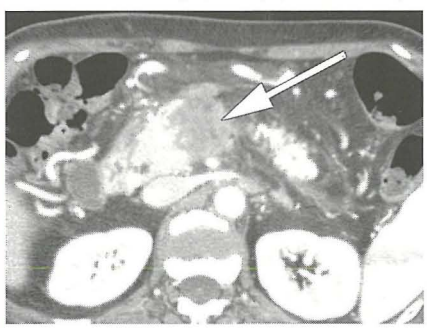


Figure 2. *Contrast-enhanced CT scan shows a large, locally unresectable adenocarcinoma of the pancreatic head (arrow). Note the difference in attenuation between the tumor and the avidly enhancing normal pancreas.*

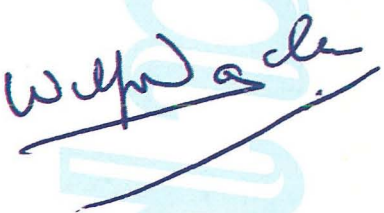
continues on page 2

Editor's Word

This issue marks another milestone in the history of TheSYNAPSE. Twelve years ago, TheSYNAPSE was born at the Malta Medical School. Little knowing whether we will reach our goals (but with a firm belief that we will), we have set on an ambitious project to provide a comprehensive set of tools and resources for all Maltese medical professionals. Looking through the documents and drafts (or dreams) of 1996, we are proud that we have managed to achieve many of the targets we dreamt of back then.

Today, we are pleased to offer a range of products and services for all members. It is however the contribution and interaction between members and stakeholders that is key to our success. It is this reason why we take this opportunity to thank all members and contributors for being part of the success story.

The future is exciting. The pipeline of products and service in development is very encouraging and we look forward to the future with confidence to build a better future together.



TheSynapse Magazine is published by Medical Portals Ltd. The Professional Services Centre, Guzi Cutajar Street, Dingli, Malta.

Editor: Dr Wilfred Galea
Scientific Editor: Ian C. Ellul
Administration Manager: Carmen Cachia
Designer: Conrad Bondin

Pancreatic Cancer

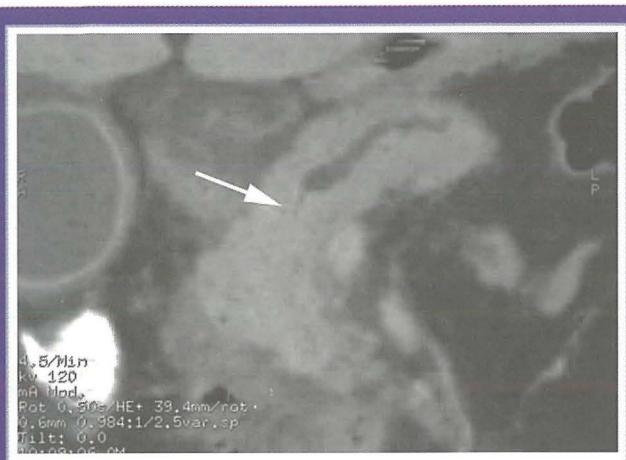


Figure 3. *Abrupt cut-off of the pancreatic duct (arrow) in the region of the neck of the pancreas. No mass was visualized in the pancreas at CT.*

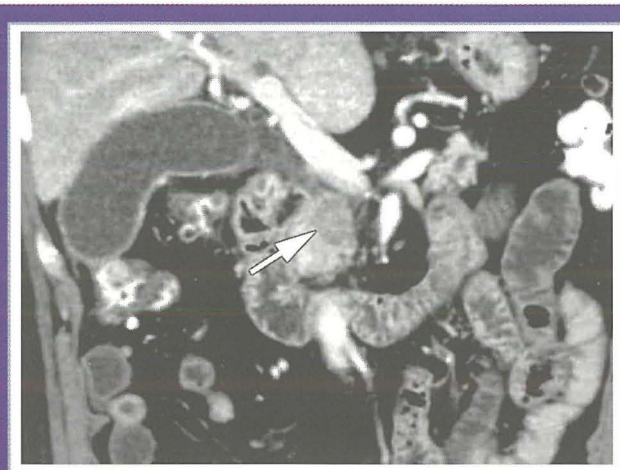


Figure 5. *Coronal reformatted pancreatic parenchymal phase image shows a focal hypoattenuating tumor (arrow). Whipple resection confirmed a T2 tumor.*

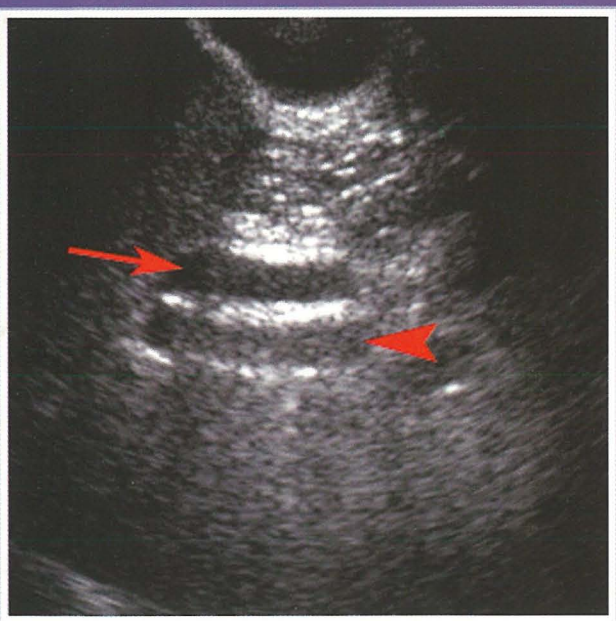


Figure 4. *Double duct sign seen on ultrasound with a dilated common bile duct (arrow) lying anterior to the portal vein (arrowhead).*

Secondary signs of malignancy such as pancreatic ductal or biliary dilatation or vascular occlusion can also be used to aid in tumor localization. About 10% of pancreatic adenocarcinomas have the same attenuation as background pancreatic parenchyma, making diagnosis more difficult. In such cases these secondary signs can be extremely useful (figure 3). The 'double duct sign', best seen on ultrasound (figure 4), is a reliable indicator of an obstructing lesion, although it is not specific for pancreatic adenocarcinoma; this is caused by obstruction of the distal pancreatic and common bile ducts, which are therefore seen as two adjacent dilated ducts.

Staging of pancreatic cancer follows the TNM classification (Table 1). Resectibility is staged according to size of the tumor and presence of nodal or extranodal metastases (Table 2). Most patients in whom resection appears to be viable at radiologic assessment will undergo laparoscopy prior to surgical exploration to rule out small peritoneal implants or liver disease, the presence of which precludes curative resection.

Approximately 90% of pancreatic adenocarcinomas manifest as a focal mass, with the remainder manifesting as more diffuse involvement. Radiologic imaging is highly sensitive for assessment of the T stage. T1 and T2 tumors are distinguished on the basis of size, and this assessment can usually be accurately made on the basis of spiral CT imaging (figure 5).

continues on page 22

Pancreatic

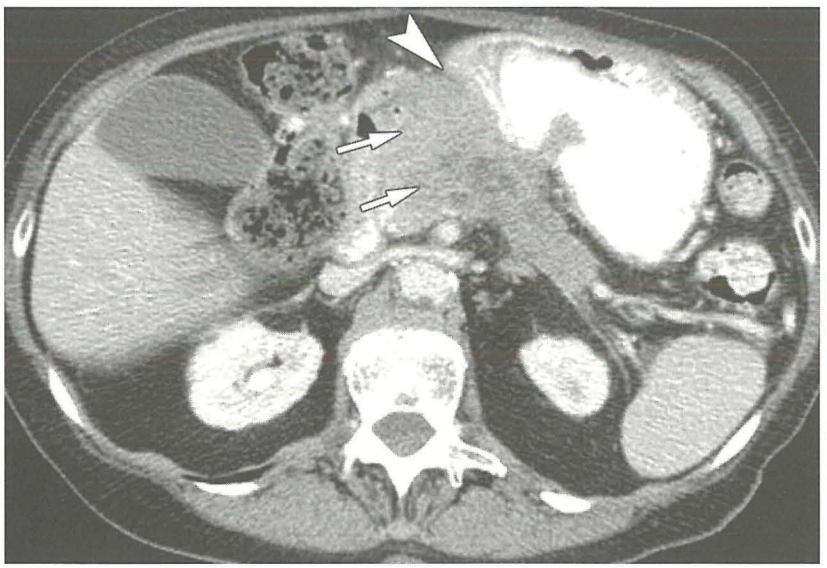


Figure 6. *Large exophytic mass (arrows) arising from the neck of the pancreas and invading the stomach (arrowhead), a finding that represents a radiologic T3 tumor.*

continued from page 2

T3 disease is defined as extension into the peripancreatic soft tissues, without invasion into the celiac axis or superior mesenteric artery (SMA) (figure 6), which invasion characterizes a T4 tumor (figure 7). Lymph node (figure 8) and extranodal (figures 9 & 10) metastases are well assessed by spiral CT.

Spiral CT is well suited for both tumor detection and assessment of resectability, but recently, endoscopic US also appears to be playing a complementary role in tumor assessment and lymph node staging, since it allows sampling of any suspect lymph nodes that are present. Comparative studies suggest that when preoperative staging is performed with both multidetector CT and endoscopic US, with one of the modalities being used for initial screening and the other in potentially resectable cases, the two modalities play complementary roles.

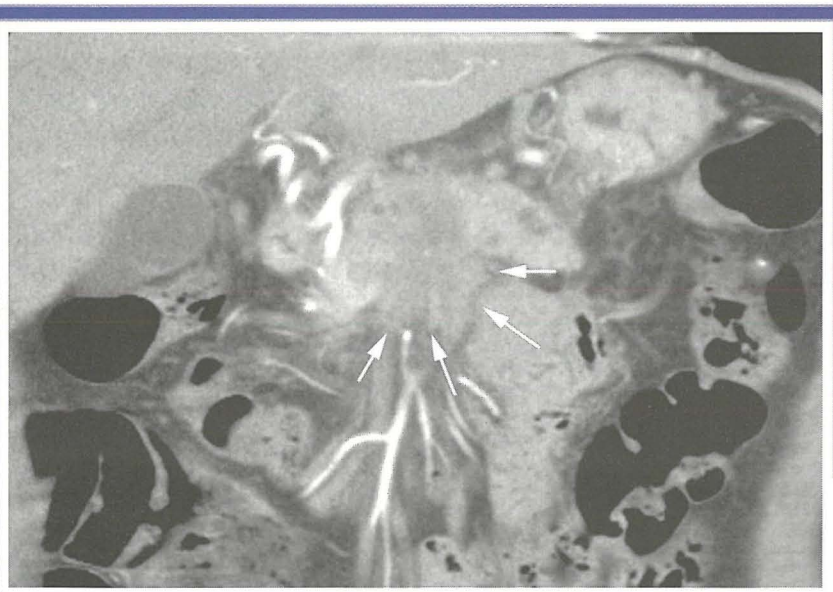


Figure 7. *Infiltration of mesenteric root (arrows) with encased branches of the enhancing SMA.*

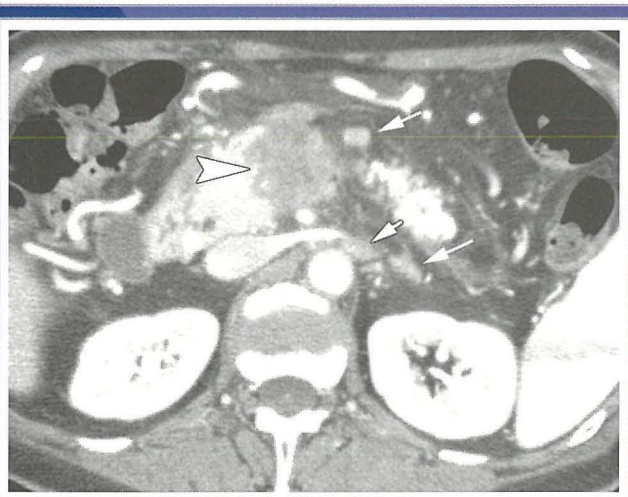


Figure 8. *CT scan shows a large pancreatic adenocarcinoma (arrowhead) as well as multiple surrounding peripancreatic lymph nodes (arrows).*

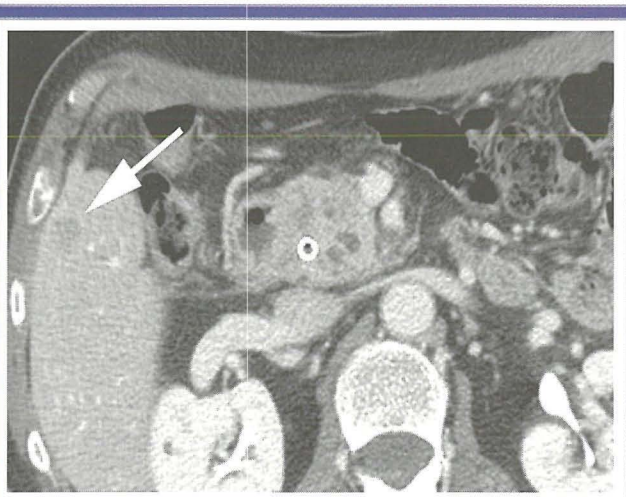


Figure 9. *Contrast-enhanced portal venous phase CT scan demonstrates a metastatic lesion in the liver (arrow).*

Cancer

Table 1: TNM Classification

Tumor Staging	
Tx	Tumor not assessed
Tis	Carcinoma in-situ
T1	Tumor < or = 2cm in diameter and confined to the pancreas
T2	Tumor >2cm in diameter and confined to the pancreas
T3	Tumor extends outside pancreas but does not involve celiac axis or SMA
T4	Tumor involves celiac axis or SMA
Lymph node Staging	
Nx	Lymph nodes not assessed
N0	Regional nodes not involved
N1	Regional nodes involved
Metastases (extranodal)	
Mx	Metastases not assessed
M0	No metastases
M1	Metastases present eg liver, lung, peritoneum

Table 2: Resectibility according to TNM stage

Stage 1	Resectible	T1 or T2, N0, M0
Stage 2	Usually Resectible	T1 or T2, N1, M0; T3, N0 or N1, M0
Stage 3	Unresectible	T4, N0 or N1, M0
Stage 4	Unresectible	T any, N any, M1

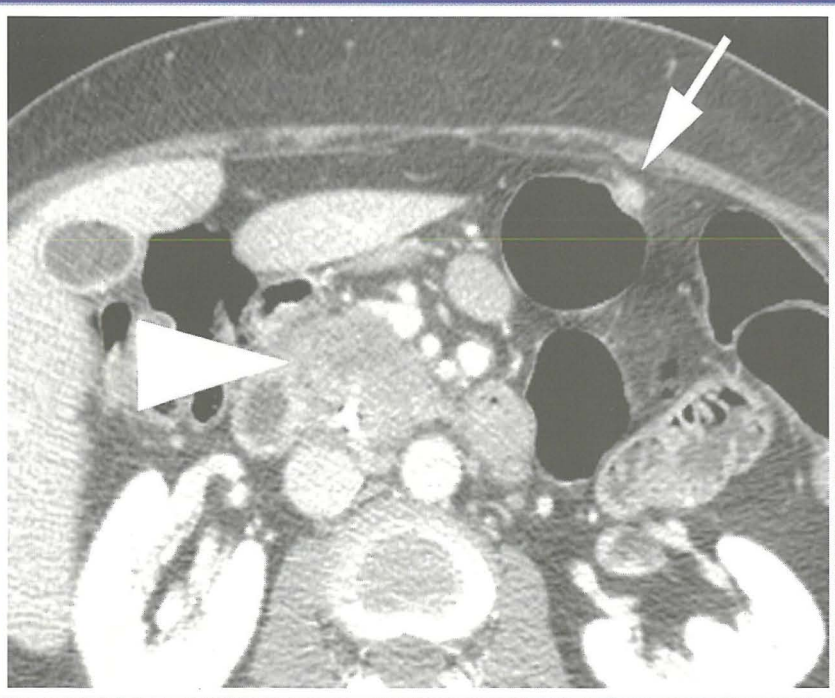


Figure 10. *Contrast-enhanced portal venous phase image shows a nodule on the inner surface of the peritoneum (arrow), consistent with peritoneal metastases. Arrowhead indicates the primary (pancreatic) tumor.*

Dr Pierre Vassallo
can be reached at the
DaVinci Hospital on
21 491 200
or by email on
pvassallo@davincihospital.com.mt