Mikroskop:20107/annot

[


```
    {
        "idx": "20107+",
        "txt_cz": "Corpusculum renale",
        "txt_en": "Renal corpuscle",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.46392",
                "y_rel": "0.856106"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Dist\u00e1ln\u00ed tubulus",
        "txt_en": "Distal tubule",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.468775",
                "y_rel": "0.864848"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "D\u0159e\u0148 ledviny",
        "txt_en": "Renal medulla",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.414031",
                "y_rel": "0.69549"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "K\u016fra ledviny",
        "txt_en": "Renal cortex",
        "desc_cz": "Ledviny jsou p\u00e1rov\u00fdm org\u00e1nem ulo&#158;en\u00fdm v tukov\u00e9m pol&#154;t\u00e1\u00f8i
  retroperitoneov\u00ec bilater\u00e1ln\u00ec pod\u00e9l p\u00e1te\u00f8e v oblasti Th11 - L2. Jejich
  nejd\u00f9le&#158;it\u00ecj&#154;\u00ed funkc\u00ed je filtrace krve a odvod metabolit\u00f9 z t\u00ecla. Jsou z\u00e1sobov\u00e1ny z
  b\u00f8i&#154;n\u00ed aorty cestou arteria renalis dextra et sinistra, kter\u00e9 se d\u00e1le v\u00ectv\u00ed (ventr\u00e1ln\u00ec na
  \u00e8ty\u00f8i v\u00ectve - rami ventrales pro p\u00f8edn\u00ed \u00e8ty\u00f8i segmenty, dors\u00e1ln\u00ec v\u00ectv\u00ed jednou -
  ramus dorsalis pro zadn\u00ed segment). Z t\u00ecchto arteri\u00ed v\u00ect&#154;\u00ed z\u00e1sobuj\u00ed postupn\u00ec k\u00f9ru: aa.
  lobares, interlobares, arcuatae, interlobulares a z nich kone\u00e8n\u00ec odstupuj\u00ed arteriolae glomerulares afferentes (vasa
  afferentia), na n\u00ec&#158; navazuje syst\u00e9m kapil\u00e1r rete mirabile arteriosum, co&#158; je n\u00e1zev pro kapil\u00e1ry se
  stejn\u00fdm typem p\u00f8\u00edvodn\u00ed i odvodn\u00ed c\u00e9vy. Proto je pokra\u00e8ov\u00e1n\u00edm c\u00e9vn\u00edho
  \u00f8e\u00e8i&#154;t\u00ec arteriola glomerularis efferens (vas efferens) a n\u00e1sleduj\u00ed peritubul\u00e1rn\u00ed
  kapil\u00e1rn\u00ed pleten\u00ec. D\u00f8e\u00f2 je z\u00e1soben\u00e1 p\u00f8edev&#154;\u00edm z arteriolae glomerulares efferentes a
  arteriolae rectae. Krev je ze d\u00f8en\u00ec odv\u00e1d\u00ecna cestou venulae rectae a z k\u00f9ry cestou venae interlobulares,
  kter\u00e9 se spojuj\u00ed se ve venae arcuatae, pokra\u00e8uj\u00edc\u00ed jako venae interlobares, kter\u00e9 \u00fast\u00ed do vena
  renalis. Vena renalis dextra et sinistra \u00fastn\u00ed do vena cava inferior.\n\t Ledviny se skl\u00e1daj\u00ed z pom\u00ecrn\u00ec
  tenk\u00e9ho vazivov\u00e9ho obalu, jejich parenchym se d\u00ecl\u00ed na k\u00f9ru a d\u00f8e\u00f2, na jej\u00ed&#158; pyramidy
  nasedaj\u00ed ledvinn\u00e9 kalichy p\u00e1nvi\u00e8ky, kter\u00e1 pokra\u00e8uje v mo\u00e8ovod. \n\t Z\u00e1kladn\u00ed stavebn\u00ed a
  funk\u00e8n\u00ed jednotkou ledviny je nefron. K nefronu pat\u00f8\u00ed corpusculum renale, proxim\u00e1ln\u00ed tubulus, Henleho
  kli\u00e8ka, kter\u00e1 m\u00e1 tenk\u00fd a tlust\u00fd segment a dist\u00e1ln\u00ed tubulus. Dist\u00e1ln\u00ed tubuly \u00fast\u00ed
  do syst\u00e9mu sb\u00ecrac\u00edch kan\u00e1lk\u00f9, kter\u00e9 se na vrcholu ledvinn\u00fdch pyramid otv\u00edraj\u00ed do
  kalich\u00f9.\n\t Nefron za\u00e8\u00edn\u00e1 jako corpusculum renale, kter\u00e9 je tvo\u00f8eno syst\u00e9mem kapil\u00e1r -
  glomerulum. Jde o kapil\u00e1ry, jejich&#158; p\u00f8\u00edvodn\u00e1 a odvodn\u00e1 c\u00e9va jsou t\u00e9ho&#158; typu - rete mirabile
  arteriosum - a jejich endotelov\u00e9 bu\u00f2ky jsou vybaveny p\u00f3ry bez diafragmy. Kapil\u00e1ry jsou obklopeny Bowmannov\u00fdm
  pouzdrem, kter\u00e9 m\u00e1 dva listy - viscer\u00e1ln\u00ed, tvo\u00f8en\u00fd podocyty, je&#158; nal\u00e9haj\u00ed na
  baz\u00e1ln\u00ed membr\u00e1nu kapil\u00e1r a pariet\u00e1ln\u00ed, slo&#158;en\u00fd z jednovrstevn\u00e9ho dla&#158;dicov\u00e9ho
  epitelu. Mezi ob\u00ecma listy je mo\u00e8ov\u00fd prostor, kam se ultrafiltruje krevn\u00ed plazma jako prim\u00e1rn\u00ed mo\u00e8 (za
  norm\u00e1ln\u00edch okolnost\u00ed neprostupuj\u00ed b\u00edlkoviny). Corpusculum renale m\u00e1 krevn\u00ed a mo\u00e8ov\u00fd
  p\u00f3l. V c\u00e9vn\u00edm p\u00f3lu do n\u00ecj vstupuje vas afferens, vystupuje vas efferens a nach\u00e1z\u00ed se tu
  juxtaglomerul\u00e1rn\u00ed apar\u00e1t jako v\u00fdznamn\u00e9 autoregula\u00e8n\u00ed za\u00f8\u00edzen\u00ed ledviny. Jsou zde
  produkov\u00e1ny renin (regulace krevn\u00edho tlaku) a erytropoetin (\u00f8\u00edzen\u00ed erytropo\u00e9zy). Pariet\u00e1ln\u00ed list
  Bowmannova pouzdra, ohrani\u00e8uj\u00edc\u00ed mo\u00e8ov\u00fd prostor, pokra\u00e8uje v mo\u00e8ov\u00e9m p\u00f3lu do
  proxim\u00e1ln\u00edho tubulu, vystlan\u00e9ho ji&#158; bu\u00f2kami cylindrick\u00fdmi. Viscer\u00e1ln\u00ed list je tvo\u00f8en
  podocyty, z jejich&#158; t\u00ecla vyb\u00edhaj\u00ed mohutn\u00ecj&#154;\u00ed prim\u00e1rn\u00ed v\u00fdb\u00ec&#158;ky a z nich
```

odstuouj\u00ed v\u00fdb\u00ecžky sekund\u00e1rn\u00ed - pedikly. Ty jsou uspo\u00f8\u00e1d\u00e1ny t\u00ecsn\u00ec vedle sebe (mezi nimi je napnuta diafragma) a obep\u00ednaj\u00ed fenestrovan\u00e9 kapil\u00e1ry glomerula. Mezi pedikly a endotelem kapil\u00e1r nalezneme silnou baz\u00e1ln\u00ed membr\u00e1nu, \u00e8\u00edmž se kompletuje filtra\u00e8n\u00ed bari\u00e9ra mezi krv\u00ed a mo\u00e8ov\u00fdm prostorem. V c\u00e9vn\u00edm p\u00f3lu ledvinn\u00e9ho t\u00ecl\u00edska jsou p\u00f8\u00edtomny ješt\u00ec mezangi\u00e1ln\u00ed bu\u00f2ky. Tyto bu\u00f2ky jsou schopn\u00e9 regulovat pr\u00f9svit kapil\u00e1r, fagocytovat a rovn\u00ecž produkovat sign\u00e1ln\u00ed l\u00e1tky (cytokiny) jako nap\u00f8\u00edklad endoteliny a prostaglandiny. Kontrakce svalov\u00fdch bun\u00eck obsažen\u00fdch ve st\u00ecn\u00ec arteri\u00ed je \u00f8\u00edzena sign\u00e1ly, k nimž pat\u00f8\u00ed nap\u00f8. angiotensin II nebo NO, kter\u00e9 zahajuj\u00ed kontrakci a n\u00e1sledn\u00ec p\u00f9sob\u00ed i na mezangi\u00e1ln\u00ed bu\u00f2ky a ovliv\u00f2uj\u00ed tak pr\u00f9svit kapil\u00e1r. \n\t Proxim\u00e1ln\u00ed tubulus je tvo\u00f8en kubick\u00fdmi až cylindrick\u00fdmi bu\u00f2kami (s nerovn\u00fdm pr\u00f9b\u00echem later\u00e1ln\u00edch okraj\u00f9), kter\u00e9 maj\u00ed na apik\u00e1ln\u00edm povrchu kart\u00e1\u00e8ov\u00fd (ž\u00edhan\u00fd) lem - hust\u00ec uspo\u00f8\u00e1dan\u00e9 mikroklky. Na ž\u00edhan\u00fd lem je v\u00e1z\u00e1na p\u00f8\u00edtomnost alkalick\u00e9 fosfat\u00e1zy, kter\u00e1 je tak enzymov\u00fdm markerem pr\u00f9kazu ž\u00edhan\u00e9ho lemu ve sv\u00ecteln\u00e9m mikroskopu. Mikroklky pokr\u00fdv\u00e1 glykokalyx (na membr\u00e1nu v\u00e1zan\u00e9 glykolipidy a glykoproteiny). Alkalick\u00e1 fosfat\u00e1za št\u00ecp\u00ed estery kyseliny fosfore\u00e8n\u00e9 a spolup\u00f9sob\u00ed tak p\u00f8i jejich zp\u00ectn\u00e9 resorpci v proxim\u00e1ln\u00edm tubulu. Ž\u00edhan\u00fd lem je znakem resorp\u00e8n\u00edho epitelu a mikroklky se zasluhuj\u00ed o mnohon\u00e1sobn\u00e9 zv\u00ectšen\u00ed membr\u00e1nov\u00e9 plochy resorpce i exkrece. Tak jsou transportov\u00e1ny zp\u00ect do krve ionty (Na + , K + , Ca 2+ , Cl -), gluk\u00f3za, sulf\u00e1ty, lakt\u00e1ty, aminokyseliny a prov\u00e1z\u00ed je i voda, naopak se do lumina secernuj\u00ed vod\u00edkov\u00e9 a amonn\u00e9 ionty, r\u00f9zn\u00e9 metabolity i n\u00eckter\u00e9 l\u00e9ky. Transport iont\u00f9 p\u00f8es membr\u00e1nu, nap\u00f8\u00edklad aktivn\u00ed transport Na + a K + pomoc\u00ed Na,K- ATP\u00e1zy, vyžaduje energii, proto se zde p\u00f8i baz\u00e1ln\u00ed \u00e8\u00e1sti bun\u00eck nalez\u00e1 mnoho mitochondri\u00ed zajišuj\u00edc\u00edch zdroj energie. P\u00f8\u00edtomnost v\u00ectš\u00edho po\u00e8tu mitochondri\u00ed zp\u00f9sobuje acidofilii cytoplazmy a z\u00e1rove\u00f2 radi\u00e1ln\u00ed ž\u00edh\u00e1n\u00ed. Bu\u00f2ky proxim\u00e1ln\u00edho tubulu jsou navz\u00e1jem v kontaktu invaginacemi, a proto se n\u00e1m ve sv\u00ecteln\u00e9m mikroskopu neda\u00f8\u00ed identifikovat bun\u00ec\u00e8n\u00e9 hranice. Jeho lumen je v\u00ectšinou v mikroskopu v\u00ectšinou trojc\u00edp\u00e9, \u00e8i št\u00ecrbinovit\u00e9 a „vypln\u00ecn\u00e9\u00ab kart\u00e1\u00e8ov\u00fdm lemem (dob\u00f8e viditeln\u00fdm p\u00f8i histochemick\u00e9m pr\u00f9kazu alkalick\u00e9 fosfat\u00e1zy, kde barevn\u00e1 (nap\u00f8. \u00e8ervenohn\u00ecd\u00e1) sraženina dokumentuje aktivitu enzymu).\n\t Proxim\u00e1ln\u00ed tubulus sm\u00ec\u00f8uj\u00edc\u00ed z k\u00f9ry ke d\u00f8eni ledviny plynule p\u00f8ech\u00e1z\u00ed do Henleho kli\u00e8ky, kter\u00e1 m\u00e1 tvar p\u00edsmene U a je rozd\u00eclena na proxim\u00e1ln\u00ed tenk\u00fd a dist\u00e1ln\u00ed tlust\u00fd segment. Ob\u00ec \u00e8\u00e1sti Henleovy kli\u00e8ky pozorujeme p\u00f8edevš\u00edm ve d\u00f8eni ledviny, zat\u00edmco corpuscula renalia, proxim\u00e1ln\u00ed tubuly, dist\u00e1ln\u00ed tubuly a \u00e8\u00e1st sb\u00ecrac\u00edch kan\u00e1lk\u00f9 nach\u00e1z\u00edme hlavn\u00ec v k\u00f9\u00f8e. Tenk\u00fd segment Henleovy kli\u00e8ky je tvo\u00f8en ploch\u00fdmi epitelov\u00fdmi bu\u00f2kami, kter\u00e9 maj\u00ed n\u00e1padn\u00ec sv\u00ectlou cytoplazmu. Kart\u00e1\u00e8ov\u00fd lem již na nich nen\u00ed. Tlust\u00fd segment je tvo\u00f8en kubick\u00fdmi bu\u00f2kami a sm\u00ecrem do k\u00f9ry plynule p\u00f8ech\u00e1z\u00ed v dist\u00e1ln\u00ed tubulus. Je nepropustn\u00fd pro vodu, což zp\u00f9sobuje hypotonicitu mo\u00e8i v tomto \u00faseku a naopak hypertonicitu intersticia.\n\t Dist\u00e1ln\u00ed tubulus m\u00e1 podobnou strukturu jako tlust\u00fd segment Henleovy kli\u00e8ky, je tvo\u00f8en pravideln\u00fdmi kubick\u00fdmi až cylindrick\u00fdmi bu\u00f2kami, kart\u00e1\u00e8ov\u00fd lem postr\u00e1d\u00e1 a na lumin\u00e1ln\u00edm povrchu m\u00f9žeme nal\u00e9zt pouze nepravideln\u00ec rozm\u00edst\u00ecn\u00e9 mikroklky. V m\u00edst\u00ec p\u00f8ibl\u00edžen\u00ed dist\u00e1ln\u00edho tubulu ke c\u00e9vn\u00edmu p\u00f3lu corpusculum renale jsou specializovan\u00e9 bu\u00f2ky macula densa, kter\u00e9 funguj\u00ed jako osmoreceptory, registruj\u00ed osmotickou koncentraci mo\u00e8i. V dist\u00e1ln\u00edm tubulu se tak\u00e9 vst\u00f8eb\u00e1vaj\u00ed a secernuj\u00ed ionty i mo\u00e8ovina, kter\u00e1 p\u00f8isp\u00edv\u00e1 ke zv\u00fdšen\u00ed osmotick\u00e9 koncentrace mo\u00e8i. \n\t Dist\u00e1ln\u00ed tubulus p\u00f8ech\u00e1z\u00ed ve sb\u00ecrn\u00fd kan\u00e1lek, jehož bu\u00f2ky jsou kubick\u00e9, \u00e8asto vyklenut\u00e9, ale oproti bu\u00f2k\u00e1m dist\u00e1ln\u00edho tubulu maj\u00ed sv\u00ectlejš\u00ed cytoplazmu a chromatin jejich jader je hrubš\u00ed. Sb\u00ecrac\u00ed kan\u00e1lky se sb\u00edhaj\u00ed do v\u00fdvodn\u00fdch a ty \u00fast\u00ed na vrcholech ledvinn\u00fdch pyramid do ledvinn\u00e9 p\u00e1nvi\u00e8ky, ze kter\u00e9 mo\u00e8 pokra\u00e8uje do mo\u00e8ovodu.\n\r\nDana Vok\u00f8\u00e1lov\u00e1, 3008, email: Dada.77@seznam.cz <mailto:Dada.77@seznam.cz> \n\r\n\t The kidneys are paired organs stored in the fat of the retroperitoneal region, located bilaterally along the spine of Th11 - L2. Their most important function is to filter blood and to remove metabolites from the blood plasm. They are supplied from the abdominal aorta through the left and right renal arteries, which further divide into smaller branches (four anterior branches - four rami ventrales and one dorsal branch- ramus dorsalis). These arteries successively divide into: lobar, interlobar, arcuate, interlobular,and finally into the afferent glomerular arteriole (vas afferens). A system of capillaries (rete mirabile arteriosum) forms from the afferent glomerular arteriole. The continuation of the vasculature is the efferent glomerular arteriole (vas efferens), which follows the peritubular capillary plexus. Blood is diverted from the kidney medulla through the venulae rectae and back through the interlobular veins, which join to form the arcuate veins and continue as interlobar veins that flow into the renal vein. The left and right renal veins empty into the inferior vena cava.\n\r\n The kidneys have a relatively thin fibrous connective tissue capsule. The parenchyma is divided into the cortex and medulla. Renal pyramids open into renal calyces of the renal pelvis, which continue into the ureter.\n\r\nThe basic structural and functional unit of the kidney is the nephron. The nephron is composed of the Bowmann\u2019s capsule, proximal tubule, thin and thick segments of loop of Henle, and the distal convoluted tubule. The distal tubules continue into the collecting ducts which opens at the top of the renal pyramid into the renal calyx.\n\r\nNephron begins as the renal corpuscle, which consists of a system of capillaries termed glomerular capillaries surrounded by Bowmann\u2019s capsule. The afferent and efferent arterioles along with the glomerular capillaries constitute the rete mirabile arteriosum and their endothelial cells contain pores without a diaphragm. Bowmann\u2019s capsule has two layers - visceral layer formed by podocytes that surround the basement membrane of capillaries and parietal layer comprising of simple squamous epithelium. Between the two layers is the urinary space, into which the plasma is ultrafiltrated as primary urine (normally does not contain proteins). From the capillaries, the blood enters the efferent arteriole. In the wall of the efferent arteriole the juxtaglomerular apparatus is located as an important self-regulatory system of the kidney. Juxtaglomerular cells produce renin (blood pressure regulation) and erythropoietin (erythropoiesis regulation). From the urinary space the primary urine enters the proximal tubule, which is lined with columnar cells. The visceral layer is formed by podocytes, whose bodies form primary and secondary processes called pedicles that interdigitate with neighboring podocytes (between them is the diaphragm). They enclose the fenestrated glomerular capillaries and form the filter barrier between blood and urinary space. Mesangial cells are found in the mesangium in the vascular pole of the renal corpuscle. They are capable of changing the diameter of capillaries, phagocytosis, and synthesizing signal substances (cytokines), such as endothelins and prostaglandins. The signals, such as antiotensin II or NO, cause contraction of smooth muscle cells in the arterial wall, while the activity of mesangial cells can also influence the lumen of blood vessels.\n\r\nThe proximal tubule is formed by cuboidal or columnar cells (with undulating lateral borders), which have a brush border on the apical surface composed of densely arranged regular microvilli with membrane bound alkaline phosphatase and a glycocalyx (a mixture of linear glycolipids and glycoproteins). Alkaline phosphatase participates in the reabsorption of cleaved phosphate esters in the proximal tubule. The alkaline phosphatase reaction product is a marker of absorbtive epithelium. Microvilli increase the surface area for absorption and excretion. Transported back into the blood are ions (Na + , K + , Ca 2+ , Cl -), glucose, sulfates, lactates, amino acids, and water. The tubules secrete hydrogen and ammonium ions, various metabolites, and some drugs. Transport of ions across the membrane, such as the active transport of Na + and K + with Na \/ K-ATPase, requires energy and therefore many mitochondria are basally located providing the energy supply. The p resence of plenty of mitochondria cause s an acidophil ic cytoplasm and typical radial striation s at the basal region of cells. Proximal tubul ar cells are interconnected by lateral interdigitations and thus may appear confluent under the microscope. Microscopically, the lumen appears slit-like or triangular, \"filled\" with a brush border (visible in immunohistochemical methods of alkaline phosphatase where the color precipitate demonstrates the activity of this enzyme).\n\r\nThe proximal tubule leading from the kidney cortex to the kidney medulla flows into the thin and thick segments of loop of Henle, named as descending thin and thick ascending portions. The ascending part follows back into the cortex. Both parts of the loop of Henle are present in the kidney medulla, while the renal corpuscles, proximal tubules, and distal tubules as well as collecting tubules are located in the cortex. The thin segment of Henle's loop consists of flat epithelial cells that no longer have a brush border and the cytoplasm is chromophobic (due to low amount of organels). The thick segment consists of cuboidal cells and transits into the distal convoluted tubule. It is impervious to water, resulting in hypotonic urine contained in this segment and oppo singly the hypertonicity of the interstitium.\n\r\nThe distal convoluted tubule has a similar structure as the thick segment of Henle\u00b4s loop. It is composed of cuboidal cells with unevenly distributed microvilli that are too sparse to be called as a brush border. In one area o posing the vascular pole of the renal corpuscle, the distal tubule is lined by tall specialized cells called the macula densa. The macula densa acts as osmoreceptor s and registers urine osmotic composition. The distal tubule absorbs and secretes ions and urea, which are responsible for the osmolality of urine.\n\r\nThe distal convoluted tubule passes into the collecting tubule, whose cells are cuboidal with frequent arcuate protrusions into the lumen. Compared to the distal tubul ar cells, they have a strikingly more chromophobic cytoplasm and condensed nuclear chromatin. Collecting ducts converge into the renal pyramids, which flow into the renal pelvis that conveys the final urine into the ureter.\n\r\n Michaela Varys, 3053, email: varys.michaela@gmail.com <mailto:varys.michaela@gmail.com>",
    "desc_en": "",
    "insert_who": "Gurka",
    "marks": [

```
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.266291",
                "y_rel": "0.885873"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Macula densa",
        "txt_en": "",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.465761",
                "y_rel": "0.858972"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Mesangium",
        "txt_en": "",
        "desc_cz": "Mesangium se d\u00ecl\u00ed na vnit\u00f8n\u00ed (intraglomerul\u00e1rn\u00ed) a vn\u00ecj&#154;\u00ed
(extraglomerul\u00e1rn\u00ed) a je tvo\u00f8eno mesangi\u00e1ln\u00edmi bu\u00f2kami, kter\u00e9 vypl\u00f2uj\u00ed prostory mezi
kapil\u00e1rami. \n\r\nKapil\u00e1ry jsou obklopeny v\u00fdb\u00ec&#158;ky podocyt\u00f9.",
        "desc_en": "The mesangium is divided into the inner (intraglomerular) and outer (extraglomerular) mesangial cells which fill in
the spaces between the capillaries. Immediately surrounding the capillaries are the podocyte processes.",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.461194",
                "y_rel": "0.859663"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Mo\u010dov\u00fd prostor",
        "txt_en": "Urinary space",
        "desc_cz": "Mo\u00e8ov\u00fd prostor se nach\u00e1z\u00ed mezi pariet\u00e1ln\u00ed a viscer\u00e1ln\u00ed vrstvou Bowmanova
pouzdra.",
        "desc_en": "The urinary space is enclosed by parietal and visceral layrers of Bowman's capsule.",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.456547",
                "y_rel": "0.85924"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Proxim\u00e1ln\u00ed tubulus",
        "txt_en": "Proximal tubule",
        "desc_cz": "Proxim\u00e1ln\u00ed tubulus je tvo\u00f8en\u00fd bu\u00f2kami jednovrstevn\u00e9ho kubick\u00e9ho epitelu, kter\u00e9
maj\u00ed kart\u00e1\u00e8ov\u00fd lem. V proxim\u00e1ln\u00edm tubulu se zp\u00ectn\u00ec resorbuje 90% vody a solut\u00f9.",
        "desc_en": "The proximal tubule has a single layer of cubic epithelium with a brush border. The proximal tubule reabsorbs 90 % of
water and electrolytes from primary urine.",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.471018",
                "y_rel": "0.853261"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Sb\u011brac\u00ed kan\u00e1lek",
        "txt_en": "Collecting tubule",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
```

```
                "x_rel": "0.565058",
                "y_rel": "0.645662"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Tenk\u00fd segment Henleovy kli\u010dky",
        "txt_en": "Thin limb of loop of Henle",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.571798",
                "y_rel": "0.644252"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Tlust\u00fd segment Henleovy kli\u010dky",
        "txt_en": "Thick limb of loop of Henle",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.572418",
                "y_rel": "0.651363"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Urotel",
        "txt_en": "Urothelium (Calyx renalis)",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.774879",
                "y_rel": "0.465646"
            }
        ]
    },
    {
        "idx": "20107+",
        "txt_cz": "Urotel",
        "txt_en": "Urothelium (Pelvis renalis)",
        "desc_cz": "",
        "desc_en": "",
        "insert_who": "Gurka",
        "marks": [
            {
                "shape": "arrow",
                "ori": "down",
                "color": "green",
                "size": "small",
                "x_rel": "0.90028",
                "y_rel": "0.260615"
            }
        ]
    }
```

]