

MCQ's for the FRCR Part 2a

PAPER 1

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Questions

1) Renal cystic disease:

- a) In patients with adult polycystic kidney disease 10% have coexisting aneurysms of the circle of Willis.
- b) There is a marked male predominance regarding simple serous cysts.
- c) Multicystic renal dysplasia usually presents in early adulthood.
- d) Simple serous cysts show uniform enhancement on CT after injection of iodinated contrast.
- e) Simple serous cysts have a high level of Lactic Dehydrogenase.

2) Renal cell carcinomas:

- a) The majority are hypervascular.
- b) Are associated with von Hippel-Lindau syndrome.
- c) Calcification occurs in over 50%.
- d) Produce a photopaenic area on Tc 99m dimercapto-succinic acid (DMSA) radio-isotope scanning.
- e) On angiography show arterial vasoconstriction after injection of adrenaline.

3) Angiomyolipomas:

- a) Are more common in middle-aged women.
- b) Are prone to haemorrhage.
- c) When isolated usually occur on the left side.
- d) Occur in 80% of patients with tuberous sclerosis.
- e) Is most reliably diagnosed on angiography.

4) The diagnosis of pulmonary embolism on Ventilation/Perfusion scan:

- a) Has a high probability when the stripe sign is present
- b) Is unlikely if the Ventilation/Perfusion scan is normal 24 hours after admission.
- c) Is increased if a mismatched defect is seen in the lung apex.
- d) If the V/Q is of low probability a pulmonary angiogram must be performed.
- e) Emphysematous bullae usually cause matched defects.

5) In renal malignancy:

- a) A purely cystic mass excludes the diagnosis of Wilm's tumour.
- b) Renal parenchyma is usually hypoechoic or anechoic in lymphoma.
- c) The 'stipple sign' on retrograde pyeloureterography is diagnostic of transitional cell carcinoma.
- d) Squamous cell carcinoma carries a good prognosis.
- e) Transitional cell carcinomas show punctate calcific deposits in over 50%.

6) Renal calculi:

- a) Urate acid stones comprise 2% of all calculi in the UK.
- b) Uric acid stones are radio-opaque on a plain abdominal film.
- c) Calcium oxalate stones are commoner in females.
- d) Magnesium ammonium phosphate stones caused by infection are commoner in males.
- e) Penicillamine aids dissolution of calculi in homocystinuria.

7) In the staging of renal cell carcinoma:

- a) Size is known to be a reliable criterion for the definition of malignant tumours.
- b) Cystic tumours tend to have a better prognosis.
- c) More than one third of patients will have distant metastases at the time of presentation.
- d) In stage IV tumours chemotherapy is a useful adjunct to radical nephrectomy.
- e) US is superior to CT in demonstrating the relationship of right upper pole tumours to the liver.

8) Recognised features of Neuroblastoma are:

- a) Uptake by the primary tumour of ^{99m}Tc MDP.
- b) Diarrhoea.
- c) An association with aniridia and hemihypertrophy.
- d) Nystagmus.
- e) Calcification in liver metastasis.

9) In an acute obstructive uropathy:

- a) Spontaneous extravasation invariably leads to some degree of renal impairment.
- b) Is a cause of gall bladder opacification.
- c) Produces an increasingly dense nephrogram.
- d) There is enhanced reabsorption of fluid from the tubules.
- e) The ureter may be tortuous and dilated.

10) Retroperitoneal fibrosis:

- a) Caused by prolonged methysergide therapy is irreversible.
- b) Can occur in polyarteritis nodosa.
- c) May show contrast enhancement on CT.
- d) May extend into the mediastinum.
- e) Is more common in women.

11) Bile duct neoplasms:

- a) There is an association between gallstones and an increased incidence of cholangiocarcinoma.
- b) Mirizzi syndrome occurs when a cholangiocarcinoma involves the confluence of the right and left hepatic ducts.
- c) Benign cystadenomas are more common in young females.
- d) Choledochal cysts have an increased incidence of malignant change.
- e) Tc-^{99m} HIDA scintigraphy will not distinguish between choledochal cyst or hepatic cyst.

12) In US of the biliary tract:

- a) The diameter of the non-obstructed common hepatic duct increases with age.
- b) Dilated intra-hepatic bile ducts display distal acoustic enhancement.
- c) A non dilated biliary tract excludes the possibility of obstruction.
- d) Biliary tract dilatation may precede the onset of clinically detectable jaundice.
- e) US is better at assessing stones in the distal portion of the common duct than stones in the proximal portion.

13) In Doppler US:

- a) Smooth plaques which reduce the arterial lumen by less than 50% do not reduce the volume of blood flowing through a vessel segment.
- b) Conventional imaging to detect waveform indices relies on the use of `continuous wave` ultrasound doppler equipment.
- c) `Plug` flow in a vessel produces a narrow range of frequencies on spectral analysis.
- d) In Doppler studies of the portal vein a beam/vessel angle of 2 degrees is inadequate for accurate assessment of velocity.
- e) The external carotid artery shows a continuous forward flow in diastole.

14) In diverticular disease:

- a) Diverticulitis can only be diagnosed on a double contrast enema if inspissated faecal material is seen within the diverticulum.
- b) Jejunal diverticula are a more common finding in women.
- c) Lymphoma is a cause of pseudodiverticula in the jejunum.
- d) In the duodenum are most common in the 4th part.
- e) Diverticulitis is the most common cause for colo-vesical fistulae.

15) In the normal breast:

- a) The major interlobar lactiferous ducts are lined by a single layer of cuboidal epithelium.
- b) The breast of a parous woman is less glandular than the breast of a nulliparous woman of the same age.
- c) Cooper`s ligaments are derived from the fascia of the chest wall.
- d) With pregnancy, the acini undergo hypertrophy.
- e) On mammography, breast density increases with age.

16) In benign lesions of the breast:

- a) On US, the presence of internal echoes within a mass excludes the diagnosis of fibroadenoma.
- b) Fibroadenomas tend to regress with age.
- c) `Floating` calcification within a cyst implies that the lesion is malignant.
- d) Skin thickening can occur in papilloma.
- e) A breast abscess is usually located in the upper, outer quadrant.

17) The following are correctly linked:

- a) Kohler`s disease : osteonecrosis of the metatarsal head.
- b) Scheuermann`s disease : compression of the medial tibial plateau.
- c) Osteochondritis dissecans : ischaemic necrosis of the medial femoral condyle.
- d) Kienbock`s disease : dense irregularity of the calcaneal apophysis.
- e) Perthes` disease : obesity.

18) Bronchopulmonary sequestration:

- a) Is more common on the left.
- b) May communicate with the oesophagus.
- c) Intralobar is more common than extralobar sequestration.
- d) Is more common in females.
- e) May show multiple, fluid-filled cystic spaces on CT.

19) The following are causes of a pulmonary eosinophilia:

- a) Aspergillus.
- b) Toxocara canis.
- c) Nitrofurantoin.
- d) Methotrexate.
- e) Busulphan.

20) Cirrhosis of the liver on US:

- a) May show hypertrophy of the caudate lobe.
- b) Micronodular cirrhosis is associated with a greater incidence of hepatoma.
- c) Causes increased echogenicity of the portal vein walls.
- d) Can be reliably differentiated from fatty liver.
- e) Can cause focal changes similar to metastatic disease.

21) Prominent periportal echoes on US can be caused by:

- a) Viral hepatitis.
- b) Acute cholecystitis.
- c) Post ERCP.
- d) Klatskin tumours.
- e) Gaucher`s disease.

22) Bladder cancer:

- a) CT assessment is more accurate in the early stages of the disease.
- b) For delineation of the bladder wall on MRI a T1 weighted sequence is preferred.
- c) The advantage of MRI in staging is its ability to demonstrate tumour extension through the bladder wall into perivesical fat.
- d) Can show calcification on plain film.
- e) Bladder wall invasion on US is seen as a hyperechoic area causing loss of wall continuity.

23) Meta iodo benzyl guanidine (MIBG) uptake is seen in the following:

- a) Carcinoid tumour.
- b) Neurofibromatosis.
- c) Pheochromocytoma.
- d) Neuroblastoma.
- e) Transitional cell carcinoma of bladder.

24) The following are features of scleroderma:

- a) Malabsorption.
- b) Interstitial lung disease more marked in the upper zones.
- c) Erosion of the inferior aspects of the ribs.
- d) Situs inversus.
- e) Positive Rheumatoid factor.

25) Causes of generalised retarded skeletal maturation:

- a) Hepatoma.
- b) Rheumatoid arthritis.
- c) Cyanotic congenital heart disease.
- d) Trisomy 21.
- e) Hypothyroidism.

26) The following bone changes may be seen in Cushing`s syndrome:

- a) Accelerated skeletal maturation in children.
- b) Generalised increased bone density.
- c) Excessive callus formation during healing.
- d) Avascular necrosis.
- e) "Fish" vertebrae.

27) The following are features of achondroplasia.

- a) Rhizomelic limb shortening.
- b) Autosomal recessive inheritance.
- c) Reduced intelligence.
- d) Anterior vertebral scalloping.
- e) Narrow sciatic notch.

28) The following bone dysplasias affect predominantly the metaphyses:

- a) Hyperphosphatasia.
- b) Cleidocranial dysostosis.
- c) Osteopetrosis.
- d) Pyle`s disease.
- e) Hurler`s syndrome.

29) The following are transmitted as autosomal dominant:

- a) Morquio`s syndrome (MPS IV).
- b) Achondroplasia.
- c) Cleidocranial dysplasia.
- d) Osteopetrosis Tarda.
- e) Alkaptonuria.

30) These radiological features are seen in dysostosis multiplex:

- a) Odontoid hypoplasia.
- b) Trident shaped hands.
- c) Madelung deformity.
- d) `J-shaped` sella.
- e) Pointing of the proximal ends of the metacarpals.

31) Fibrous dysplasia:

- a) Is transmitted as an autosomal recessive.
- b) Is associated with hyperparathyroidism.
- c) The bone lesions are symmetrical.
- d) Periosteal new bone is a common feature.
- e) Can cause exophthalmos.

32) Features of Nail-patella syndrome:

- a) Narrow spinal canal.
- b) Renal dysplasia.
- c) Iliac horns.
- d) Short 5th metacarpal.
- e) Cubitus valgus.

33) Radiological features of osteogenesis imperfecta are:

- a) Multiple Wormian bones.
- b) Biconcave vertebral bodies.
- c) Dental caries.
- d) Acro-osteolysis.
- e) "Concertina" fractures.

34) The following are associated:

- a) Caroli's disease and congenital hepatic fibrosis.
- b) Primary sclerosing cholangitis and retroperitoneal fibrosis.
- c) Ankylosing spondylitis and lower zone fibrosis.
- d) von Hippel-Lindau syndrome and mediastinal fibrosis.
- e) Alveolar proteinosis and Nocardia.

35) Choanal atresia:

- a) When unilateral presents with acute respiratory difficulty in the newborn infant.
- b) Is more frequently unilateral.
- c) Membranous obstruction is more common than bony obstruction.
- d) Is a cause of chronic upper airway obstruction in a child.
- e) The diagnosis can usually be made on the plain film.

36) Juvenile angiofibroma:

- a) Is a benign lesion.
- b) Is seen exclusively in females.
- c) Routinely requires biopsy for diagnosis
- d) Bone destruction is more accurately assessed on MR.
- e) Is of high signal on T1 weighted SE sequences.

37) Histoplasmosis:

- a) Disseminated disease is common.
- b) Hilar lymphadenopathy is uncommon.
- c) Can be a cause of SVC obstruction.
- d) May cavitate.
- e) Can cause punched out lucencies in the skull.

- 38) Increased lung permeability as assessed with ^{99m}Tc DTPA aerosol ventilation studies is seen in the following conditions:
- Sarcoidosis.
 - Emphysema.
 - Cigarette smoking.
 - COAD.
 - PCP.
- 39) Giant cell tumours of bone:
- Are rarely seen after epiphyseal closure.
 - Are relatively avascular.
 - Are seen as eccentric photopaenic areas on radionuclide bone studies.
 - Does not metastasize.
 - Can have a multilocular appearance on plain film.
- 40) Involvement of the central nervous system by sarcoidosis:
- Is a cause of hydrocephalus.
 - May present as a space occupying lesion.
 - Can be a cause of intracranial calcification.
 - Show uniform enhancement on CT.
 - Has a characteristic appearance on noncontrasted MR.
- 41) Features of cystic hygroma:
- Has an equal sex incidence.
 - Communication with the lymphatic system.
 - Are commonly multilocular.
 - Can be detected prenatally.
 - May suggest chromosomal abnormality.
- 42) **Osteochondroma:**
- Is almost always found in the metaphysis.
 - When multiple is termed diaphyseal aclasis.
 - Occurs in the calvarium of the skull.
 - Point towards the adjacent joint.
 - Soft tissue calcification suggests malignant transformation.
- 43) Cysticercosis:
- Is due to infestation with the tapeworm *Echinococcus granulosus*.
 - The CNS is involved in up to 60 - 90% of infected people.
 - A negative radiograph excludes cysticercosis.
 - The heart is not involved.
 - MR is superior to CT at demonstrating end stage calcification.
- 44) **Adrenal tumours:**
- May be associated with medullary carcinoma of the thyroid.
 - Calcification may be seen in up to 70% of cases of neuroblastoma.
 - Conn's adenoma is of high attenuation on CT.
 - Pre-operative assessment by angiography is necessary in phaeochromocytoma.
 - Angiomyolipomas appear bright on T1 weighted images.
- 45) **Chordoma:**
- Is most common in the cervical region.
 - Females are affected more commonly than males.
 - Metastases do not occur.
 - May calcify.
 - Are highly radioresponsive.

46) Pancreatic insulinoma:

- a) Is the most common functioning islet cell tumour.
- b) Arises most frequently in the tail of the pancreas.
- c) Malignant transformation occurs in 90%.
- d) Is hyperechoic on US.
- e) Are hyperdense compared to normal pancreatic tissue on precontrast CT.

47) Eosinophilic granuloma:

- a) Is commonest in 1-3 year olds.
- b) Monostotic is more common than polyostotic disease.
- c) Can cause `honeycomb lung`.
- d) Radiological skeletal changes are predominantly sclerotic.
- e) Is a cause of anterior scalloping of vertebral bodies.

48) Concerning gastric malignancy:

- a) Incidence is increased in Peutz-Jegher`s syndrome.
- b) Ulceration is uncommon in leiomyosarcoma.
- c) Leiomyoma does not calcify.
- d) Primary gastric lymphoma is usually Hodgkin`s lymphoma.
- e) Is more common on the greater curvature.

49) Osteoid osteoma:

- a) Is usually painless.
- b) Is predominantly epiphyseal.
- c) Affects mainly the pelvis and shoulder girdle.
- d) Periosteal reaction is minimal.
- e) The tumour nidus appears photopaenic on scintigraphy.

50) Brodie`s abscess:

- a) Is tuberculous in origin.
- b) Usually occur prior to fusion of the growth plates.
- c) Both the metaphysis and epiphysis are usually involved.
- d) Plain film commonly shows a lucent area within the medulla with well-defined marginal sclerosis.
- e) Produces a `double line` effect on MR.

51) Causes of increased uptake on bone scans:

- a) Septic arthritis.
- b) Non-accidental injury.
- c) Avascular necrosis.
- d) Paget`s disease.
- e) Perthes` disease.

52) Soft tissue uptake of diphosphonate is seen in:

- a) Amyloid.
- b) Systemic sclerosis.
- c) Uterine fibroid.
- d) Malignant pleural effusion.
- e) Splenic infarct.

53) In CT scanning of the mediastinum:

- a) Anatomical staging influences the prognosis in small cell lung cancer.
- b) 50% of nodes 1 - 1.5 cm in diameter are involved by tumour.
- c) Contiguity of tumour mass with mediastinal pleura indicates unresectability.
- d) CT is more accurate than mediastinoscopy at assessing nodal involvement.
- e) Persistent left superior vena cava may mimic a mediastinal mass.

54) The following patterns of bronchiectasis are correctly linked:

- a) Allergic bronchopulmonary aspergillosis : lower lobe, cylindrical bronchiectasis.
- b) Post-pertussis : unilobar, cystic bronchiectasis.
- c) Cystic fibrosis : lower lobe, varicose bronchiectasis.
- d) Hypogammaglobulinaemia : lower lobe, cylindrical bronchiectasis.
- e) Japanese panbronchiolitis : panlobular cylindrical bronchiectasis.

55) Recognised features of PCP are:

- a) Discrete pulmonary nodules.
- b) Pleural effusions.
- c) Nephrocalcinosis.
- d) Interstitial pattern.
- e) Pneumothorax.

56) Pulmonary calcification is seen in:

- a) Alveolar cell carcinoma.
- b) Wegener`s granulomatosis.
- c) Rheumatoid nodules.
- d) Metastatic papillary carcinoma of thyroid.
- e) Histiocytosis X.

57) In HRCT of the chest:

- a) Radiation dose to the patient is increased compared with a conventional 10 mm contiguous section protocol.
- b) The majority of patients with fibrosing alveolitis show a predominantly `ground glass` pattern.
- c) `Subpleural lines` are diagnostic of asbestosis.
- d) Centrilobular emphysema typically has a surrounding wall of fibrous tissue which can measure up to 2mm.
- e) Air trapping produces areas of increased lung attenuation.

58) Looser`s zones:

- a) Are typically asymmetrical.
- b) Are commonly found in the scapulae.
- c) Are associated with fibrous dysplasia.
- d) Are seen in aluminium toxicity.
- e) Appear on isotope scanning before evident on plain film.

59) Synovial sarcoma (malignant synovioma):

- a) Usually occur within a joint capsule.
- b) Do not metastasize.
- c) Rarely calcify.
- d) Periarticular osteoporosis is uncommon.
- e) Has a high signal on T1 weighted images.

60) Cerebellar haemangioblastoma:

- a) Is the most common primary adult posterior fossa tumour.
- b) Is hypodense compared to normal brain on CT.
- c) Is associated with renal cell carcinoma.
- d) Frequently calcifies.
- e) Does not enhance on CT.

Answers

1) Renal cystic disease:

- a) T In one third of patients with APKD cysts will also be seen in the liver.
- b) F The sex distribution is equal.
- c) F One of the commonest causes of abdominal mass in the newborn. In adulthood is usually detected coincidentally by the presence of curvilinear calcification in the renal area.
- d) F
- e) F Low LDH.

2) Renal cell carcinomas:

- a) T Under 20% are hypovascular. Hypervascular RCCs may demonstrate vascular lakes and early venous filling on angiography. Hypovascularity tends to be associated with papillary cell type which pursues a more indolent course.
- b) T Occurs in 10 - 25% and is bilateral in 1 - 3%.
- c) F Occurs in 10 - 20%.
- d) T Due to non-functioning renal tissue.
- e) T

3) Angiomyolipomas:

- a) T Angiomyolipomas are benign hamartomatous lesions containing varying amounts of fat, smooth muscle and blood vessels. Isolated angiomyolipomas arise in patients 40 to 60 years of age. There is a marked female predominance.
- b) T A cause of flank pain and haematuria. Tumours greater than 4 cm in diameter have a greater risk of bleeding.
- c) F In isolated AML with no stigmata of tuberous sclerosis 80% occur on the right side.
- d) T Tuberous sclerosis is one of the phakomatoses (neurocutaneous syndromes). It is characterised by autosomal dominant inheritance and clinically by seizures, mental retardation, and adenoma sebaceum of the skin. It is frequently associated with visceral lesions such as cardiac rhabdomyomas, renal angiomyolipomas and pancreatic cysts. About 80% of patients with tuberous sclerosis have AMLs which are often multiple and bilateral.
- e) F CT is the investigation of choice. It is far more sensitive in the imaging of fat. In the absence of fat it may be difficult to differentiate from renal cell carcinoma.

4) The diagnosis of pulmonary embolism on Ventilation/Perfusion scan:

- a) F The stripe sign is a rim of normally perfused lung peripheral to a mismatched perfusion defect. This appearance is usually due to central emphysema.
- b) F A positive V/Q may become normal within 24 hours of anticoagulation. 50% of patients under 40 years of age have complete resolution.
- c) F It is unusual for a PE to be in the lung apex. The apical mismatch is usually due to TB scars.

- d) F An alternative diagnosis must be considered unless the clinical suspicion is very high.
- e) T Unless there is a large communication with the airways when they may cause a mismatched defect.
(a) (*GJ Nuclear Medicine Dec. 1994*)

5) In renal malignancy:

- a) F Distinctly uncommon but documented. Most Wilm`s tumours are predominantly solid, and may have anechoic areas related to necrosis and haemorrhage.
- b) T
- c) F This occurs due to trapping of contrast medium within the folds of the papillary growth. Reflux may produce a similar appearance.
- d) F Poor due to early metastases. There is a strong association with chronic infection, calculus disease or schistosomiasis.
- e) F Uncommon, less than 10%.

6) Renal calculi:

- a) T But frequency increases on travelling East to 20% in Germany and 35% in Israel.
- b) F They are radiolucent.
- c) F They are commoner in males.
- d) F They are commoner in females.
- e) F Penicillamine is used in the treatment of cystine stones in cystinuria, characterised by excretion of dibasic amino acids cystine, lysine, arginine and ornithine.

7) In the staging of renal cell carcinoma:

- a) F Some small tumours of less than 3cm will metastasize early while larger tumours may remain quiescent and contained within the renal capsule.
- b) F The pattern of tumour growth may present in 4 forms: papillary, trabecular, cystic and solid. These are unrelated to clinical behaviour apart from the papillary tumours which appear to carry a better prognosis than the others.
- c) T Unfortunately RCC is often diagnosed late because of its varied forms of presentation. The complete classic triad of symptoms comprising frank haematuria, palpable mass and flank pain occurs in less than 11% of patients.
- d) F Currently there is no known effective form of chemotherapy available.
- e) T However US cannot distinguish the planes between the perinephric fat and the renal fascia which means it is unable to distinguish accurately between Stage I and Stage II tumours.
Clin. Rad. (1994) 49, 223-230.

8) Recognised features of Neuroblastoma are:

- a) T ^{99m}Tc MDP frequently allows detection of both primary and secondary deposits. ^{123I} MIBG possesses similar properties.
- b) T Due to an increase in vasoactive intestinal polypeptides.

- c) F This is a feature of Wilm`s tumour.
- d) T A feature in 20% due to cerebellar metastasis.
- e) T Stippled or amorphous calcification occurs in the primary tumour in up to 70%. Lymph node and liver metastases can also calcify.

9) In an acute obstructive uropathy:

- a) F Spontaneous extravasation may be alarming but is usually a benign, self-limiting process, unless there is infection or continuing obstruction and leakage.
- b) T The mechanism is unclear.
- c) T An `obstructive ` nephrogram results in high concentrations of contrast medium in the tubules. The nephrogram may persist for up to 48 hours.
- d) T As part of the compensatory mechanism there is pyelosinus and pyelovenous backflow via forniceal tears and increased tubular reabsorption of fluid. It is thought that the GFR is reduced due to afferent arteriolar vasoconstriction.
- e) F This is a feature of chronic obstruction.

10) Retroperitoneal fibrosis:

- a) F It is thought to be reversible.
- b) T
- c) T Particularly when active inflammation is present.
- d) T
- e) F In both primary and secondary retroperitoneal fibrosis there is a male preponderance M:F= 2:1.

11) Bile duct neoplasms:

- a) T Also liver fluke infestation, biliary papillomas and chronic ulcerative colitis complicated by sclerosing cholangitis. An increased incidence is also seen in choledochal cyst.
- b) F This is called a Klatskin tumour.
- c) T Benign cystadenomas originate from the bile duct epithelium but do not usually communicate with the biliary tree.
- d) T There is an increased incidence of cholangiocarcinoma. Other complications include biliary cirrhosis, recurrent cholangitis and portal hypertension.
- e) F Tc-99m HIDA will confirm that a choledochal cyst is in continuity with the biliary system.

12) In US of the biliary tract:

- a) T It also increases after cholecystectomy and if there has been previous obstruction.
- b) T Clear bile transmits sound without attenuation, unlike blood which attenuates the US beam at about the same rate as the liver.

- c) F This is well documented especially if the obstruction is of recent onset. Dilatation is also less likely to occur if the obstruction is due to encasement of the common duct by tumour, or fibrosis of the duct wall, or there is loss of compliance of the surrounding liver parenchyma.
- d) T This may occur when ;1. some segments of the intra-hepatic biliary tree are affected by tumour while other parts remain unaffected; 2. stones in the duct create a ball-valve effect ;3 in chronic incomplete obstruction such as carcinoma of the head of the pancreas. However, while the serum bilirubin may not be elevated, the serum alkaline phosphatase is more sensitivThis is usually raised if the dilatation is pathological.
- e) F Gas in the 1st and 2nd parts of the duodenum hinders examination of the distal duct.

- (i) *Clinical Ultrasound. A Comprehensive Text.*
(ii) *Abdominal and General Ultrasound.*
(iii) *Ed. Cosgrove, Meire and Dewbury.*
(iv) *Pub. Churchill Livingstone Longman Group UK Ltd.1993*

13) In Doppler US:

- a) T Therefore if volume flow is maintained despite a reduction in cross-sectional area there must consequently be an increase in flow velocity at the site of narrowing.
- b) F `Continuous wave` US utilises 2 separate transducers and can supply no information about the depth from which a signal originates. Pulsed Doppler is able to determine the depth from which signals arise by calculating the time between transmission and reception.
- c) T In `plug flow` most of the blood is moving at similar velocities producing a narrow range of frequencies on spectral analysis. In parabolic flow there is a wide range of velocities giving rise to a broad spectrum of frequencies.
- d) F The Doppler signal depends on the cosine of theta (the beam/vessel angle). When theta is 90` therefore no signal is obtained. Ideally the beam/vessel angle should be no greater than 60`.
- e) F The external carotid artery characteristically shows low or absent end diastolic velocities because it is supplying a high pressure system.

14) In diverticular disease:

- a) F The presence of a faecolith is a common finding. It may subsequently cause abrasion and lead to inflammation.
- b) F Twice as frequently in men.
- c) T Other causes are scleroderma and Crohn`s disease.
- d) F They invariably occur in the 2nd part.
- e) T Diverticulitis is responsible for over 50% of cases. Other complications are recurrent urinary tract infections, pneumaturia, and faecaluria.

15) In the normal breast:

- a) F The acini are lined by a single layer of cuboidal epithelium. These drain into the columnar epithelium of the smaller ducts and then into the stratified squamous epithelium of the major ducts.
- b) T When lactation stops, the glandular tissue involutes so that the breast is even less glandular than it was prior to pregnancy.
- c) T The fascia of the chest wall splits into anterior and posterior layers to envelop the breast. The

fascia forms septa called Cooper's ligaments which attach the breast anteriorly to the skin and posteriorly to the fascia of the pectoralis muscle.

- d) F The number of acini is increased.
- e) F The breasts of a young nulliparous woman tend to be diffusely dense. In middle-aged parous women fibroglandular density is confined largely to the upper and outer quadrant. In older women there is even greater fatty replacement of breast tissue.

16) In benign lesions of the breast:

- a) F On US fibroadenomas tend to have smooth, well-defined margins. Internal echoes are not uncommon and are frequently homogeneously distributed. Typically a fibroadenoma is well defined, is homogeneous and may display distal acoustic enhancement. On US carcinoma cannot be reliably excluded.
- b) T They are composed mainly of glandular tissue and therefore are gradually replaced by fatty tissue.
- c) F 'Milk of calcium' or 'floating' calcification represents layering in tiny microcysts and means that a lesion is probably benign.
- d) F Although it may present with unilateral nipple discharge. Skin thickening or retraction implies a malignant process, but can also be caused by previous biopsy, fat necrosis, breast inflammation and radiation therapy.
- e) F They are usually retro-areolar, occurring in young primiparous women during lactation.

17) The following are correctly linked:

- a) F Kohler's disease is an ischaemic necrosis affecting the navicular bone.
- b) F Scheuermann's disease is damage to the vertebral body growth plate which may result in anterior wedging or platyspondyly.
- c) T The most common site is the lateral aspect of the medial femoral condyle.
- d) F Kienbock's disease is ischaemic necrosis affecting the carpal lunate.
- e) F Perthes' disease is osteochondrosis of the femoral head, not to be confused with a slipped capital femoral epiphysis which is associated with obesity.

18) Bronchopulmonary sequestration:

- a) T Usually the posterior basal segment of the left lower lobe.
- b) T It arises as an accessory tracheobronchial foregut bud, hence its systemic arterial supply.
- c) T Intralobar is about 3x more common and usually presents in adulthood. It is enclosed by the visceral pleura of the affected pulmonary lobe. Systemic feeding vessels originate from the descending thoracic aorta. Vascular drainage into the left atrium occurs through the normal pulmonary veins resulting in a left-to-left shunt. Associated congenital abnormalities are rare. Extralobar sequestration has its own pleural sheath which prevents collateral air drift and usually presents in neonates. 90% are contiguous with the left hemidiaphragm in the thorax. Systemic feeding vessels commonly originate from the thoracic or abdominal aorta (80%), or from the splenic, gastric, subclavian or intercostal arteries. Vessels drain into the systemic circulation through the IVC, azygos or hemiazygos veins. Associated congenital abnormalities are frequent.
- d) F Is more common in males.

- e) T A plain chest radiograph often shows a sharply circumscribed, oval or triangular opacity at the left lung base. CT demonstrates a low attenuation soft tissue mass. Cystic spaces, if present, represent dilated bronchioles filled with gelatinous mucus or pus. CT may be useful in deciding which patients with a persistent basal pneumonia should go on to angiography. This remains the only modality to demonstrate adequately unusual vascular sources such as the splenic, gastric, subclavian or intercostal arteries.

19) The following are causes of a pulmonary eosinophilia:

- a) T Pulmonary eosinophilia can be defined as an eosinophilic pulmonary infiltrate usually associated with an excess of eosinophils in the peripheral blood. The commonest causative agent in the UK is *Aspergillus*.
- b) T
- c) T Typically causes interstitial pulmonary oedema or a mixed alveolar and interstitial pattern.
- d) F Causes an alveolitis without an associated eosinophilia.
- e) F Causes an alveolitis without an associated eosinophilia.

20) Cirrhosis of the liver on US:

- a) T There is often relative sparing of the caudate lobe. The caudate lobe usually measures half the width of the right lobe.
- b) F Micronodular cirrhosis (1-5mm) is usually due to alcoholism. Macronodular cirrhosis (up to several cm) is usually due to hepatitis B. Hepatoma may complicate 5% of cases.
- c) F Most advanced cases of liver cirrhosis will show a bright hepatic parenchyma. Increased hepatic echogenicity reduces the apparent echogenicity of the portal vein walls.
- d) F US is accurate at showing parenchymal abnormality in biopsy proven cases of cirrhosis but cannot differentiate between cirrhosis and fatty liver.
- e) T Regenerating nodules are usually very small (2-3mm) and cannot be imaged sonographically, but large regenerating nodules may simulate metastases.

1. Differential diagnosis in abdominal US

21) Prominent periportal echoes on US can be caused by:

- a) T The liver may appear normal in acute or mild cases. However, more severe cases of viral hepatitis may show reduced parenchymal echogenicity which make periportal echoes appear relatively more prominent.
- b) T This is documented. Other signs on US may be GB wall thickening greater than 3mm or hazy delineation of the gallbladder wall.
- c) T Air in the biliary tree is a recognised cause.
- d) T Cholangiocarcinoma particularly at the confluence of the right and left hepatic ducts is a cause.
- e) F Gaucher's disease causes hepatomegaly and is a cause of diffusely increased liver echogenicity.

1. Diff. Diagnosis in Abd. US

22) Bladder cancer:

- a) F CT reliability increases with more advanced disease. In the early stages the only abnormality may be bladder wall thickening which is a non-specific finding. CT is unable to differentiate between the different layers of the bladder wall and cannot assess deeper muscle invasion.
- b) F Both urine and smooth muscle have relatively long relaxation times on T1 weighting and are therefore seen with relatively low signal intensity. On T2 weighting the difference between the two is more marked, the bladder wall being visualised with a low signal intensity in contrast to the high intensity urine.
- c) T T2 weighting will allow assessment of deep muscle invasion and T1 weighted sequences are optimal for assessing perivesical tumour extension.
- d) T But the incidence is low, about 0.5%. Both transitional cell and squamous cell carcinoma can calcify. It may appear as linear, curvilinear or stippled.
- e) F Tumour spreading into the bladder wall is seen as an hypoechoic area. More extensive spread may be seen as hypoechoic tumour extending into the perivesical fat, although if the tumour is seen in the bladder dome or base staging accuracy may be as low as 38%.

23) Meta iodo benzyl guanidine (MIBG) uptake is seen in the following:

- a) T Apudomas or tumours of neural crest origin are capable of accumulating I 131 MIBG.
- b) F Normal activity is seen in the liver, spleen, bladder, salivary glands, myocardium, lungs; 85% of the injected dose is excreted unchanged by the kidneys.
- c) T Tumours as small as 0.2gm have been detected. There is an 80-90% sensitivity and more than 90% specificity.
- d) T Other tumours are medullary thyroid carcinoma, nonfunctioning retroperitoneal neuroendocrine tumour and adrenal metastasis of choriocarcinoma.
- e) F This is not recognised.

24) The following are features of scleroderma:

- a) T Small bowel involvement occurs in up to 45%. Malabsorption occurs because of delayed intestinal transit and bacterial overgrowth.
- b) F Lung involvement occurs in 10-25%. Changes include reticular shadowing, diffuse interstitial infiltrates, honeycombing and volume loss. Aspiration pneumonitis secondary to gastro-oesophageal reflux is not uncommon.
- c) F Symmetrical erosions are seen on the superior surfaces, predominantly the posterior aspects of the 3rd to 6th ribs.
- d) F Not a recognised feature.
- e) T RF is positive in 30%. 50% of patients have articular involvement usually affecting the fingers, wrists and ankles. There is resorption of the terminal phalanges with atrophy of the soft tissues; bony erosions of the distal interphalangeal, 1st carpometacarpal, metacarpophalangeal and metatarsophalangeal joints without significant osteoporosis.

25) Causes of generalised retarded skeletal maturation:

- a) F A cause of accelerated maturation.
- b) F A cause of localised accelerated maturation.

- c) T Congenital heart disease and particularly cyanotic disease is a cause.
- d) T Most chromosome disorders are a cause of delayed maturation.
- e) T Acquired juvenile hypothyroidism usually shows some delay in ossification. Other changes include enlargement of the sella turcica and slipping of the capital femoral epiphyses. Congenital hypothyroidism (cretinism) causes a marked delay in appearance of ossification centres and in their growth. Those ossification centres which do appear are often irregular and stippled. Other changes are stunted growth, delayed dentition, thickening of the cranial vault, brachycephaly (premature closure of the coronal / lambdoid sutures) and hypoplasia of the sinuses and mastoids.

26) The following bone changes may be seen in Cushing's syndrome:

- a) F Cushing's syndrome is the result of an increase in endogenous or exogenous cortisol. Endogenous Cushing's disease is as a result of pituitary disease, usually adenoma. Adrenal causes of Cushing's syndrome include adrenocortical hyperplasia and adrenal adenoma or carcinoma. Ectopic ACTH from carcinoma of the bronchus is a further source. Iatrogenic administration of corticosteroids is however the most common cause. In children Cushing's syndrome is a cause of delayed skeletal maturation.
- b) F Osteoporosis occurs.
- c) T This causes increased density under end plates of compressed vertebral bodies (marginal condensation) and around fractures in long bones and ribs.
- d) T Avascular necrosis particularly of the femoral heads is not uncommon in cases of exogenous steroid administration but occurs infrequently in cases of endogenous production.
- e) T Changes in vertebral body shape occur producing a biconcave appearance.

27) The following are features of achondroplasia.

- a) T The term 'rhizomelic' refers to shortening affecting the humerus and femur, 'mesomelic' the forearm and lower leg and 'acromelic' the hands and feet. Endochondral growth rate is reduced resulting in shortening of the long bones but normal girth is maintained.
- b) F It is transmitted as an autosomal dominant although most (80%) of the cases are sporadic. It affects males more commonly than females.
- c) F Sufferers possess normal intelligence and motor function is maintained.
- d) F Posterior vertebral scalloping occurs. Vertebral bodies are also reduced in height and reduced activity at the pedicular growth plates results in narrowing of the neural canal. In the lumbar spine a decrease in the interpedicular distance is seen caudally resulting in spinal stenosis.
- e) T In the pelvis the sacrum is low set so that one or two vertebral bodies may lie below the level of the iliac crests. The sacrum is more horizontal and appears foreshortened on the AP view. The iliac bones appear square or 'helmet' shape. The sacrosacral notch is short and narrow.

28) The following bone dysplasias affect predominantly the metaphyses:

- a) F This condition presents in the first two years of life and affects mainly the diaphyses. It has been referred to as 'juvenile Paget's disease' because of the similar radiological features. There is a generalised osteopaenia, overgrowth of the long bones and an elevated alkaline phosphatase. Increased density of the skull vault is seen in older children. Hypophosphatasia, an autosomal recessive condition with a deficiency of serum alkaline phosphatase and excessive urinary excretion of phosphoethanolamine, causes cupping and fraying of the metaphyses.

- b) T Transmitted as autosomal dominant with 30% spontaneous mutations. The skull shows retarded ossification and delayed suture closure which contain multiple Wormian bones. Basilar invagination is common. Typically, the lateral third of the clavicles are absent or hypoplastic. Delayed ossification is also seen in the pelvis producing apparent widening of the symphysis pubis. In the hand, there is tapering of the distal phalanges and cone-shaped epiphyses.
- c) T Two main forms are recognised: Tarda transmitted as autosomal dominant; and Congenita which is autosomal recessive and more severe. Normal bone modelling can occur between periods of abnormal growth which produces a `bone within a bone` appearance. Other features are a rugger jersey spine, increased bone sclerosis with transverse metaphyseal bands and increased metaphyseal diameter in the long bones producing a conical flask shape.
- d) T Metaphyseal dysplasia or Pyle`s disease (AR) demonstrates mild increase in bone density with hock bottle or Erlenmeyer flask deformity of the femora and tibia. The mandibular angle is obtuse and there is mild hyperostosis of the calvarium.
- e) F This is one of the mucopolysaccharidoses and exhibits the features of dysostosis multiplex.

29) The following are transmitted as autosomal dominant:

- a) F All the mucopolysaccharidoses are transmitted as autosomal recessive except MPS II (Hunter`s syndrome) which is X-linked.
- b) T But 80% are spontaneous mutations.
- c) T One third are new mutations.
- d) T Genetic inheritance is mainly autosomal dominant but the more severe malignant or congenita form is autosomal recessive.
- e) F The majority are inherited as autosomal recessive. An error of metabolism within the tyrosine pathway leads to an accumulation of homogentisic acid within the tissues. Its deposition leads to a black pigmentation called ochronosis.

30) These radiological features are seen in dysostosis multiplex:

- a) T Particularly prevalent in Morquio`s disease. In these patients because of the high risk from accidental injury prophylactic stabilisation of the cervical spine is recommended at about 6-8 years.
- b) F This is a feature of achondroplasia.
- c) F Radial shortening in relation to the ulna is seen in : Dyschondrosteosis (Leri-Weil disease); diaphyseal aclasis; Turner syndrome; trauma; infection.
- d) T Other features in the skull include macrocephaly with calvarial thickening.
- e) T In the hand the tubular bones are crudely shaped with proximal tapering of the metacarpals. The epiphyses are commonly small and irregular and there is tilting of the distal radius and ulna towards each other.

31) Fibrous dysplasia:

- a) F There are no known hereditary factors.
- b) T Other associated endocrine abnormalities are acromegaly; Cushing`s syndrome; hyperthyroidism and hypophosphataemic rickets.

- c) F Bony abnormalities may be monostotic or polyostotic. In the polyostotic cases the lesions tend to be unilateral; if bilateral then asymmetrical.
- d) F In the long bones cyst like lesions are seen which erode the bone cortex from within causing local expansion, endosteal scalloping and marked cortical thinning. Periosteal new bone formation is not a feature.
- e) T In the craniofacial form (Leontiasis ossea) marked bony sclerosis and thickening causes severe facial deformity leading to encroachment on neural foramina. The diploic thickening may be indistinguishable from Paget's disease.

32) Features of Nail-patella syndrome:

- a) F This is a feature of achondroplasia and hypochondroplasia in particular.
- b) T This can be a cause of renal failure in later life.
- c) T Hereditary osteo-onychodysplasia (HOOD) is an autosomal dominant condition with symmetrical abnormalities. Iliac horns are a diagnostic feature. Hypoplasia of the anterior half of the ilia results in drooping of the iliac crests with symmetrical exostoses arising from the posterior surface.
- d) T This is a recognised feature.
- e) T There is an increased carrying angle at the elbow.

33) Radiological features of osteogenesis imperfecta are:

- a) T This is one of the diagnostic features although they may be obliterated in adulthood. Osteogenesis imperfecta can be divided into two types ; osteogenesis imperfecta congenita (OIC) and a less severe tarda (OIT) variety. OIC, sometimes known as the thick bone type, is not usually compatible with life although less severe forms exist. The commonest form is Type I which accounts for 80% of cases and is transmitted as an autosomal dominant. OIT is known as the thin bone type. The incidence in Europe is about 1 in 20 000 births.
- b) T Severe osseous fragility results in flattened or biconcave vertebral bodies, some of which may have suffered compression fractures.
- c) T Poor dentition leads to an increased susceptibility to caries.
- d) F This is not a feature.
- e) T In the thick bone type bones are thick in relation to their length. This apparent shortening may be exaggerated by multiple fractures which produces a `concertina` appearance.

34) The following are associated:

- a) T Caroli's disease is congenital dilatation of the intrahepatic bile ducts. There is also an association with cystic disease of the kidney.
- b) T Primary sclerosing cholangitis is also associated with ulcerative colitis and Riedel's struma.
- c) F Upper zone fibrosis.
- d) F No such association exists. The features of von Hippel-Lindau syndrome are pancreatic and hepatic cysts with renal cell carcinoma and pheochromocytoma.
- e) T Infection is a frequent occurrence probably due to poorly functioning macrophages. Nocardia Asteroides for unknown reasons is the most common organism.

35) Choanal atresia:

- a) F Congenital atresia of the posterior nares usually presents with acute respiratory difficulty associated with feeding problems when bilateral. Incomplete or unilateral obstruction tends to present at a later age, childhood or even in young adults with nasal obstruction and discharge.
- b) T Choanal atresia is bilateral in 33% of cases.
- c) F Bony obstruction is far more common, occurring in 90%.
- d) T May be a cause of acute and chronic upper airway obstruction. In acute obstruction the lungs may appear small or of normal volume. In chronic obstruction the lungs may appear overinflated.
- e) F The diagnosis can be made clinically by failure to pass a soft catheter through the nose. The diagnosis can be made on the plain film but this is unusual. In older patients it may be suspected if the plain film shows diminished translucency on the affected half or if there is associated hypoplasia or facial asymmetry. Another feature may be a high arched palate. A more definitive diagnosis is usually made by introducing water soluble contrast through a catheter into the nasal cavity with the patient in the supine position and then taking a lateral radiograph. CT can assess whether the obstruction is bony or membranous.

36) Juvenile angiofibroma:

- a) T The most common benign nasopharyngeal tumour. It is probably hamartomatous in origin. Although benign it can grow to an enormous size and invade local structures.
- b) F It is seen virtually exclusively in males, usually in teenagers.
- c) F It is a highly vascular tumour which can present with severe epistaxis. Biopsy is extremely hazardous due to the risk of haemorrhage. Part of the radiological work up should assess the extent of the lesion and its vascularity. Some require embolisation prior to surgery to reduce the blood supply.
- d) F MR is better at showing the soft tissue extent of the tumour. Subtle bone destruction requires CT.
- e) F Characteristically the tumour is of low to intermediate signal intensity on both T1 and T2 weighted sequences. Discrete punctate areas of hypointensity are seen due to flow void channels in highly vascular stroma.

37) Histoplasmosis:

- a) F Histoplasmosis is a fungus found in moist soil and in bird or bat excreta. Human infection is found most commonly in North America. In most patients the disease is confined to the lungs and most cases are asymptomatic. Disseminated disease, however, can occur in the very young or elderly and can be fatal.
- b) F Asymptomatic disease produces patchy scarring and calcified foci in the lungs. Hilar lymphadenopathy is common, particularly in children. During healing the lymph nodes may calcify and erode into adjacent bronchi causing bronchial obstruction.
- c) T Mediastinal fibrosis can occur in a few cases and surround involved nodes leading to constriction of other mediastinal structures, particularly the superior vena cava, pulmonary arteries and pulmonary veins.
- d) T In the immunocompromised patient histoplasmosis on the plain film may take many forms: miliary nodulation resembling miliary TB; reticulonodular shadowing, resembling chronic interstitial lung disease; and patchy consolidation or multiple nodules with or without cavities.

Dissemination to extrapulmonary sites is a particular feature in the immunocompromised patient.

- e) F This is a feature of Histiocytosis X.

38) Increased lung permeability as assessed with ^{99m}Tc DTPA aerosol ventilation studies is seen in the following conditions:

- a) T
b) F Delayed permeability.
c) T The half time of disappearance of ^{99m}Tc DTPA in non-smokers is about 70 minutes. In smokers this decreases to about 20 minutes.
d) F Delayed permeability.
e) T Increased lung permeability is non-specific and may be seen in many conditions. The commonest situation to cause increased permeability is cigarette smoking. Usually the change of permeability is not significant clinically; however, if it is very rapid, it may be impossible to achieve a satisfactory ventilation study with aerosols. In cases of increased lung permeability there is rapid washout of tracer from the lungs which is demonstrated as a sharp downward slope on aerosol permeability curves. The half time of disappearance in PCP may be less than 10 minutes.

39) Giant cell tumours of bone:

- a) F It affects the 20 to 40 year age group. Only 3% of giant cell tumours occur before epiphyseal closure.
b) F Angiography is useful prior to surgery to assess vascularity. Most tumours are hypervascular.
c) F Increased uptake, particularly at the periphery of a lesion is seen on radionuclide bone studies.
d) F Although classified as a benign tumour, up to 10% of giant cell tumours develop metastases and are primarily malignant, and an additional 5% become malignant on recurrence. Local recurrence is not uncommon, depending on the choice of therapy. Treatment options include curettage and packing with allograft, autograft, or cement, curettage with freezing with liquid nitrogen and amputation.
e) T Radiographic features are usually distinctive. The tumours are seen after epiphyseal closure and may extend almost to the articular surface. Growth can be rapid resulting in expansion and osteolysis. CT shows an expanded or pushed out cortex which is remodelled around the lesion by means of periosteal new bone formation, although periosteal reaction is limited. Cortical ridges or internal septa produce a multilocular appearance.

40) Involvement of the central nervous system by sarcoidosis:

- a) T Cerebral sarcoidosis is evident in 14% of post mortems of patients dying of sarcoidosis, but in only 1-5% clinically. In neurosarcoidosis granulomatous inflammation involves the meninges or brain parenchyma. Meningeal disease is more common and results in a chronic nonpurulent process that may be diffuse and nodular or well circumscribed and masslike. An adhesive meningitis may result in cranial nerve palsies. Communicating or obstructing hydrocephalus is a common complication.
b) T Parenchymal involvement occurs less frequently. Deposits may be multiple and small or masslike and similar to a neoplasm.
c) T The lesions of neurosarcoidosis on CT scans are isodense or slightly hyperdense compared with brain and may contain calcifications.

- d) T Use of intravenous contrast produces homogeneous enhancement in active inflammations and spotty enhancement in end stage fibrosis. Intraparenchymal lesions tend to be located peripherally and demonstrate minimal surrounding oedema.
- e) F The MR appearance of intracranial sarcoidosis is highly variable. Lesions may be isointense or hypointense to cortex on T1 weighted images and hyperintense or (not infrequently) hypointense on T2 weighted images. The explanation for this variability is unknown and may depend on the amount of connective tissue stroma and fibrosis which is present. The use of gadolinium contrast markedly increases the sensitivity of MR to leptomeningeal involvement by sarcoid.

41) Features of cystic hygroma:

- a) T Cystic hygroma (cavernous lymphangioma) is a benign congenital abnormality that occurs with equal sex distribution and results from malformation of the developing lymphatic system.
- b) T It is thought that primitive endothelial lymph buds begin to dilate abnormally between the 6th and 8th gestational weeks and gradually form cystic sacs. These dilated sacs may either be separate from the normal lymphatic system or communicate with it via partially obstructed ducts.
- c) T If unilocular, hygromas are similar in appearance to other congenital masses such as branchial cleft and thyroglossal duct cysts. Hygromas are more commonly multilocular and may be indistinguishable from tuberculous adenitis, teratoma, and vascular lesions such as AVM's and haemangioma.
- d) T Prenatal sonography may detect foetal cystic hygroma during the second or third trimester.
- e) T 11-35% of foetuses with sonographically identified abnormalities have chromosomal abnormalities.

42) Osteochondroma:

- a) T Osteochondroma is the most common benign skeletal lesion. It consists of a projection of bone with a cartilage cap. Often solitary, it can occur in any bone that is preformed in cartilage and is most common in the long tubular bones, particularly those about the knee. It is almost always found in the metaphysis, rarely in the diaphysis, and never in the epiphysis.
- b) T Confusingly, given its origin from the growth plate.
- c) F This is formed from membrane.
- d) F Because they commonly occur at or near sites of tendon or ligament attachment, their orientation is determined by the direction of muscle pull, and thus most point away from the adjacent joint and migrate away from the end as growth proceeds. Growth of the lesion ceases after puberty.
- e) T Malignant degeneration to chondrosarcoma occurs in less than 1% of solitary osteochondromas and in 2% to 27% of patients with multiple hereditary osteochondromas. Radiological signs suggestive of malignant transformation include rapid growth of a stable lesion; formation of a soft tissue mass which may exhibit calcification in rings or spicules (suggesting a low grade lesion) or amorphous and irregular calcification or no calcification (suggesting a higher grade or myxoid tumour); dispersed cap calcification that is separate from the calcified area deep to the cap; and destruction and erosion of adjacent bone.

43) Cysticercosis:

- a) F Cysticercosis is due to infestation with the pork tapeworm *Taenia solium*. *Echinococcus granulosus* is the tapeworm responsible for hydatid disease.

- b) T Ingestion occurs usually by the faecal / oral route. The embryos that hatch from the ingested eggs pass through the stomach wall into the bloodstream. These embryos then pass into the eyes, skin, muscles or brain and develop into cystic larvae (cysticerci). The central nervous system is involved in up to 60-90% of people infected.
- c) F Viable cysts within the CNS may produce little host reaction. Calcification occurs in the dead cysts and this may take 1-10 years to develop. Dying cysts, however, produce toxic degeneration products which elicit intense inflammation, and symptoms (most commonly headaches or seizures) are most evident at this stage. Many patients remain asymptomatic.
- d) F It may involve heart muscle.
- e) F Both CT and MR have a role in the evaluation of cysticercosis. Initially an acute encephalitic phase can be seen, characterized by multiple enhancing nodules surrounded by severe cerebral oedema. In the chronic phase, if the lesions remain viable, nonenhancing cystic lesions are seen without surrounding oedema. As the larvae die, the cyst fluid becomes more jellylike, and the capsular membrane thickens. This membrane ring thickens and enhances on CT. On MR the capsular membrane appears as a dark rim on T2 weighted images. Following this stage, calcification begins to appear within the scolex. CT is superior in demonstrating end stage calcification, whereas MR is more sensitive in detecting subarachnoid and intraventricular cysts.

44) Adrenal tumours:

- a) T Multiple endocrine neoplasia type II (MEN II) is the association of medullary carcinoma of the thyroid (100%) with pheochromocytoma (50%) and hyperparathyroidism (10%).
- b) T The calcification is ill-defined, stippled and nonhomogeneous. Lymph node and liver metastases may also calcify.
- c) F Conn's adenoma accounts for 70% of Conn's syndrome. It is usually small, 0.5 to 1.5 cm. Homogenous relatively low density due to build up of cholesterol. 30% of Conn's syndrome is due to hyperplasia which can occasionally be nodular and mimic an adenoma.
- d) F Intra-arterial injection is contra-indicated because of the potential to induce an hypertensive crisis. Even an IV injection may precipitate an hypertensive crisis.
- e) T Adrenal angiomyolipoma is an uncommon, benign inactive tumour composed of adipose and myeloid tissue. In most lesions the fatty component is predominant and therefore appear hyperechoic on US, low attenuation on CT and are bright on T1 weighted images on MR. Symptoms may relate to mass effect or spontaneous haemorrhage may cause flank pain or even haemodynamic shock.

45) Chordoma:

- a) F Chordoma generally occurs at one of the ends of the spine; sacro-coccygeal (50%), spheno-occipital (35%), or cervical (especially C2)/thoracic/lumbar (15%).
- b) F This tumour comprises 2-4% of all bone tumours and 20% of spinal tumours. The peak incidence of sacro-coccygeal chordoma occurs in the 6th to 7th decades. Males are affected twice as frequently as females.
- c) F Haematogenous metastases (usually to lung and liver) are more common than spread to local lymph nodes. Metastases occur in the later stages of the disease and are more often associated with cervical, thoracic, or lumbar tumours than with a sacro-coccygeal primary.
- d) T Plain films usually demonstrate sacral destruction and a pelvic soft tissue mass. The bony margins of the lesion are relatively well defined, often sclerotic and sometimes expanded. Sacro-coccygeal tumours may attain a huge size within the pelvic cavity. The average size at

presentation is 10 cm. The soft tissue matrix may contain sequestra of necrotic bone, dystrophic calcification or reactive bone formation.

- e) F The tumour is relatively radioresistant. Radiation therapy therefore plays its most important role in palliation of primary or recurrent disease. Radiation induced sarcoma is a hazard in long term survivors.

46) Pancreatic insulinoma:

- a) T The most common functioning islet cell tumour associated with MEN I. It arises from B cells which comprise only 20% of the islet cell population. Islet cells arise from the amine precursor uptake and decarboxylation (APUD) system of cells which synthesise and store polypeptide hormones. Islet cells are grouped into clusters, the islets of Langerhans, which comprise approximately 2% of total pancreatic weight and are distributed unevenly throughout the pancreas. The 2nd most common islet cell tumour is gastrinoma which is derived from alpha and delta cells.
- b) F Insulinomas have no predilection for any part of the pancreas. Up to 10% are ectopic and 10% are multiple (especially in MEN I).
- c) F Malignant transformation occurs in 5-10%. The tumour occurs with equal sex distribution during the 4th and 5th decades but develops earlier in those with MEN I. Metastatic disease may require a combination of surgical debulking of both primary and secondary lesions, cytotoxic chemotherapy, and selective arterial embolisation.
- d) F The tumour is usually round or oval, sharply defined and hypoechoic relative to normal pancreas. When intraoperative sonography is performed tumour detection improves significantly because the pancreatic tail can be examined.
- e) F Insulinomas are isodense with normal pancreatic tissue and are undetectable on noncontrast CT unless the pancreatic contour is deformed. Dynamic rapid sequence scanning during IV bolus infusion increases soft tissue contrast resolution and localises tumours that are more than 2 cm in diameter. On angiography insulinomas are well-circumscribed, hypervascular and uniformly dense staining in the capillary phase. Well-defined lesions as small as 0.5 cm may be detectable by using selective angiography with digital subtraction technique.

47) Eosinophilic granuloma:

- a) F Histiocytosis X has 3 components: Eosinophilic granuloma is commonest in 4-7 year olds; Hand-Schuller-Christian disease is seen in 1-3 year olds and Letterer-Siwe disease which is the acute and rapidly progressive form of the disease usually occurs during the first year of life.
- b) T 50-75% have solitary lesions. When multiple it is usually only 2 or 3. The long bones, pelvis, skull and flat bones are most commonly involved.
- c) T If disseminated disease is going to occur it usually does so within the first 6 months of detection of the disease and is more common in patients under 5 years of age. Lesions which remain solitary for 12 months are not expected to disseminate. Lung involvement occurs in less than 10% and is associated with a worse prognosis. The radiological features are: hilar lymphadenopathy (rare); miliary shadowing; honeycomb lung with air cyst formation; and increased lung volume.
- d) F The basic lesion is an oval or round region of osteolysis involving any part of a bone, though the epiphysis is usually spared. Lesions may have a thin sclerotic rim with endosteal scalloping. Expansion is uncommon except in the ribs and vertebral bodies. The cortex may be destroyed, leading to fractures and simulate 'onion skin' periosteal new bone formation.
- e) F This is not a feature.

48) Concerning gastric malignancy:

- a) T An autosomal dominant condition in which multiple hamartomatous polyps are seen in the small bowel and also the colon and stomach in 30%. There is an increased incidence of carcinoma of the stomach, duodenum and ovary.
- b) F Leiomyosarcomas grow submucosally in the gastric wall leaving the luminal surface smooth. However, ulceration may be seen in up to 50% of cases. The ulcers tend to be small, even if the tumour itself is large.
- c) F Foci of calcification are a characteristic feature of both leiomyoma and leiomyosarcoma. Necrosis and haemorrhage are evident radiologically as a nonhomogeneous appearance before and after contrast enhancement.
- d) F Primary gastric lymphoma is usually non-Hodgkin`s. It can be ulcerative and infiltrative as well as polypoid. Often cannot be distinguished from carcinoma, but extension across the pylorus or the gastro-oesophageal junction is suggestive of lymphoma. Gastric lymphoma accounts for half of all gastro-intestinal lymphomas.
- e) F Mostly located in the distal third of the stomach and cardia; 60% on the lesser curvature, 10% on the greater curvature; 30% at the oesophago-gastric junction.

49) Osteoid osteoma:

- a) F Osteoid osteoma accounts for approximately 10% of benign primary bone tumours and is almost always accompanied by pain. The pain increases at night and is usually relieved by salicylates.
- b) F Epiphyseal involvement is extremely rare. It is usually diaphyseal in origin although extension to the metaphysis does occur.
- c) F Common sites include the femur and tibia which account for 60% of the lesion sites. 20% of lesions arise in the hands and feet. It occasionally occurs in the posterior elements of the spine usually in the lumbar region, although involvement of the vertebral body can occur. In the spine the tumour is usually associated with a scoliosis and is located at the concave surface.
- d) F Typically a rounded central lucency is present measuring less than 1 cm. This nidus contains variable amounts of punctate calcification. There is eccentric bone expansion and surrounding dense sclerosis and periosteal reaction.
- e) F Osteoid osteoma typically exhibits moderate tracer uptake in the zones of bony sclerosis with marked uptake in the region of the nidus. This pattern of uptake is called the `double density` sign. On CT the nidus enhances after administration of IV contrast.

50) Brodie`s abscess:

- a) F These were originally described by Brodie in 1832. They are characteristically found in subacute pyogenic osteomyelitis which are usually staphylococcal in origin. Generally there is no history of antecedent infection. 50% of abscesses are sterile, presumably due to previous antibiotic treatment.
- b) T The age range is from 6 to 61 years but 75% of cases occur in patients younger than 25 years, usually prior to closure of the growth plates. The male to female ratio is 2:1.
- c) F The lesions characteristically appear in the metaphysis, particularly that of the tibia. Rarely they traverse the open growth plate affecting the epiphysis, although such extension does not commonly result in growth disturbances.
- d) T This indicates a slowly growing lesion. The lucent region may follow a tortuous channel. Such channels usually indicate a pyogenic process and are uncommon in TB.

- e) T The 'double line' affect is the high signal intensity of granulation tissue surrounded by low signal intensity of bone sclerosis.

51) Causes of increased uptake on bone scans:

- a) F A triple phase bone scan should always be obtained in cases of suspected infection. Acute osteomyelitis is characterised by increased vascularity and enhanced activity in the delayed skeletal images, whereas septic arthritis and cellulitis show increased vascularity but normal or low grade bone uptake on delayed images. Gallium-67 or labelled WCC's may provide additional information.
- b) T Any traumatic fracture will produce increased uptake. In NAI the bone scan may occasionally miss skull fractures, so a skull XR should be obtained routinely. Rib fractures at different stages of healing may be visualised, confirming repeated injury.
- c) T While avascular bone is represented by a photon deficient area on a bone scan, in practice this is seldom seen unless images are performed early in the disease process. The most frequent finding is increased tracer uptake; this reflects the healing response from surrounding bone.
- d) T Bone scan features of Paget's disease include: intense uptake of tracer; diffuse involvement of bone; emphasis of anatomical features eg transverse processes in spine; ends of long bones affected rather than diaphyseal disease; bone expansion; deformity or bowing of long bone; gradual change only over years; polyostotic disease usually present; spine and pelvis are the most commonly involved sites.
- e) F Perthes' disease is a form of osteochondritis dissecans caused by an infarct in the capital femoral epiphysis. This results in abnormal growth and reduced mobility in the affected hip, and is a cause of photopaenia in the femoral epiphysis.

*An Atlas of Clinical Nuclear Medicine
Fogelman, Maisey and Clarke.
Martin Dunitz.*

52) Soft tissue uptake of diphosphonate is seen in:

- a) T
- b) T Soft tissue uptake occurs as a result of calcinosis cuti in the hands.
- c) T
- d) T
- e) T There are many situations in which diphosphonate may localise in soft tissues. The common factor for these appears to be the presence of microcalcification, although other causes are recognised.

An Atlas of Nuclear Medicine.

53) In CT scanning of the mediastinum:

- a) F Anatomical staging influences the prognosis in squamous, large cell and adenocarcinoma. TNM staging is not relevant in the vast majority of patients with small cell lung cancer because of the systemic nature of the disease.
- b) T The involvement of nodes on CT is assessed predominantly by size and the CT criteria are:
(i) 1 cm diameter - commonly not involved.
(ii) 1 - 1.5 cm diameter - 50% involved.
(iii) 1.5 cm diameter - 95% involved.

(Webb et al. 1975; Khan et al. 1985)

False positive mediastinal nodes on CT were found in 25% of cases in one series (Spiro and Goldstraw 1984) and this is often due to reactive hyperplasia and similarly, small nodes < 0.5 cm diameter may contain metastatic deposits.

- c) F Contiguous invasion of the mediastinum with involvement of the heart, great vessels, trachea or oesophagus precludes resection. Invasion of the mediastinal pleura or pericardium does not prevent resection, although significant invasion of mediastinal fat usually does. As seen on CT, contiguity of tumour mass with the mediastinal pleura or thickening of the mediastinal pleura does not indicate mediastinal extension or unresectability. However, a significant mediastinal mass contiguous with a lung tumour, which results in compression of mediastinal vessels or oesophagus, or replacement of mediastinal fat by soft tissue density is strong evidence.
- d) F The measured sensitivity of CT by using total nodal sampling as the gold standard is lower than evaluation by mediastinoscopy or palpation at surgery. Although mediastinoscopy is more accurate than CT, some regions of the mediastinum are not accessible; CT is generally used to guide mediastinoscopy.
- e) T A persistent left sided SVC usually drains into the coronary sinus after coursing backwards as it tracks through the mediastinum. There is usually a coexistent right SVC and left innominate vein. Axial CT sections may confuse this with a lymph node metastasis adjacent to the aortic arch.

W. Richard Webb

Appropriate use of CT and MRI in Lung Cancer

International London Annual Course 1994

54) The following patterns of bronchiectasis are correctly linked:

- a) F ABPA is more commonly proximal, upper lobe, varicose bronchiectasis. Lower lobe, cylindrical bronchiectasis is a feature of hypogammaglobulinaemia.
- b) T
- c) F Cystic fibrosis is more commonly pan-lobar (predominantly upper lobe), cylindrical bronchiectasis.
- d) T
- e) T The conjunction of widespread centrilobular opacities and panlobular cylindrical bronchiectasis are the features of Japanese panbronchiolitis.

DM Hansell

CT of Airways Disease SPR Brompton

55) Recognised features of PCP are:

- a) T PCP is the most common cause of interstitial pneumonia in immunocompromised patients. It is particularly common in the AIDS population with approximately 60 - 80% of all patients suffering at least one episode of PCP during the course of their illness and 40% of patients having recurrent PCP. Discrete pulmonary nodules are a less common manifestation of PCP.
- b) T Recognised but rare.
- c) T AIDS patients undergoing treatment with prophylactic nebulised pentamidine are more likely to develop atypical disease including an apical pattern of involvement, calcified hilar and abdominal nodes and viscera and pulmonary cystic disease.
- d) T An interstitial pattern is recognised in about 20% on CT. This may be bilaterally symmetric or asymmetric with linear and reticular markings.

- e) T Thin walled cavities may develop, and although appearances may return to normal some residual scarring and cyst formation is not uncommon. Pneumothorax is a well recognised complication of cystic change.

*S. Padley SPR Brompton.
Pulmonary infection in the Immunosuppressed*

56) Pulmonary calcification is seen in:

- a) F Presents as a diffuse, pneumonic (10 - 40%) or localised lesion (60 - 90%).When localised, a mass is the most common presentation, usually well circumscribed and peripheral in location. It is more commonly ill defined. An air bronchogram is common. There is no calcification. A pleural effusion is seen in about 5%. Mediastinal lymphadenopathy is less common than with carcinoma of the bronchus. It accounts for about 20-25% of all primary lung cancers.
- b) F The radiological features of WG are: patchy alveolar infiltrates; widely distributed irregular nodules of varying sizes; thick-walled cavities; pleural effusion in 25%; lymphadenopathy is exceedingly rare. Calcification is not seen in the lung parenchyma but may be present in the tracheal rings.
- c) F Necrobiotic nodules in rheumatoid disease are rareThey are well circumscribed nodular masses in the lung, pleura or pericardium which are identical to the subcutaneous nodules found in advanced rheumatoid arthritis. The nodules are usually multiple, commonly located in the lung periphery and cavitation occurs. Calcification is not seen. Unlike the incidence of rheumatoid arthritis itself, rheumatoid lung is much more common in men.
- d) T Papillary carcinoma of the thyroid accounts for 60% of all thyroid carcinomas, usually in the 5th decade and more common in females. Spread is usually to regional lymph nodes. Haematogenous spread to lung occurs in 4% and calcification occurs. Generally, if calcification occurs in the primary tumour, then pulmonary metastases are likely to calcify.
- e) F Histiocytosis X characteristically is a fibrotic lung disease with increased lung volume in a third of cases. Changes are usually bilaterally symmetrical with upper lobe predominance.The most common findings are a diffuse reticulonodular pattern; ``honeycomb lung``; ill-defined stellate nodules; thin-walled cysts and rarely a pleural effusion. Calcification is not a finding.

57) In HRCT of the chest:

- a) F The mean skin radiation dose to the patient from a standard HRCT protocol using 1.5 mm sections at 20 mm intervals is estimated as little as 6% that of a standard 10 mm contiguous section protocol.
- b) F The majority of patients with fibrosing alveolitis show a predominantly reticular pattern on HRCT but identifying the 15-20% of patients with a predominantly ground glass pattern is important. In these patients the ground glass pattern most frequently represents increased cellularity in the interstitium or air spaces and are more likely to respond to treatment.
- c) F This finding is nonspecific and can be found in normal patients as a result of atelectasis within dependent lung (ie the posterior lung when the patient is positioned supine). Such normal posterior lines or opacities are transient and disappear in the prone position.
- d) F Emphysema is defined as permanent abnormal enlargement of airspaces distal to the terminal bronchiole accompanied by the destruction of the walls of the involved airspaces. It is usually distinguishable from honeycomb cysts which possess thick walls of fibrous tissue.
- e) F Areas of decreased lung attenuation that do not represent cystic lesions or emphysema can sometimes be recognised on HRCT in patients who have diseases that produce air trapping, poor ventilation, or poor perfusion of the lung parenchymaThe areas of decreased lung attenuation seen on HRCT can be focal, lobular or lobar, or multifocal. This is most common

in patients with bronchiolitis obliterans, although a similar finding has been reported with pulmonary embolism.

58) Looser`s zones:

- a) F Looser`s zones are bilaterally symmetrical transverse lucent bands of uncalcified osteoid which are in effect insufficiency stress fractures with incomplete healing due to mineral deficiency. Later in the disease they have sclerotic margins.
- b) T Common sites are the scapulae, the femoral necks and shafts, the pubic and ischial rami, ribs and metatarsals. They are orientated perpendicular to bone and extend to involve the cortical surface.
- c) T Other associations are: osteomalacia and rickets; Paget`s disease; osteogenesis imperfecta; organic renal disease and renal tubular dysfunction.
- d) T Aluminium toxicity occurs in uraemic patients who are required to take phosphate binders that include aluminium salts but who have decreased renal capacity to excrete aluminium. The increased aluminium levels produce an encephalopathy and osseous changes which include osteopaenia, multiple fractures, and Looser`s zones.
- e) T

59) Synovial sarcoma (malignant synovioma):

- a) F Synovial sarcoma is uncommon, comprising less than 10% of soft tissue sarcomas. Most patients are aged 15 to 35 years old. 60 to 70% of lesions are located in the lower limb. Although there is a predilection for the region of the knee and lower thigh, the tumour can occur anywhere along a limb. Lesions are very rarely located within a joint capsule.
- b) F Tumour growth is insidious. Patients may not therefore seek medical attention until the tumour has been present for years. Delay in diagnosis leads to the frequent occurrence of metastases. The lung is most often involved (75% of metastases), followed by regional lymph nodes and bone.
- c) F On plain films and CT, synovial sarcoma usually appears as a well-defined, lobulated mass of moderate density, sometimes containing cystic or necrotic regions. 30 to 50% of tumours contain calcification (sometimes detectable only by CT) which is amorphous in nature. Involvement of the underlying bone is uncommon but periosteal reaction occurs in 10 to 15% of cases.
- d) F Being a painful lesion, periarticular osteoporosis is often present. Progress to extensive destruction may be expected.
- e) F T1 weighted images show a low signal intensity. There is an inhomogeneously increased signal intensity on T2 weighting.

60) Cerebellar haemangioblastoma:

- a) T Haemangioblastomas comprise 7% of all posterior fossa tumours and are the most common primary adult posterior fossa tumour. The tumours most generally occur in the cerebellum, most frequently within the paramedian hemispheric region, though they are also seen in the medulla oblongata, spinal cord or rarely in the supratentorial region.
- b) T Grossly, haemangioblastoma is usually a well demarcated cystic tumour with a small vascular mural nodule, but up to 40% of lesions are solid.
- c) T 10 to 30% of patients with cerebellar haemangioblastoma meet criteria for von Hippel -Lindau syndrome, an autosomal dominant condition with incomplete penetrance associated with retinal angiomas, renal cell carcinoma, renal or pancreatic cysts, and pheochromocytomas.

The peak incidence of tumour is during the 5th and 6th decades, although they appear earlier in von Hippel-Lindau syndrome.

- d) F Calcification is extremely rare. The differential diagnosis includes astrocytoma in which calcification is frequent.

- e) F The most common appearance on CT is a large cerebellar cyst with an enhancing mural nodule. A solid enhancing tumour mass that may or may not contain cysts is also seen. MR imaging is superior to CT within the posterior fossa and characteristically identifies the cyst if it is present (the cyst is usually slightly higher in signal than CSF on both T1 and T2 weighted images), an intensely enhancing mural nodule and associated flow voids.