URINARY SYSTEM PATHOLOGY LABORATORY – NEPHROPATHOLOGY
DESCRIPTIONS FOR MICROSCOPY SPECIMENS

0-22 E: CHRONIC PYELONEPHRITIS

This sample is from a 53 year old man who presented with hypertension and renal failure. His history revealed multiple previous attacks of pain and fever. A series of radio-diagnostic methods showed bilateral dilated renal pelvi –calyceal systems and irregular surfaces of the kidney. Bilateral nephrectomy for the diseased kidneys with renal transplantation was planned.

Grossly: the kidneys were slightly enlarged. External surfaces were roughly nodular with irregularly depressed scars. Cut surface revealed marked dilatation of the renal pelvis with atrophy of the parenchyma.

Microscopically : You see that the parenchyma is thinned and the main pathology is in the tubules and interstitium. Tubules and glomeruli are reduced in number. In the interstitium dense infiltration of mononuclear cells and lymphocytic aggregates are observed. Some glomeruli are surrounded by fibrosis. (Periglomerular fibrosis) and a some of them are totally sclerosed. The remaining tubules are dilated with hyaline casts (Thyroidization) Around calyces , there is fibrosis and inflammatory cell infiltration of mainly lymphocytes and plasmocytes.

0-20 : HYDRONEPHROSIS (OBSTRUCTIVE ATROPHY)

A 40 year old man had colicky pain in the lumbar area and occasional hematuria. Direct abdominal graphy showed a stone in the lower end of the left ureter. The intravenous pyelography showed dilatation of ureter , pelvis calyces above the location of stone and non functioning kidney

Grossly : The kidney was enlarged . Calyces and renal pelvis are enlarged and showed cystic dilatation. Renal parenchyma was greatly reduced in certain areas even to 0.2 cm in thickness.

Microscopically: Examine the sections with naked eye first ! You will see a near-normal area adjacent to two band-like extensions. In the near-normal area, you can differentiate between cortex (pink-staining) and medulla (pale with streaks of red- congestion). Follow the outer contour of cortex, you will see a thin pink, fibre-like area, the atrophic part.

In the sections , you see atrophic parenchyma tissue adjacent to relatively normal kidney tissue. In the normal looking portion examine the glomeruli, tubules, interstitium and blood vessels .On both sides of the normal parenchyma, there are thinned extensions which represent atrophic parenchyma . In these parts you only see dense fibrous tissue with scattered tubules and vascular structures. On one side of this fibrotic tissue you see transitional epithelium. In this atrophic parenchyma no glomeruli are seen.

0-28 :RENAL CELL CARCINOMA

A 48 year old man presented with flank pain and hematuria . On physical examination an intraabdominal mass was found. Ultrasonography showed the presence of a renal tumor. Nephrectomy was done

Macroscopy : The kidney was enlarged with a tumor mass of 10 cm in diameter of the upper pole. Cut section showed a yellow tumor with cystic and fibrotic areas The tumor replaced the renal parenchyma toward the lower part of the kidney.

Microscopy: Section includes both the tumor and atrophic renal parenchyma on one side. The tumor consist of masses of poorly formed tubule-like structures separated by thin fibrous septa which contains capillaries. Neoplastic cells have large clear, empty looking cytoplasms with well-defined cytoplasmic borders. Their nuclei are slightly irregular and mildly pleomorphic with prominent nucleoli. This is a well-differentiated tumor and the cells are not very pleomorphic Notice areas of fibrosis, distorted glomeruli and mononuclear inflammatory cells in the adjacent atrophic renal tissue.

0-25 WILM'S TUMOR

Mother of a one year infant felt a palpable mass in the abdomen of her baby. A tumor was diagnosed radiologically and then nephrectomy was performed.

Grossly: The kidney appeared as an irregular mass .The cut surface consisted mostly of grayish white solid tumor mass, renal parenchyma could only be seen at one pole of the kidney.

Microscopy :This section includes only a cellular tumor, you do not see the adjacent parenchyma. The characteristic features of the tumor are compact masses of cells which form occasional abortive tubules and glomeruli. The tumor cells are primitive and have round or oval hyperchromatic nuclei and scanty cytoplasm . These structures are enclosed in a stroma made up of immature spindle shaped cells and capillaries. Try to see three components of this tumor : primitive blastemal cells, their mesenchymal and epithelial (tubular) differentiation.

O-8/37 MEMBRANOPROLIFERATIVE GLOMERULONEPHRITIS (MPGN) AND CHRONIC REJECTION

This kidney is a transplanted one. Although the patient received immunosuppressive therapy, kidney failure developed and as it was clinically evaluated as a transplant rejection, nephrectomy of the transplanted kidney was performed.

Microscopy: There is arterial and arteriolar narrowing by myointimal hyperplasia and medial hypertrophy, infiltration of the parenchyma and vessel walls by mononuclear inflammmatory cells and some parenchymal atrophy and fibrosis. Examine the glomeruli in the cortex, notice that they are enlarged and have a lobulated appearence and when you look carefully, you will see cellular proliferation in the glomerular tuft: these are mesengial cells. You also see basement membrane thickening in the glomerular capillaries, they seem rigid.You can see crystalline deposits in the tubules.

O-40 NODULAR GLOMERULOSCLEROSIS (KIMMELSTIEL-WILSON DISEASE)

A 75year old man who had diabetes, hypertension and frequent attacks of pyelonephritis underwent nephrectomy because of obstructing transitional cell carcinoma of the ureter.

Macroscopy:The kidney was normal for weight and size, but corticomedullary differentiation was lost. Mild calyceal dilatation and distortion was seen. An obstructing papillary tumor was seen in the ureter.

Microscopy: In this sample, you will see morphological findings of both chronic pyelonephritis and benign nephrosclerosis. Renal artery branches within the kidney show thickening of the wall due to a combination of fibroelastic intimal

proliferation, elastic lamina reduplication, and muscular hypertrophy of the media. Afferent arterioles have hyalinization, their muscular walls being replaced by an amorphous material, which is rigid. You can see conversion of individual glomeruli into a mass of hyaline tissue devoid of capillary lumina. Now examine the changes typical of DM. In addition to diffuse glomerular basement membrane thickening, seen practically in all of the glomeruli, you will see amorphous hyaline nodular deposits in some glomeruli. This type of glomerular involvement (nodular glomerulosclerosis) is pathognomonic of DM.

DESCRIPTIONS FOR MACROSCOPY SPECIMENS

CHRONIC PYELONEPHRITIS: There are many samples. Most of the kidneys are slightly enlarged, the others are small . Their cortices have irregularly depressed scars and coarsely nodular appearence. On cut section, these coarse, discrete scars overlie deformed calyces, and calyces and renal pelvis are dilated, pelvic fat tissue has increased due to parenchymal atrophy. In some ares the parenchyma seems to nearly normal in thickness but cortico-medullary differentiation is lost. In the pelvis and calyces you see yellowish white to grey-white appearence of the mucosa. In one of the kidneys the pelvis and calyces are hemorrhagic. You can see cortical 1-5 mm. cysts in one of the kidneys. See that the involvement is not symmetrical or homogenous: In some areas you see atrophic parenchyma tissue adjacent to relatively normal kidney tissue. In one of the samples, you will see extreme atrophy in one pole, while parenchyma in the other pole is quite preserved.

TUBERCULOUS PYELONEPHRITIS:The kidney is slightly enlarged with irregular nodular cortex. External surface displays small irregular yellow elevated confluent nodules. You can see multiple tissue defects (cavities) in the parenchyma. You can see necrotic material in the cavities. Kidney has yellowish to grey-white soft friable material (caseous necrosis) filling the pelvis and calyces.Calyces and renal pelvis are dilated.

NEPHROLITHIASIS (STAGHORN CALCULI) + HYDRONEPHROSIS + CHRONIC PYELONEPHRITIS:The kidneys are enlarged . The external surfaces ares coarsely nodular You can see the staghorn stones (which create a cast of pelvis and calyces) in the pelvis and you see cystic dilatation of pelvis and calyces above the location of stone. The pyramids have bocome cup shaped. Renal parenchyma is greatly reduced in certain areas even to 0.1 cm in thickness.

HYDRONEPHROSIS (OBSTRUCTIVE ATROPHY):The kidney is massively enlarged . Calyces and renal pelvis are enlarged and converted to cysticsacs. Renal parenchyma is totally atrophic The kidney is transformed to a large multiloculated cystic structure with fibrous tissue wall. The other sample is a small kidney with totally atrophic parenchyma.

POLYCYSTIC KIDNEY :This adult-type polycystic kidney is massively enlarged. You cannot see any residual parenchyma because the kidney is totally replaced by cysts. You can see thin walled cysts of various sizes. Some cysts are still filled with clear or dark- colored fluid. You can see fatty capsule fragments on external surface because the kidney capsule could not be removed due to adhesions

BILATERAL HYPOPLASIA OF KIDNEYS:The kidneys are smaller and weighed less than normal.External surface is normal. On the cut surface the number of renal pyramids has decreased.Overall achitecture of kidney is normal. There is no calyceal or pelvic dilatation

NEPHROLITHIASIS + HYDRONEPHROSIS + CARCINOMA OF PELVIS:The kidney is enlarged with irregular nodular external surface There is a stone embedded in the pelvis. One part of it is smooth while the other part has irregular spicules. There is dilatation of pelvis and calyces above the location of stone Renal parenchyma is atrophic in most areas. A 3x3 cm sized turnor in the calyx of the opposite pole is seen. The tumor has both exophitic papillary structures and irregular flat invasive areas.

TRANSITIONAL CELL CARCINOMA OF RENAL PELVIS:The kidney is enlarged with irregular nodular external surface Parenchyma is atrophic with dilation of pelvis and calyces. Renal pelvis and calyces are filled with a papillary tumor. The tumor has both fine and corase papillary structures. You will laso see an embedded stone in the pelvis. There is another sample with similar features except the stone. This sample has finer papillary structures.

CHRONIC PYELONEPHRITIS, HYDRONEPHROSIS AND HYDROURETER DUE TO CARCINOMA OF URETER:In this kidney you will see typical changes of obstruction associated chronic pyelonephritis. You can see the papillary tumor in the ureter which caused the ureteral obstruction.

RENAL CELL CARCINOMA :There are many samples of renal cell carcinoma. In most of the samples, the kidneys are enlarged with tumor masses of 7-13 cm usually in one of the poles. Cut sections show bright yelow to grey white solitary tumors with sharply defined margins.They are confined within the kidney capsule but bulge into calyces and pelves. The tumors replace the renal parenchyma toward the other pole of the kidney. See the areas of necrosis within some of the tumors. Notice areas of central stellate fibrosis, cystic change and haemorrhagic areas. In a few samples you see some tumors growing as multiple nodules and replace the entire parenchyma and also invade the perinephric fat tissue. Another sample has cystic and solid nodules, totally replacing the kidney parencheyma.

WILMS' TUMOR:These samples appear as very large irregular, coarsely nodular masses with small kidneys on one pole. Huge tumors invading capsule and perirenal tissues are seen. The cut surfaces are variegated, consisting mostly of grayish white solid tumor mass, but there are fish-flesh, yellowish and tiny cystic areas as well. Notice small foci of fibrosis and haemorrhage. Renal parenchyma is seen at one pole of the kidney. In one of the samples it is hemmhorragic, due to surgical manipulation.

ANGIOMYOLIPOMA OF KIDNEY:The kidney is enlarged and its external surface appears as an irregular coarsely nodular mass.The cut surface displays an irregularly infiltrating tumor involving a great portion of the kidney.It has a variegated

appearence: it consists mostly of flesh colored solid areas, but there are yellowish white nodules and tiny dilated vessels. There are foci of haemorrhage.

URINARY SYSTEM PATHOLOGY LABORATORY – UROPATHOLOGY
DESCRIPTIONS FOR MICROSCOPY SPECIMENS

0-27 : TRANSITIONAL CELL CARCINOMA OF PELVIS

A 66 year old man who had hematuria for 6 months duration was admitted to hospital . Radiologist investigation revealed a left renal tumor located in the pelvis and nephrectomy was done.

Macroscopy: A 3x3 cm sized tumor in the middle part of renal pelvis and a similar tumor of 1 cm in diameter in upper pole were seen.

Microscopy : Sections include renal parenchyma and a tumor in the pelvis. The tumor is composed of cells resembling the transitional epithelium and it grows into the lumen of the pelvis. The tumor cells form multilayered papillary structures around fibrovascular stroma .They show loss of polarity, variation in size, slight hyperchromatism and occasional mitosis. In the renal parenchyma, you see changes of chronic pyelonephritis: some of the gomeruli are sclerosed, there is tubular atrophy and chronic inflammatory cell infiltration in the interstitium. In the pelvis you can see granulomatous reaction around areas of tumor invasion.

P-11 SEMINOMA

A 43 year old man who has been having a swelling in his scrotum for 4 months was admitted to hospital . scrotal ultrasonography confirmed a tumor and hydrocele in the right testis. Inguinal orchiectomy was performed.

Macroscopy: The testis was enlarged and hard. There was a serous fluid between the layers of tunica vaginalis. The cut surface of the testis showed a large homogenous neoplasm of grayish white color. A compressed testicular tissue could hardly be seen at one side of the tumor.

Microscopy: Section shows sheets of tumor cells which are generally uniform. They have large pale cytoplasm and centrally located, large, pleomorphic, vesicular nuclei some of which display mitoses. Notice the delicate fibrous stroma that contains lymphocytes which is typical of seminoma. You may see areas of necrosis.

P- 26 :TERATOCARCINOMA OF TESTIS

A 17 year old boy presented with a firm painless scrotal mass Transillumination of the scrotum was negative. Inguinal orchiectomy was performed.

Macroscopy: The testis was enlarged and hard. Cut surface displayed a cystic gray white multiloculated tumor with cartilage like areas compressing the normal testis. The tumor had small foci of hemorrhage and necrosis (soft, yellow colored areas).

Microscopy: Examine and differentiate variable types of tissues. They are all mature. See the cartilage variable types of lining epithelium - pseudostratified ciliated epithelium, squamous epithelium - and stromal elements such as young fibroblasts. Try to find area of necrosis (usually marked on the slides!). Adjacent to this necrotic area you will see a focus of embryonal carcinoma. Main features are masses and poorly formed adenoid structures composed of very primitive cells with pleomorphic nuclei and scanty cytoplasm. Note prominent nucleoli and single cell necrosis.

P 15 : LEYDIG CELL TUMOR OF TESTIS

A 24 year old patient presented a small hard nodule in his left testis. Upon clinical suspicion of testicular tumor inguinal orchiectomy was performed.

Macroscopy: Cut surface of the enlarged testis showed orange colored, well defined neoplasm surrounded by compressed testicle tissue.

Microscopy: Section includes both the neoplasm and testis tissue which is compressed but otherwise normal. The tumor is composed of solid mass of uniform cells which have large pale, clear or granular cytoplasm and small round, uniform nuclei. Note the very delicate vascular stroma and fibrous encapsulation around tumor.

P-22 : PROSTATIC HYPERPLASIA AND HYPERTROPHY

A 68 year old patient had nocturia, decrease in force and caliber of urine during the last 3 years. Clinical diagnosis after physical examination was benign prostatic hyperplasia and transurethral resection of prostate (TUR-P) was performed.

Macroscopy: the prostate tissue was sent in irregular “chips” of various sizes. They weighed 85 gr. Some of the chips had brownish areas of burnt tissue on their periphery. The chips were firm and somewhat nodular and small cystics glands could be seen on the surface in some areas

Microscopy: Examine both stromal and epithelial components. Both the fibromuscular stroma and the glands have proliferated. The glandular epithelium is usually hyperplastic, forming papillary structures. Some glands show cystic dilatation and contain corpora amylacea in their lumina. You can see focal lymphocytic aggregates in the stroma. Some of the chips have bluish –violet colored, areas of burnt tissue lacking recognizable structure on their periphery.

P- 23 ADENOCARCINOMA OF PROSTATE

A 77 year old patient has been having dysuria and frequency for 6 months. On rectal digital examination a hard nodule of 1 cm in diameter was felt in prostate. serum level of PSA was elevated . With the probable diagnosis of prostatic adenocarcinoma Trru-cut biopsy was performed. The pathological diagnosis was prostatic adenocarcinoma

Macroscopy: prostatectomy specimen revealed hard white tumoral mass involving both lobes. The tumor had irregular borders and areas of necrosis.

Microscopy: This is one quarter of a slice of prostatic tissue. In addition to areas of benign prostatic hyperplasia, you will see areas in which the normal structure of the prostate is lost. The neoplasm forms irregular adenoid structures composed of epithelial cells vesicular nuclei. These glandular structures are usually small, closely packed and invade prostatic fibromuscular stroma irregularly. Compare the size of nuclei with that of hyperplasia.

URINARY SYSTEM PATHOLOGY LABORATORY – UROPATHOLOGY
DESCRIPTIONS FOR MACROSCOPY SPECIMENS

SEMINOMA OF TESTIS:One inguinal orchiectomy specimen shows enlarged testis. There was a serous fluid between the layers of tunica vaginalis. The cut surface of the testis shows a large homogenous, lobulated neoplasm of grayish white color. A compressed testicular tissue can hardly be seen at one side of the tumor. Tunica albuginea is not penetrated but there is marked vascular congestion. On the cut surface of the other large sample, you will see a similar tumor, but with friable- necrotic areas. Another example shows a nearly normal sized testis with a white lobulated solid tumor in one pole. It is surrounded by normal testiular tissue. Although the tumors' sizes are different, appearences on cut sections are similar.

TERATOMA OF TESTIS:Inguinal orchiectomy specimens show enlarged testicles, one in huge dimensions. Cut surface displays a variegated appearence. They are multiloculated cystic gray white tumors with some solid areas. Very rarely, you may see tiny, cartilage like areas. The compresed normal testis can be seen in the smaller specimens. The tumors may have barely recognizable very small foci of hemorrhage, bbut no prominent hemorrhage or necrosis.

EMBRYONAL CARCINOMA OF TESTIS:These are inguinal orchiectomy specimens. The tumors replace the entire testes. They are gray white, poorly demacated, with large areas of hemorrhage and necrosis (soft, yellow colored areas). Another sample has a smaller tumor confined to testis. This tumor had yolk-sac tumor ares on the periphery with typical embryonal carcinoma in the central areas. Macroscopically, the periphery is somewhat glistening whitish solid tumor tissue while the center has extensive bleeding (dark colored areas) and necrosis (yellowish colored, friable areas).

YOLK SAC TUMOR OF TESTIS:This specimen is from an infant. This small testis is actully enlarged in comparison to normal infant size. There is a well demarcated, non-encapsulated tumor in the lower pole of the testis. compressing testis tissue. It is yellow-white colored, with a glistening surface (The shiny appearence is somewhat lost after formalin fixation)

TERATOCARCINOMA OF TESTIS:One is an inguinal orchiectomy specimen with a very large tumor replacing the entire testis and invading the testicular tunics. Cut surface displays a variegated appearence similar to a pure teratoma: you can see cystic multiloculated areas and solid areas with different textures, but this tumor also has the friable gray white appearence - extensive necrosis reminiscent of embryonal carcinoma. A second sample has a smaller tumor confined to testis, but with a similar cut-surface. It has multiloculated small cystic areas and gray white, partially necrotic and hemhorragic ares. It has irregular, infiltrating borders. and areas of necrosis (soft,yellow). Another example seems like a teratoma, but has very tiny areas of necrosis and multifocal hemorrhage representative of embryonal carcinoma.

SEMINOMA + EMBRYONAL CARCINOMA OF TESTIS: In this combined germ cell tumor limited to the testis, seminoma areas are at the periphery of the tumor, appearing whitish, homogenous, and lobulated, as expected. Embryonal carcinoma areas are the central necrotic, yellowish, hemorrhagic areas.

PROSTATIC HYPERPLASIA AND HYPERTROPHY:These are transvesical prostatectomy specimens. This procedure is largely replaced by trans-urethral resection procedure today. These are not the entire prostates, just periurethral nodules, the sites of the so called benign prostatic hyperplasia. The prostatic nodules are enlarged, firm and have increased weight. (Compare them with the nearly normal prostates on cystectomy specimens. A normal prostate is roughly similar to chesnut in size and shape) The cut surface varies in color and consistency depending on the proliferating component. Areas of glandular hyperplasia appear as yellow- white colored areas, with very tiny cystic structures of variable sizes, and areas of fibromuscular hypertrophy appear gray, firm, fibrous and sharply demarcated.

TRANSITIONAL CELL CARCINOMA OF URINARY BLADDER:You see two cystectomy specimens In the right wall of one, and in the right and anteior walls of the other you see exophitic tumors composed of tiny, finger-like papillary structures. The bladder walls are thicker than normal and the size and capacity of one has greatly reduced as a result of fibrosis secondary to chemotherapy.

SPERMATIC GRANULOMA / GRANULOMATOUS EPIDIDIMYTIS: These two entities cannot be differentiated by macroscopic examination alone. In these inguinal orchiectomy specimens, the testes appear normal, but there are lobulated masses in the epididymis, at the lower pole. On close inspection, you can see yellowish gray, round, confluent structures. These are actually granulomas. This lesion can be (and, were, in most of these cases!) mistaken for testicular and epididymal tumors. The nodules may compress the testicular tissue, but the testes are otherwise normal. (Use them for comparison with atrophic or enlarged-tumor bearing testes).

SPERMATOCELE/ HYDROCELE: In a long-standing case, these cystic lesions usually cannot be differentiated by gross examination alone.You see a cystic mass with a thickened, fibrotic wall and a small, compressed, atrophic testis in one pole. The inner surface of the wall has an irregular yellowish appearance due to accumulated cellular debris in time.

HYPERTROPHY OF URINARY BLADDER:This is a partial cystectomy specimen. The bladder is turned inside out so that you can see the pale mucosa. lts size and capacity has increased.The bladder wall is thicker than normal. Vesical obstruction has resulted in hypertrophy of the muscle coat. Hypertrophy of muscle bundles produce trabeculation.

TESTICULAR TORSION: Torsion of the spermatic cord resulted in hemorrhagic infarction of the testis and epydidimis. Both are extremely swollen, hemorrhagic and have a more homogenous, almost glistening surfaces when compared to normal. Tunica albuginea appears tightly stretched with dusky discoloration (due to marked congestion and bleeding).