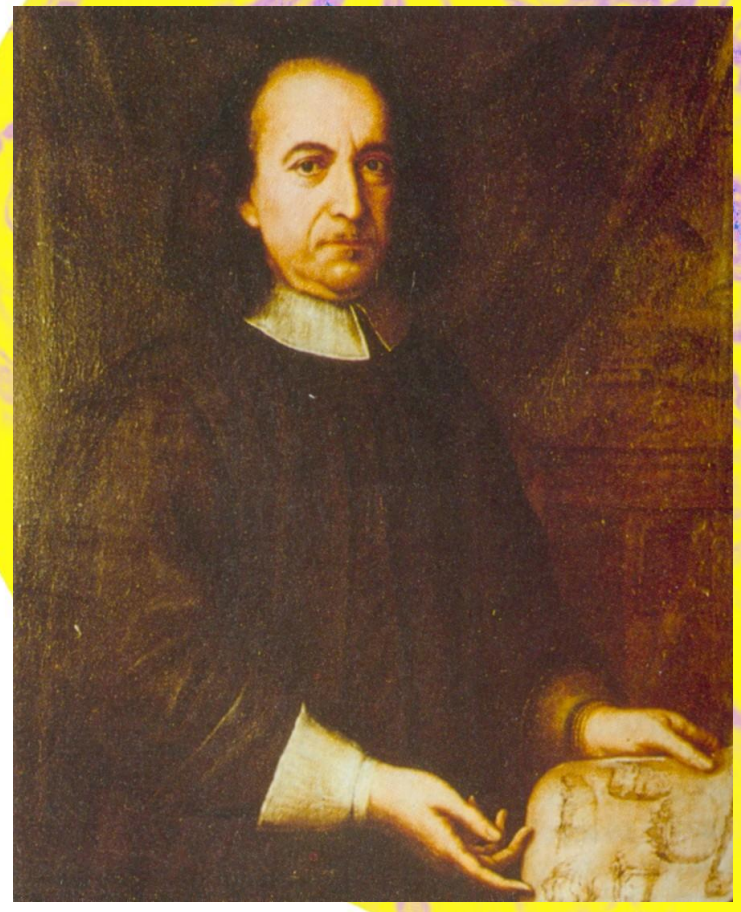
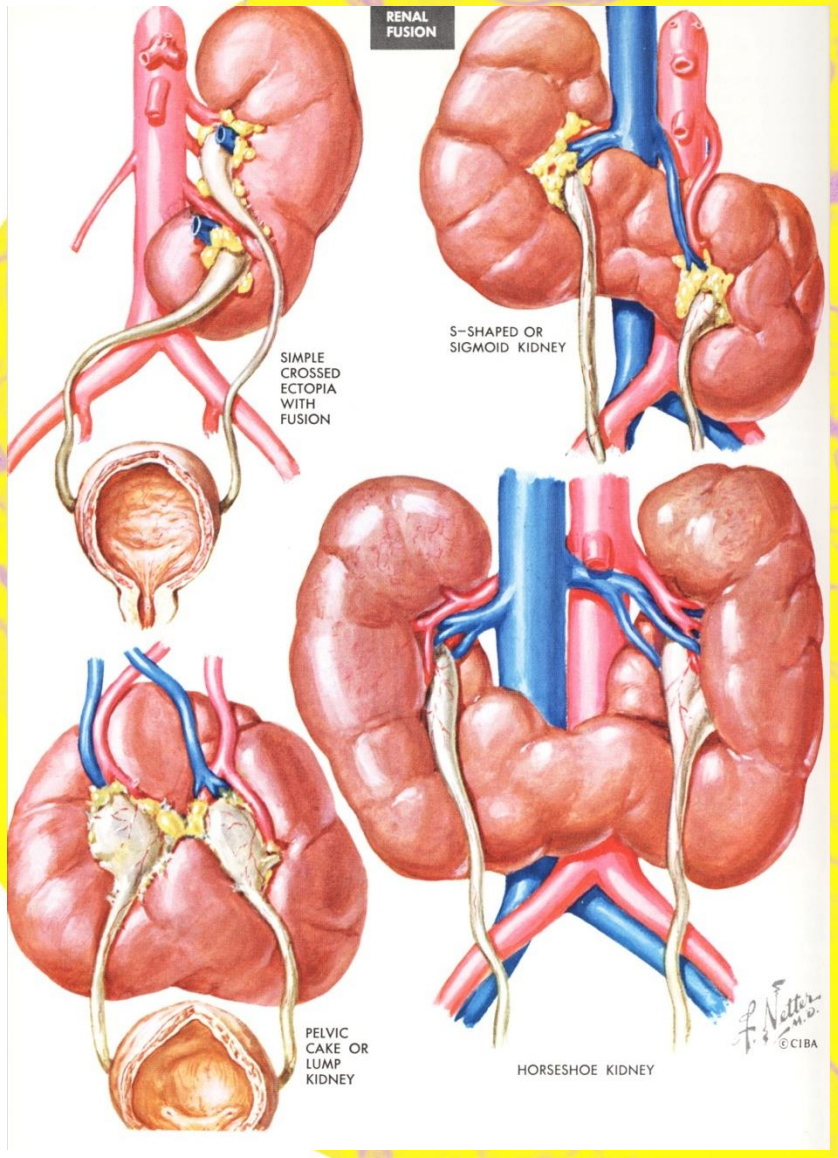
LECTURE 17

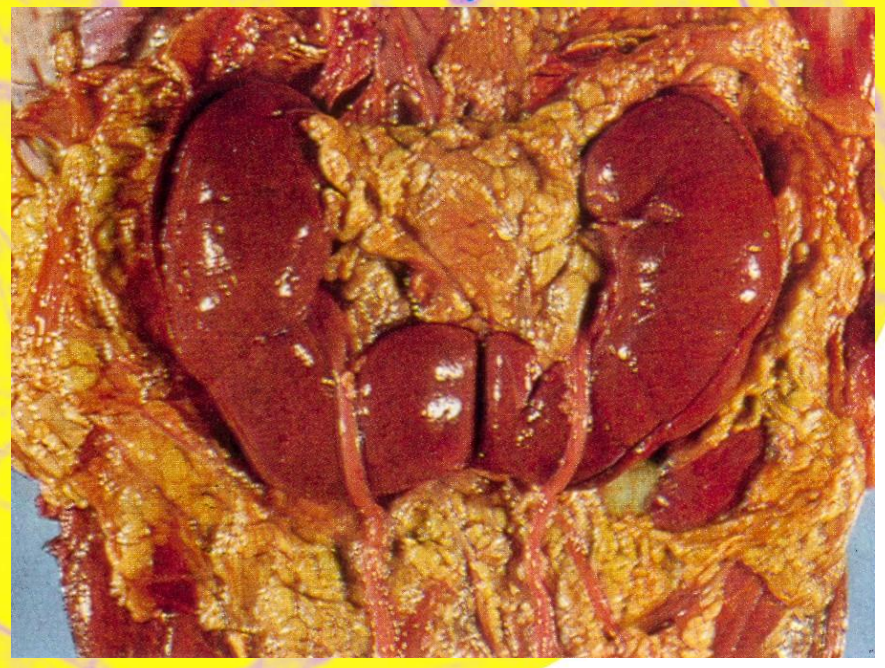


MARCELLO MALPIGHI
(1628-1694)

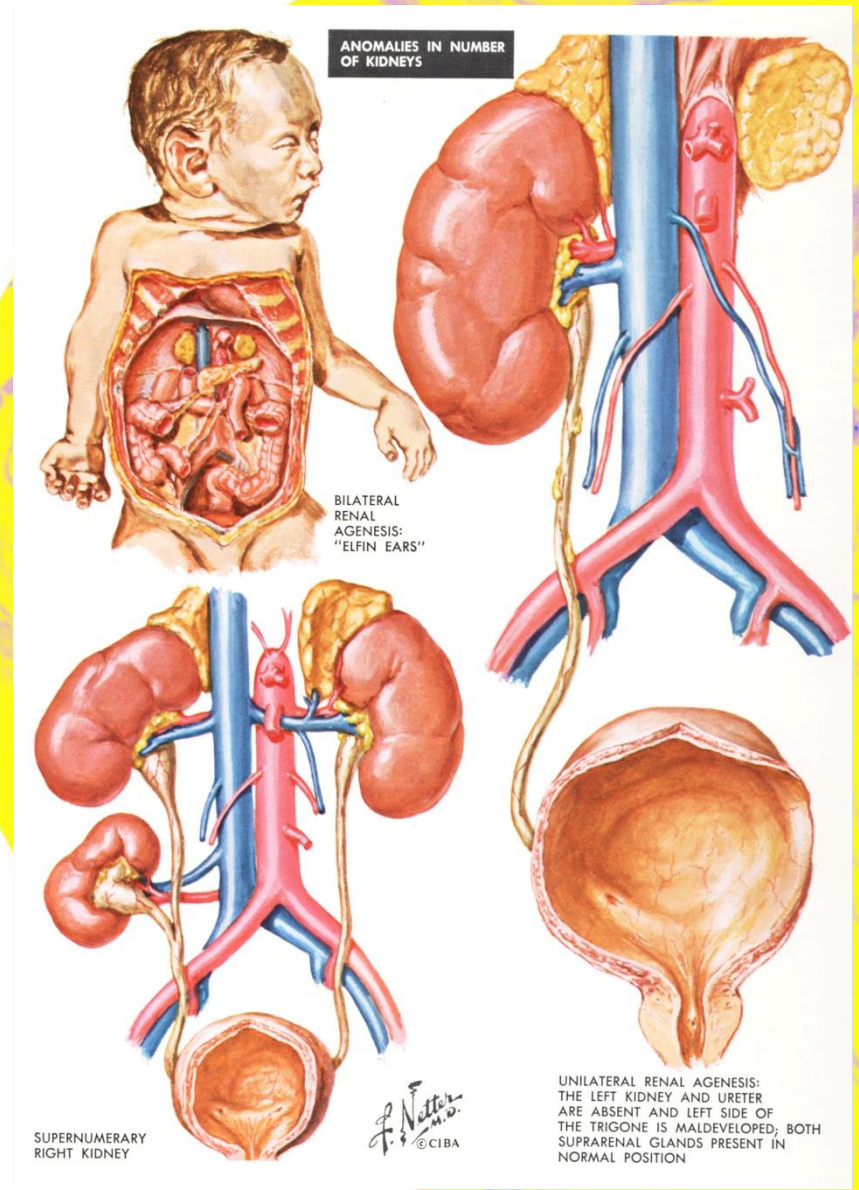
DEVELOPMENTAL DISTURBANCES



ARCUATED KIDNEY



DEVELOPMENTAL DISTURBANCES



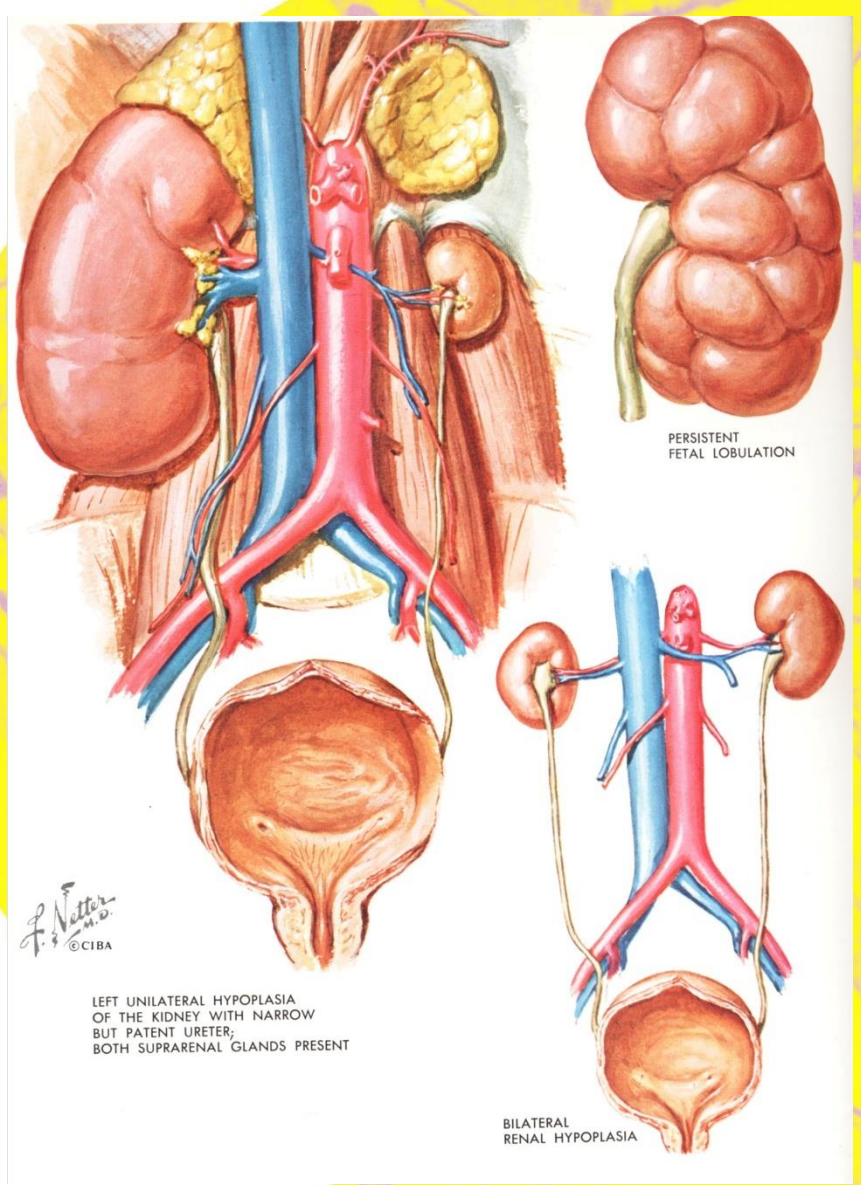
CONGENITAL LACK OF KIDNEY(S)

AGENESIA, APLASIA

DYSTOPIA OF KIDNEY (TRANSLOCATION)

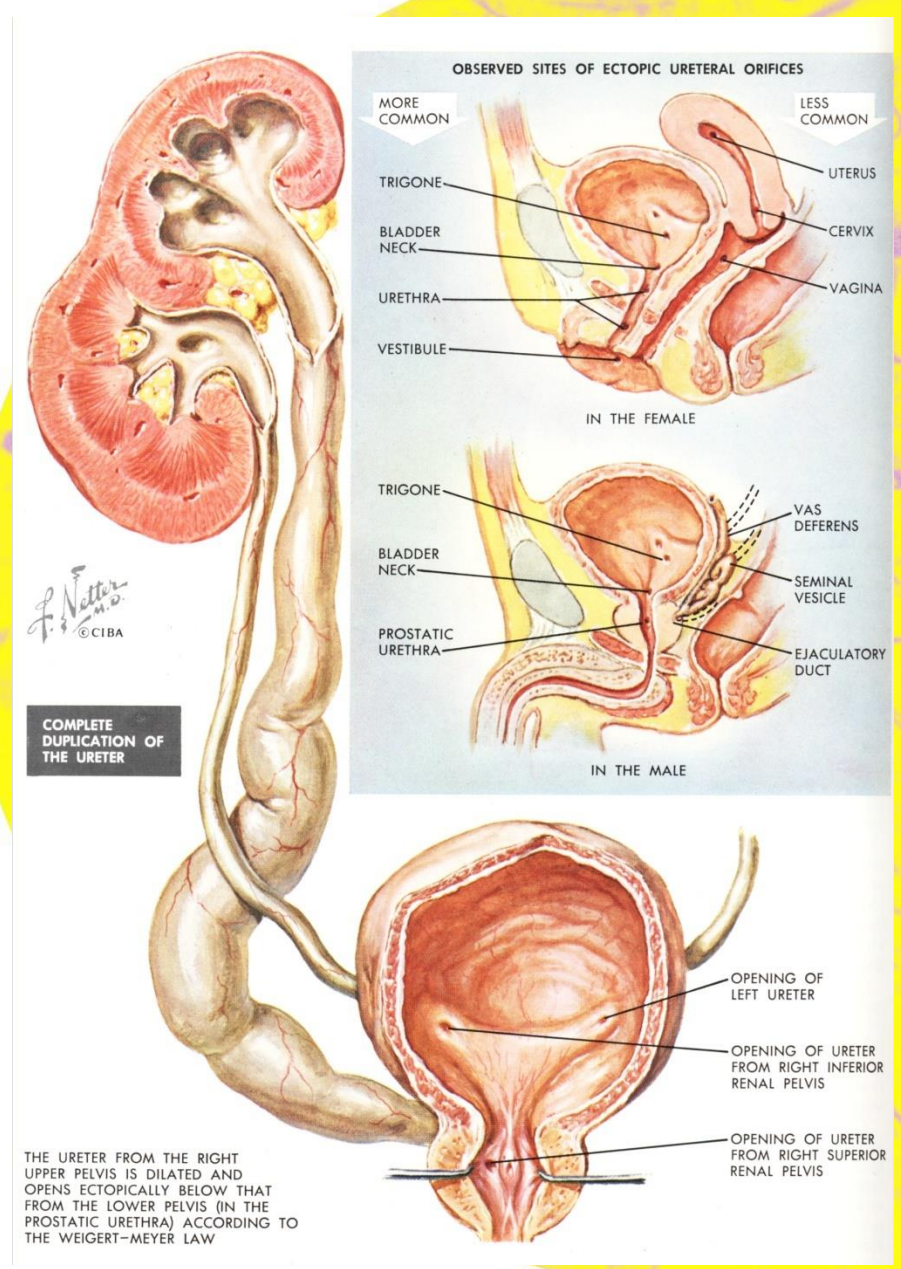
PELVIC RENAL DYSTOPIA

DEVELOPMENTAL DISTURBANCES

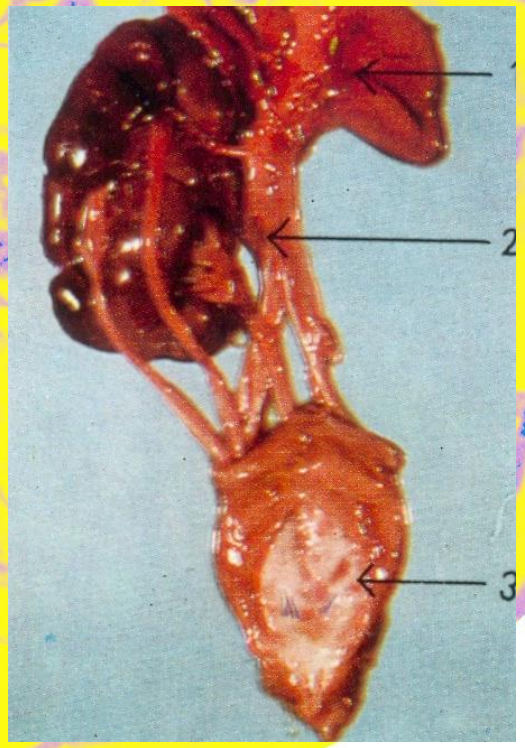


HYPOPLASIA

DEVELOPMENTAL DISTURBANCES

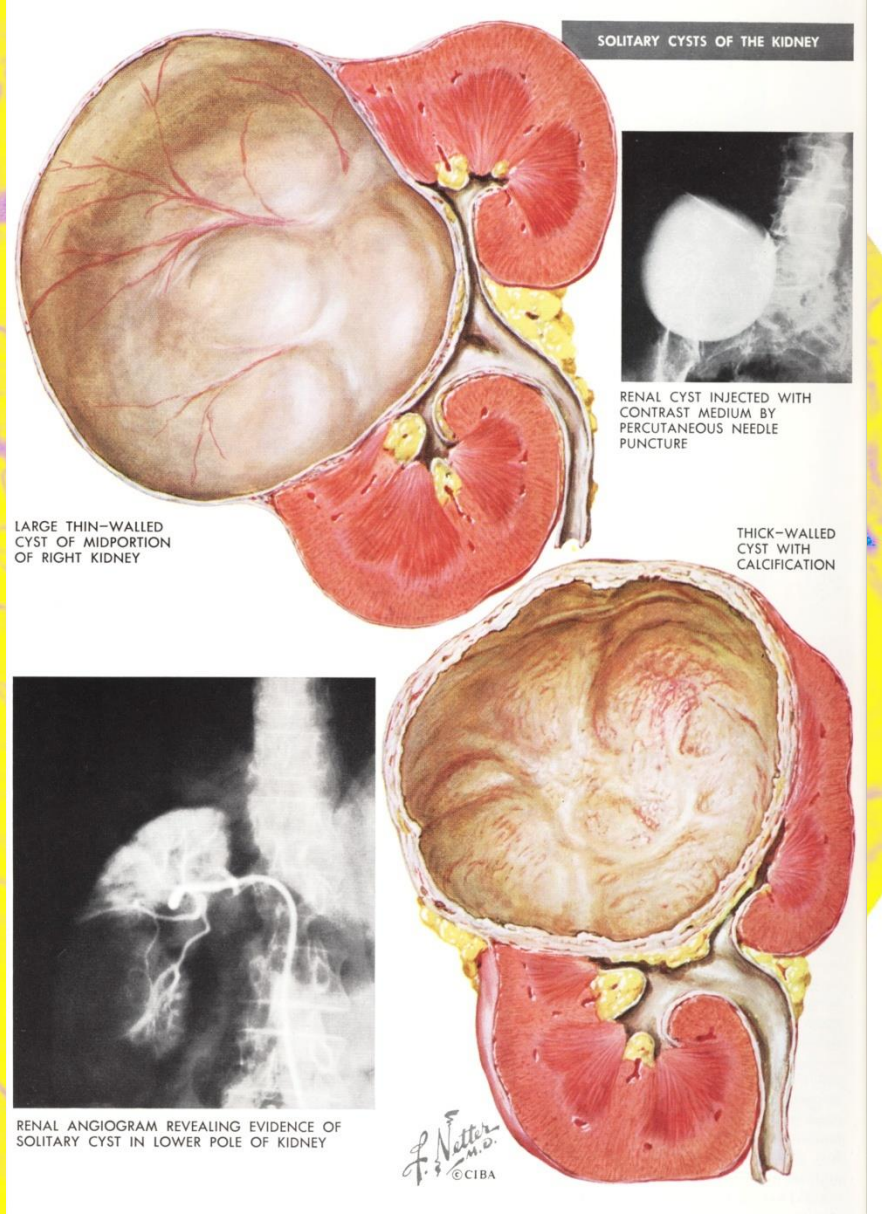


DUPLICATED PYELON AND URETER

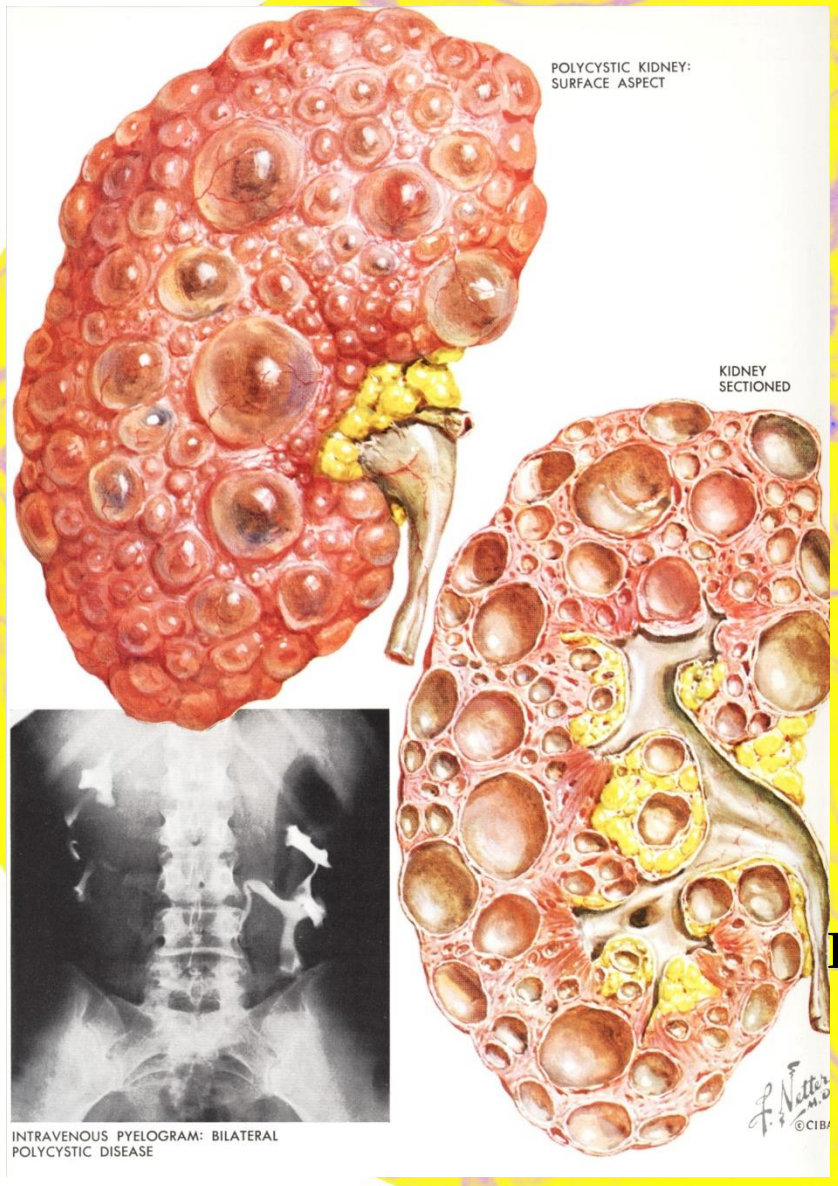


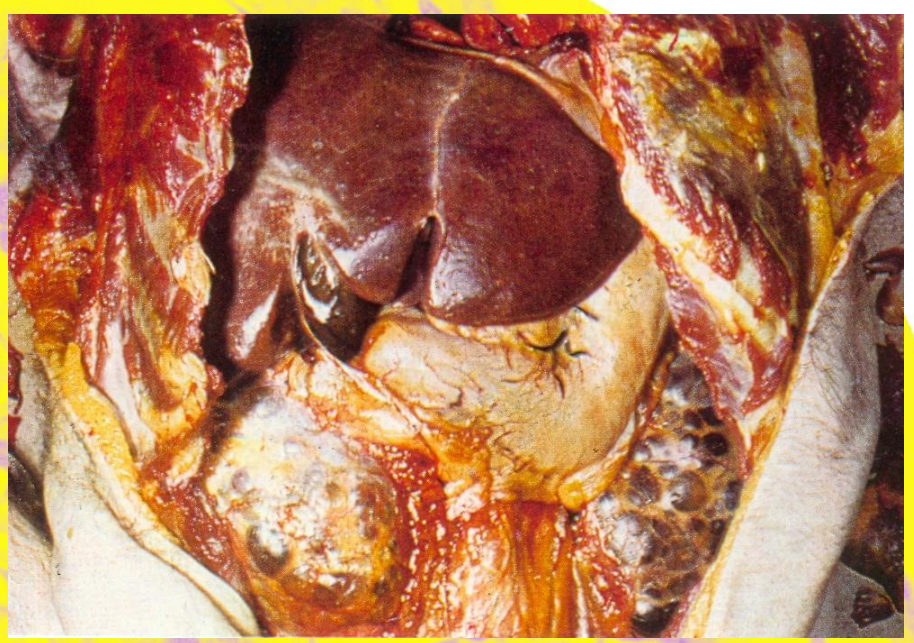
SOLITARY CYSTS

SIMPLE CYST



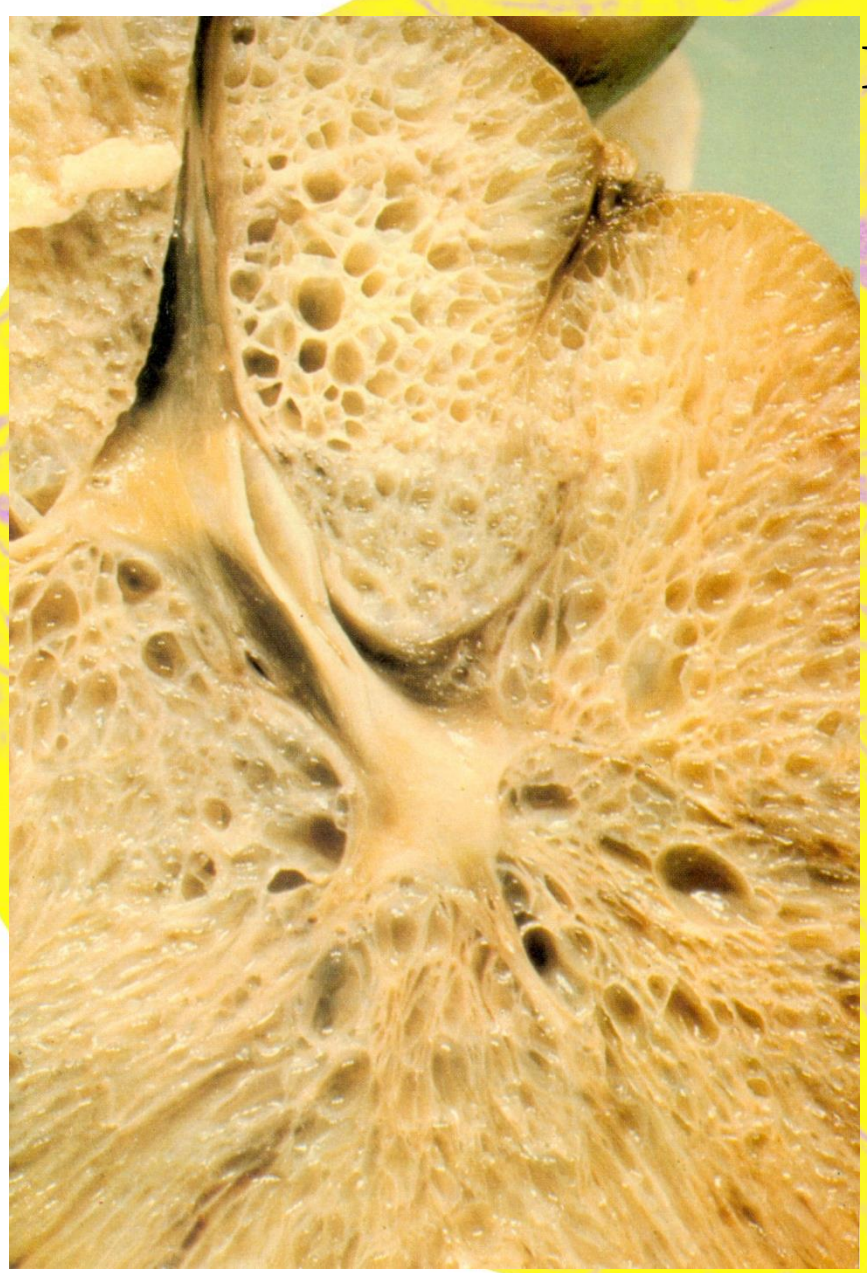
DEVELOPMENTAL DISTURBANCES



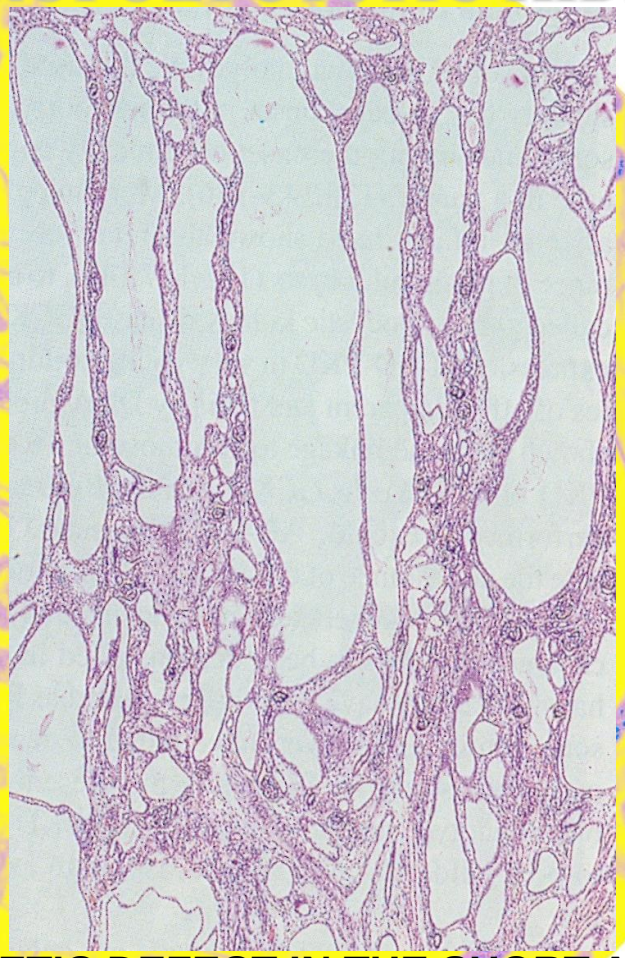


POLYCYSTIC KIDNEY
(*RENES MACROPOLYCYSTICI*)
TRIAD OF SYMPTOMS:
SYMMETRIC TUMOR IN ABDOMEN, HYPERTENSION, INFLAMMATION OF RENAL PELVIS - PYELITIS

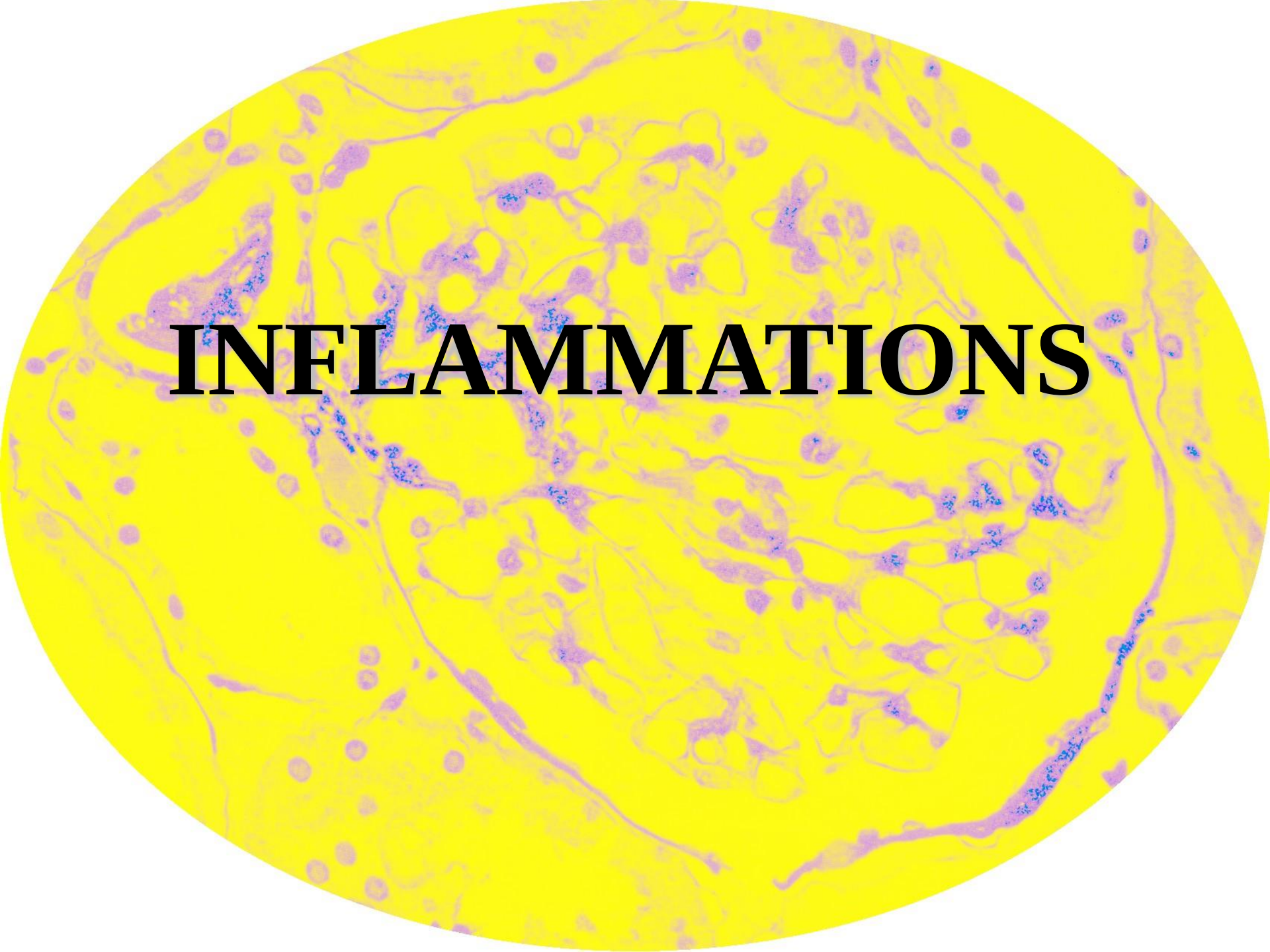
DEVELOPMENTAL DISTURBANCES



MICROPOLYCYSTIC KIDNEYS



GENETIC DEFECT IN THE SHORT ARM OF CHROMOSOME 6 (RECESSIVE IN NEWBORNS AND DOMINANT IN ADULTS). DIFFERENT PATHOMORPHOLOGIC TYPES, ALSO WITH CYSTIC CHANGES IN LIVER


INFLAMMATIONS

NEPHRITIS

GLOMERULONEPHRITIS

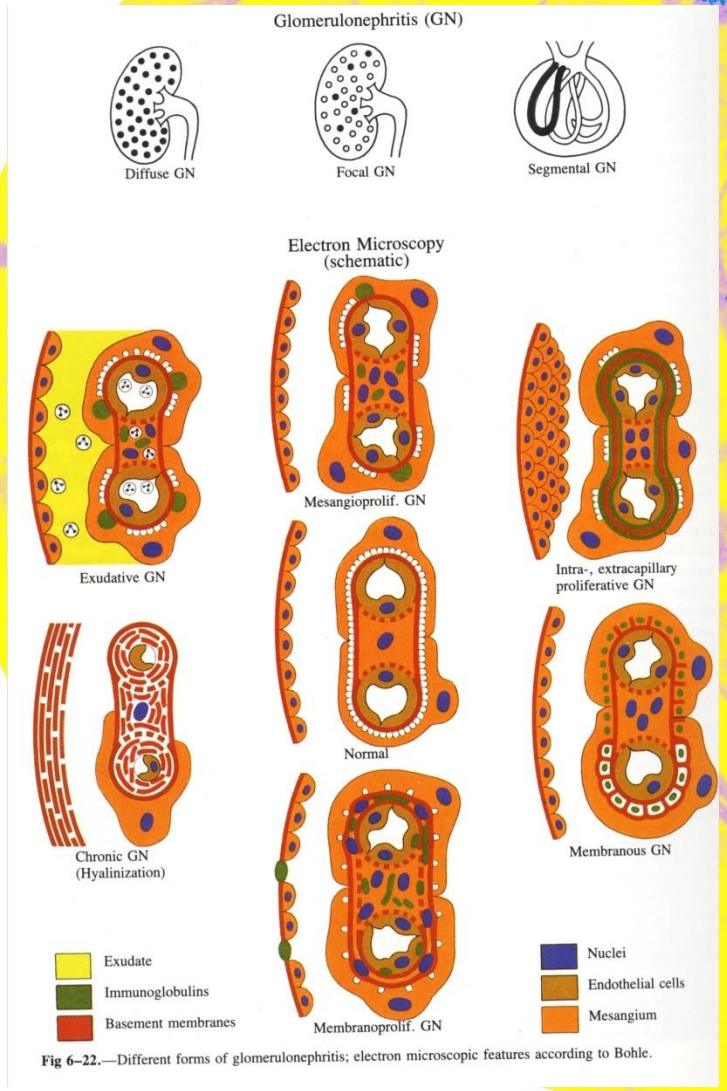


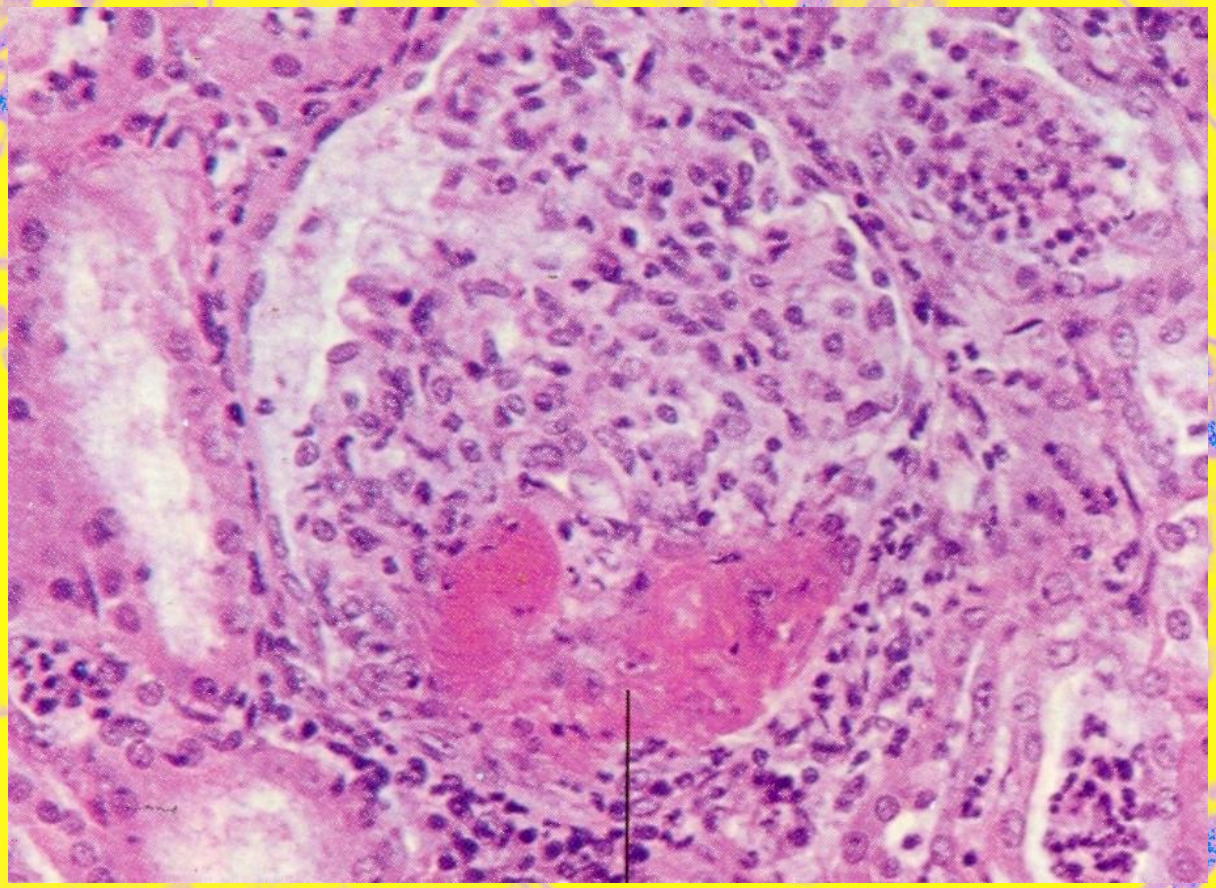
Fig 6–22.—Different forms of glomerulonephritis; electron microscopic features according to Bohle.

GLOMERULONEPHRITIS

FOCAL GN **DIFFUSE GN**

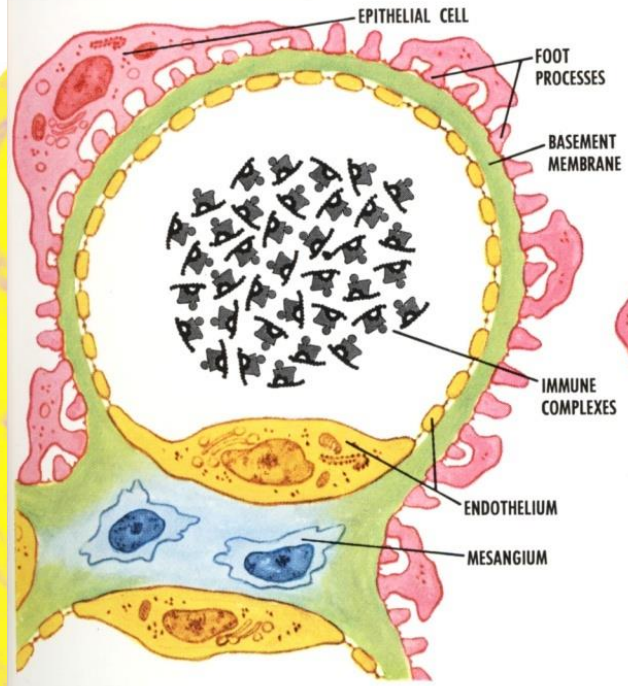
NEPHRITIS

FOCAL GLOMERULONEPHRITIS

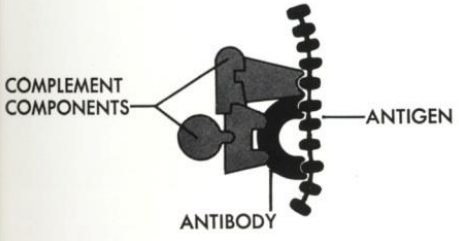


NEPHRITIS
GLOMERULONEPHRITIS

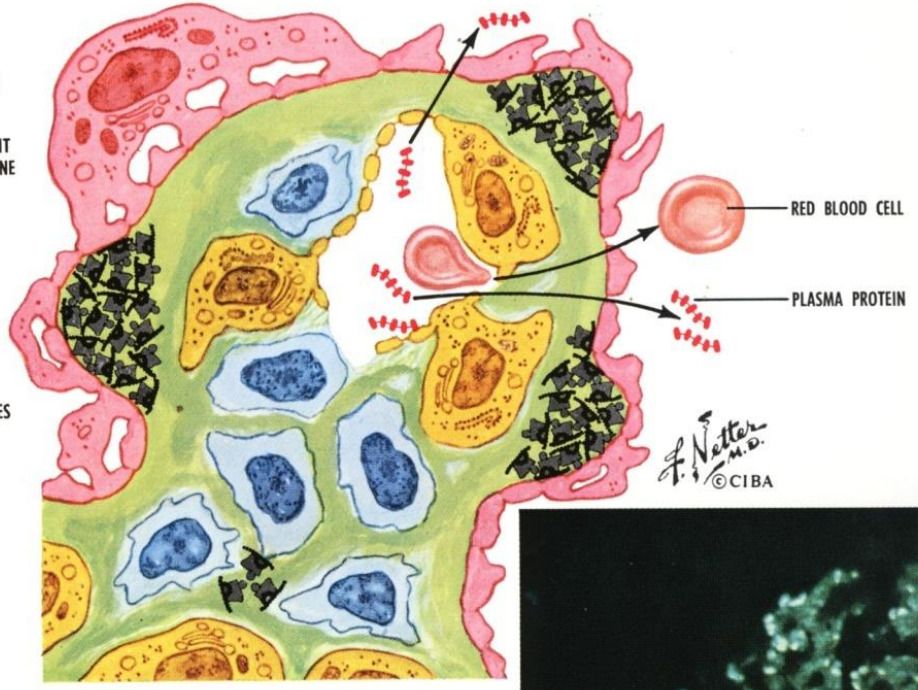
HYPOTHESIS OF PATHOGENESIS OF *ACUTE* GLOMERULAR INJURY BY CIRCULATING IMMUNE COMPLEXES (SCHEMATIC)



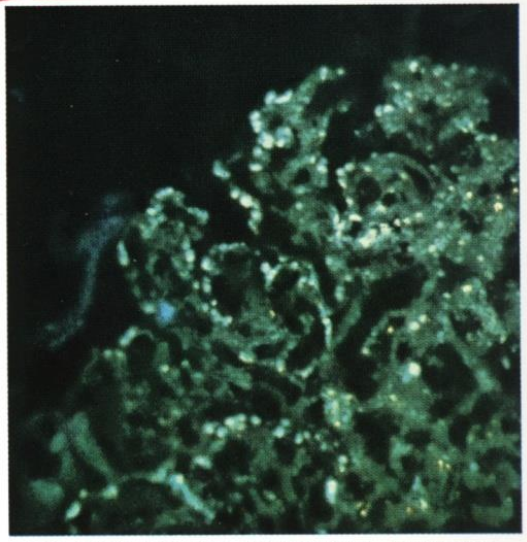
A: CIRCULATING IMMUNE COMPLEXES, FORMED ANYWHERE IN THE BODY, CONSISTING OF ANTIGEN, ANTIBODY, AND COMPLEMENT COMPONENTS, ARRIVE AT GLOMERULAR CAPILLARIES IN *LARGE AMOUNTS OVER A SHORT PERIOD OF TIME*



COMPOSITION OF COMPLEXES



B: COMPLEXES PENETRATE ENDOTHELIUM AND BASEMENT MEMBRANE OF GLOMERULAR CAPILLARIES AND FORM LARGE ISOLATED DEPOSITS (HUMPS); FOOT PROCESSES FUSE; MESANGIAL AND ENDOTHELIAL CELLS SWELL AND PROLIFERATE, INVADING CAPILLARY LUMEN; FIBRILLAR BASEMENT MEMBRANELIKE MATERIAL (MESANGIAL MATRIX) IS DEPOSITED BETWEEN CELLS; INCREASED POROSITY OF CAPILLARY WALLS PERMITS ESCAPE OF PLASMA PROTEINS AND BLOOD CELLS, CAUSING PROTEINURIA AND HEMATURIA

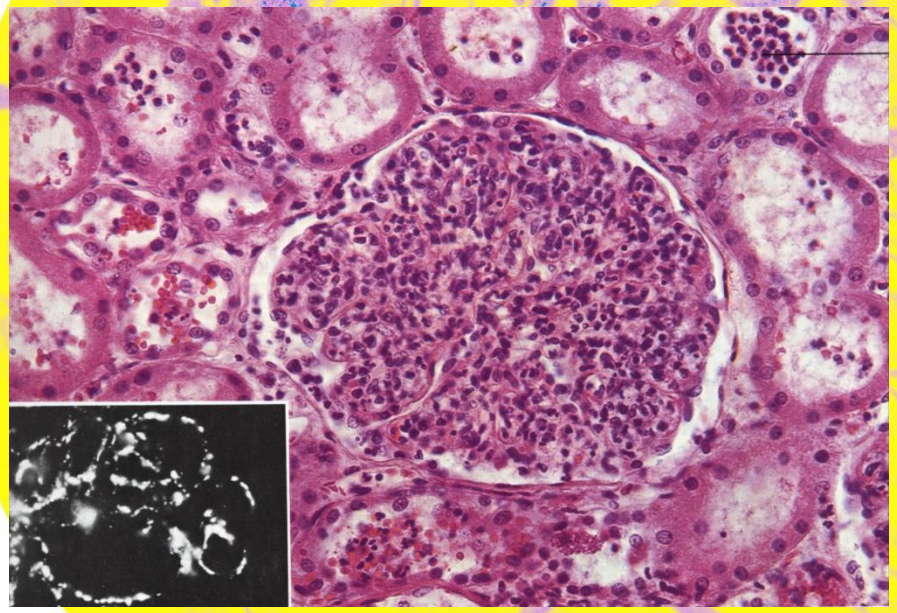


IMMUNOFLUORESCENT PREPARATION, ACUTE GLOMERULONEPHRITIS: IRREGULAR LUMPY DEPOSITS OF GAMMA GLOBULIN AND COMPLEMENT, RESEMBLING EXPERIMENTAL ACUTE IMMUNE COMPLEX DISEASE

NEPHRITIS

GLOMERULONEPHRITIS

DIFFUSE ACUTE GLOMERULONEPHRITIS

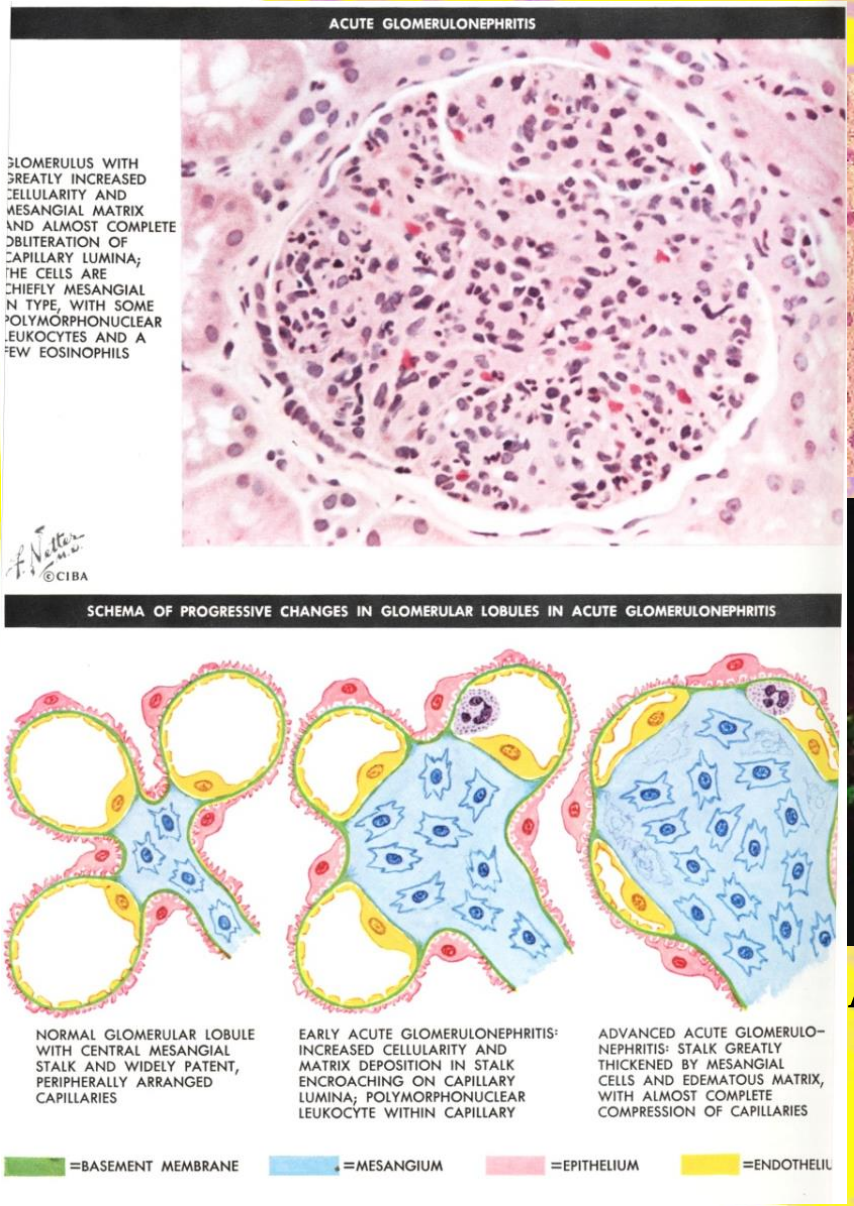


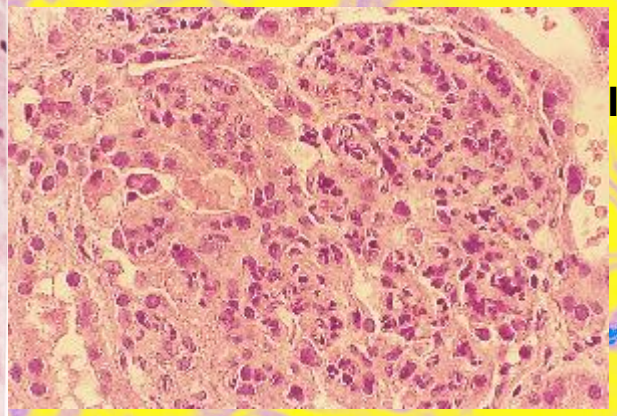
SIGNIFICANTLY INCREASED NUMBER OF NUCLEI IN THE GLOMERULUS, MOSTLY BECAUSE OF NEUTROPHILS

MACROSCOPY OF ACUTE NEPHRITIS (LARGE RED KIDNEY)

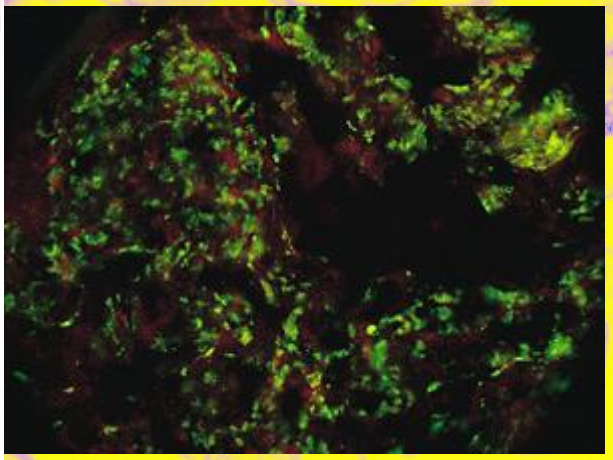
NEPHRITIS

DIFFUSE GLOMERULONEPHRITIS





SIGNIFICANTLY INCREASED NUMBER OF NUCLEI IN GLOMERULUS, MOSTLY BECAUSE OF NEUTROPHILS

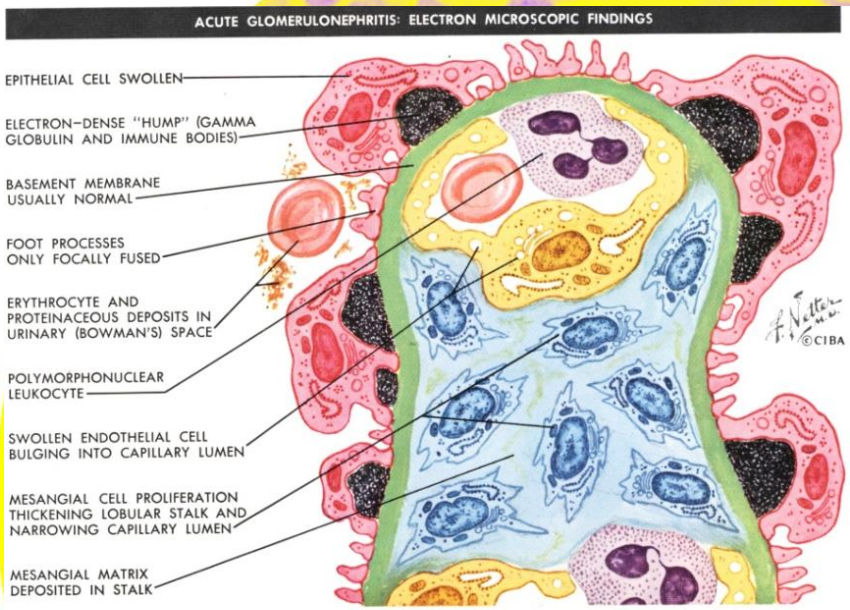


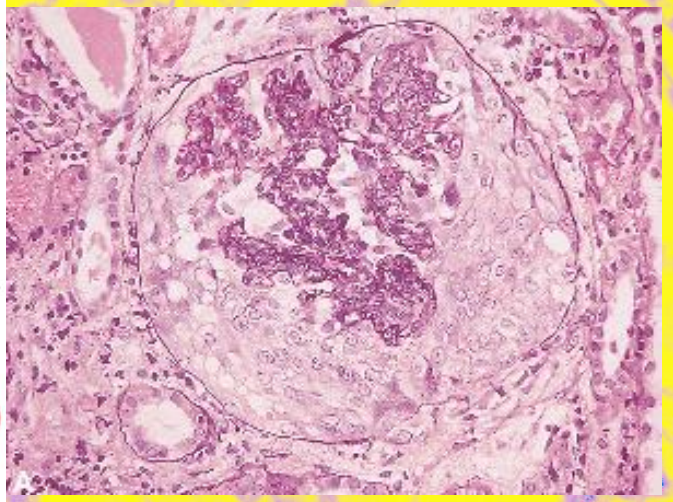
GRANULAR DEPOSITS OF ANTIGEN-ANTIBODY - COMPLEMENT COMPLEX

ACUTE GLOMERULONEPHRITIS (POST STREPTOCOCCAL)

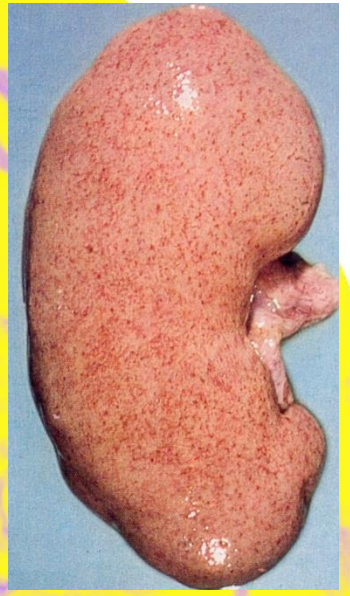
NEPHRITIS

DIFFUSE GLOMERULONEPHRITIS

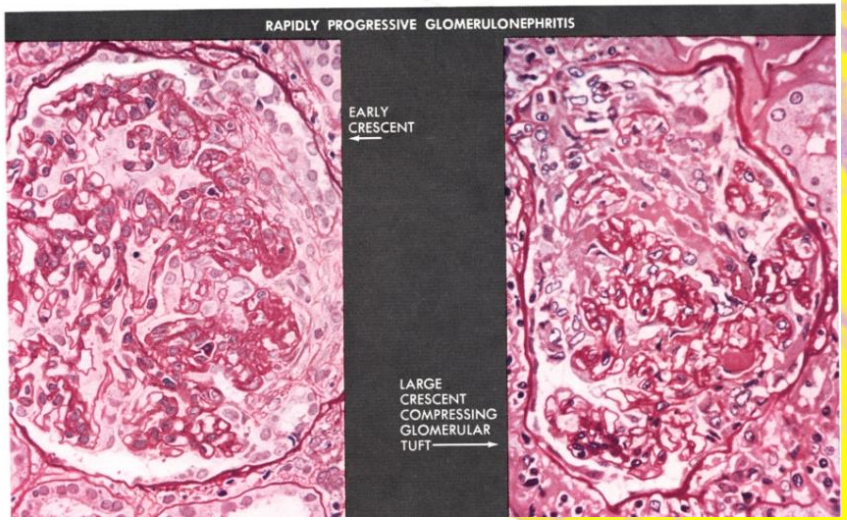




CHARACTERISTIC PROLIFERATION OF CRESCENT PODOCYTES IN BOWMANS CAPSULE



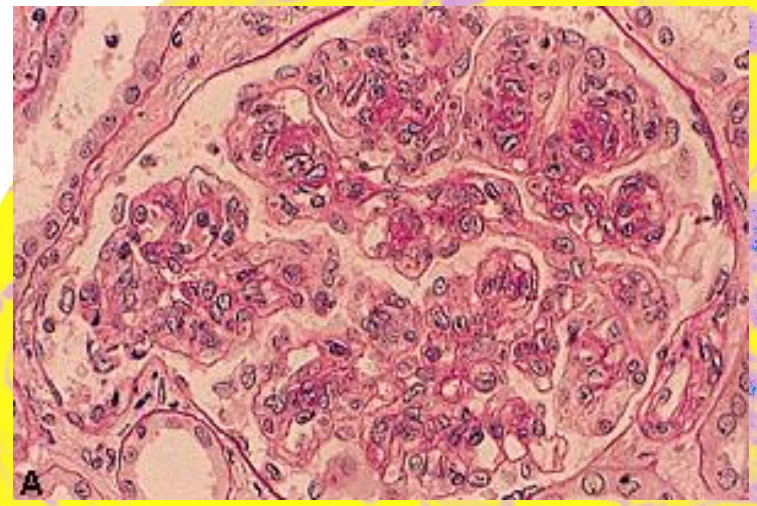
LARGE, YELLOW KIDNEY



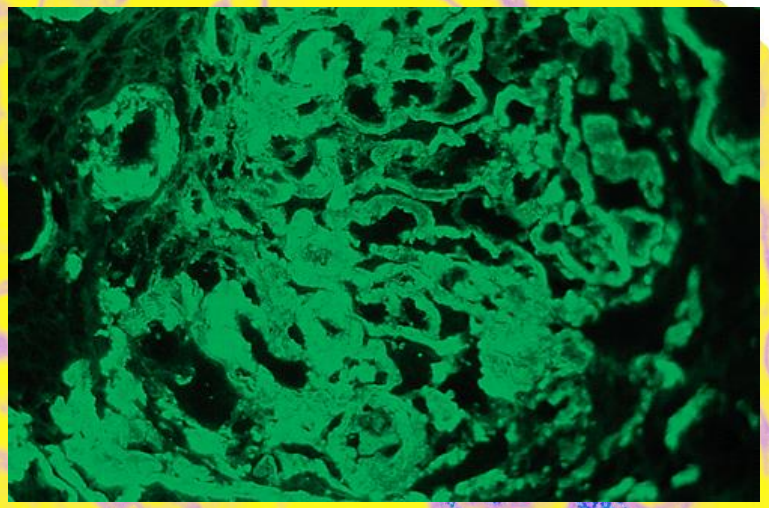
FULMINATING GLOMERULONEPHRITIS (RAPIDLY PROGRESSIVE)

NEPHRITIS

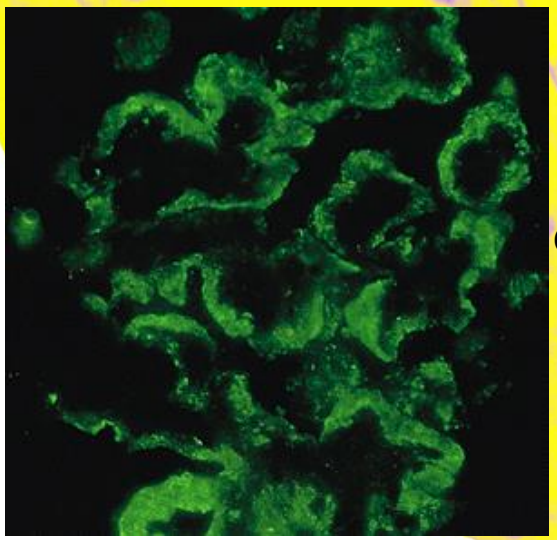
MESANGIOCAPILLAR GLOMERULONEPHRITIS



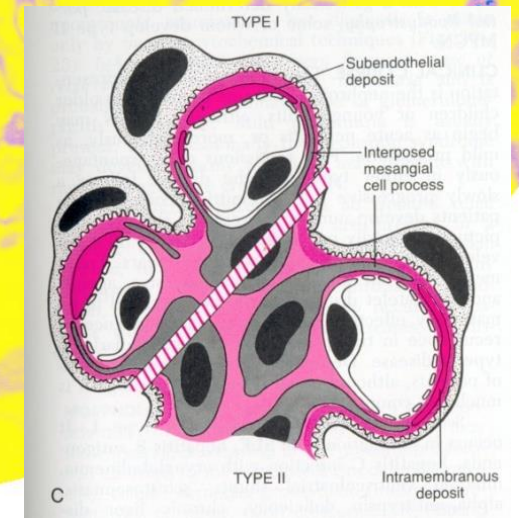
DOUBLE CONTOUR OF CAPILLARY WALLS



MESANGIOCAPILLAR GLOMERULONEPHRITIS TYPE II: DIFFUSE DEPOSITS IN CAPILLAR AND MESANGIAL WALLS (ANTI- C3)

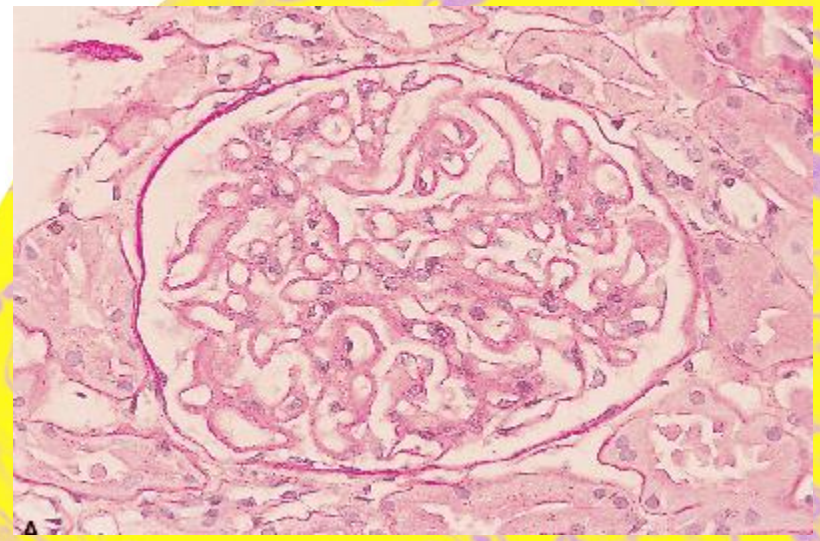


MESANGIOCAPILLAR GLOMERULONEPHRITIS TYPE I: PRESENCE OF FOCAL DEPOSITS IN MEZANGIUM (ANTI-C3)

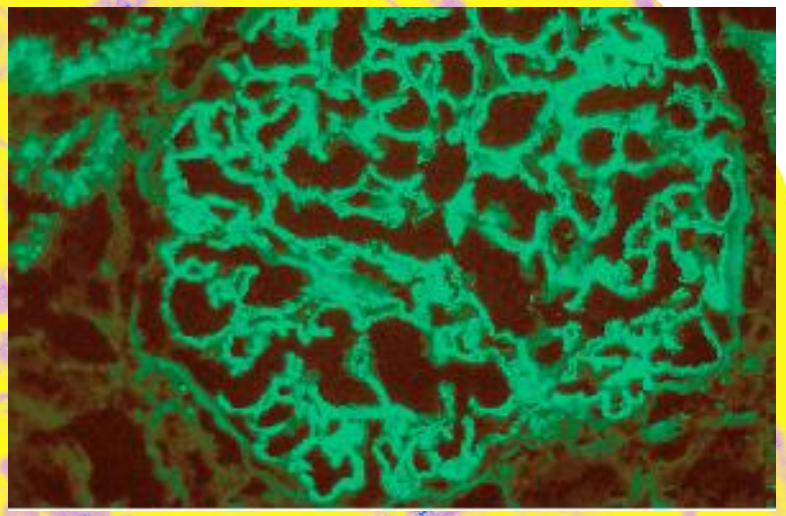


NEPHRITIS

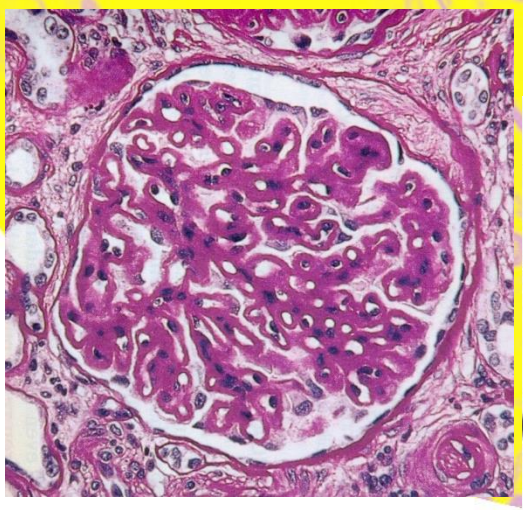
MEMBRANOUS GLOMERULONEPHRITIS

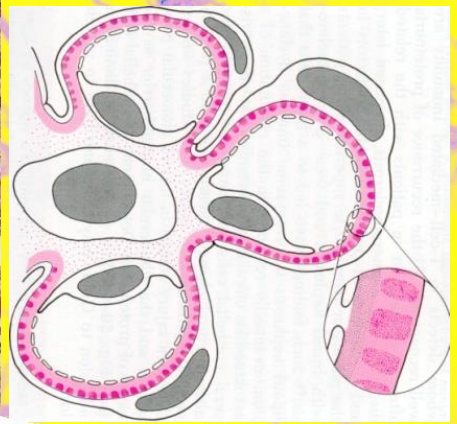


MEMBRANOUS GN – LINEAR THICKENING OF BASEMENT MEMBRANE



MEMBRANOUS GN – GRANULAR DEPOSITS IN BASEMENT MEMBRANE (THICKENING OF BASEMENT MEMBRANE, ANTI-IgG)





MEMBRANOUS GN (SCHEME)

NEPHRITIS

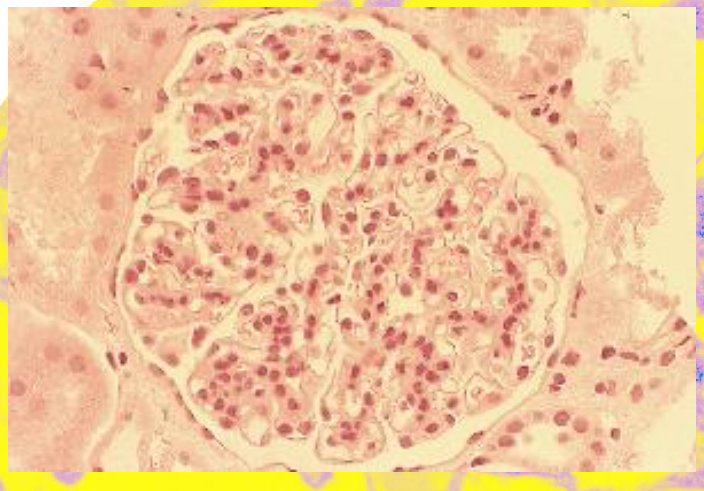
DIFFUSE GLOMERULONEPHRITIS

PATHOLOGY OF GLOMERULONEPHRITIS

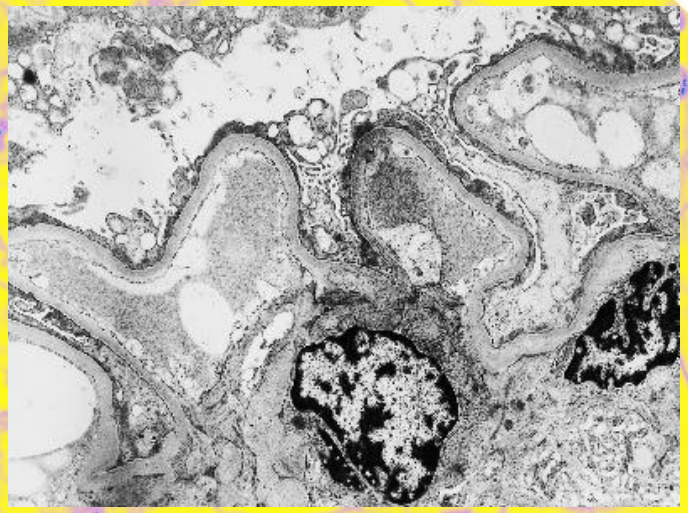
1. PROTEINURIA OVER 3,5 g/ 24h
2. DECREASE IN PROTEIN LEVELS IN PLASMA: EDEMA AND TRANSUDATES
3. HYPERLIPIDEMIA INCLUDING INCREASE IN CHOLESTEROL LEVELS

NEPHRITIS

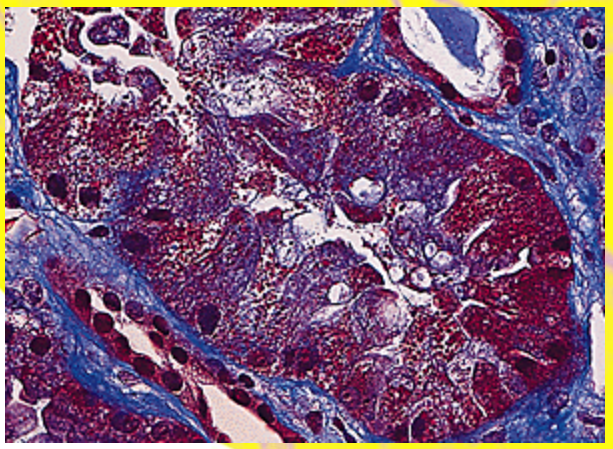
SUBMICROSCOPIC GLOMERULONEPHRITIS – MINIMAL CHANGE



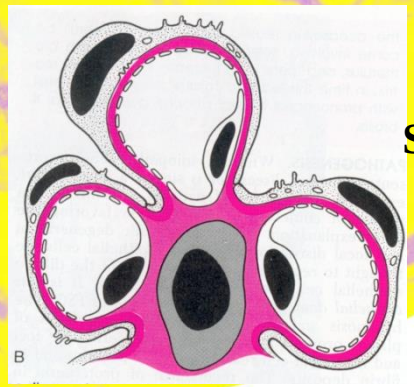
INSIGNIFICANT INCREASE IN MESANGIUM MATRIX



ELECTRON MICROSCOPY SHOWS CHANGES IN STRUCTURE OF PODOCYTES – MERGING OF PODOCYTE ON BASEMENT MEMBRANE



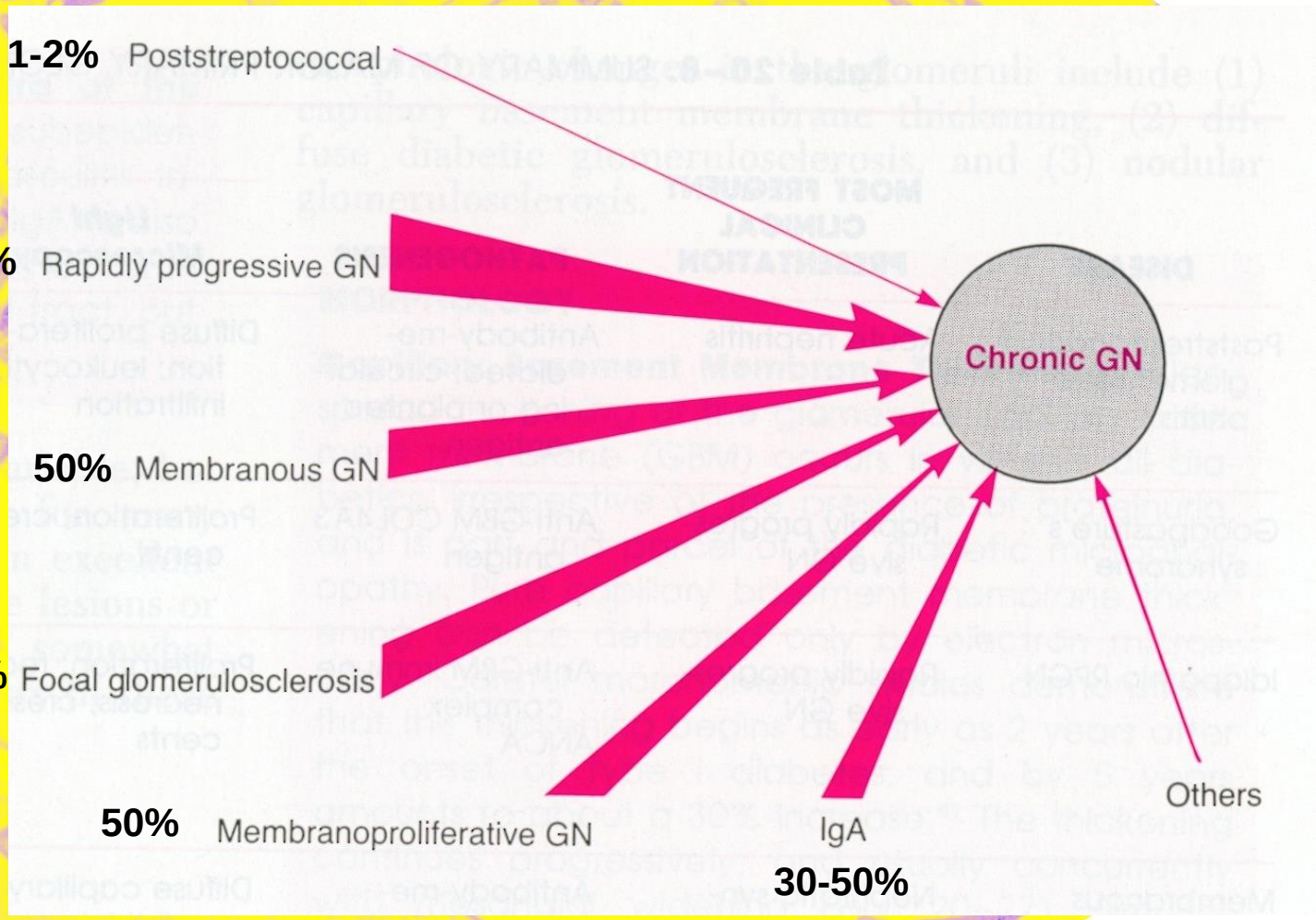
ACCUMULATION OF LIPID DROPLETS IN EPITHELIUM OF CANALICULI



SUBMICROSCOPIC GN (SCHEME)

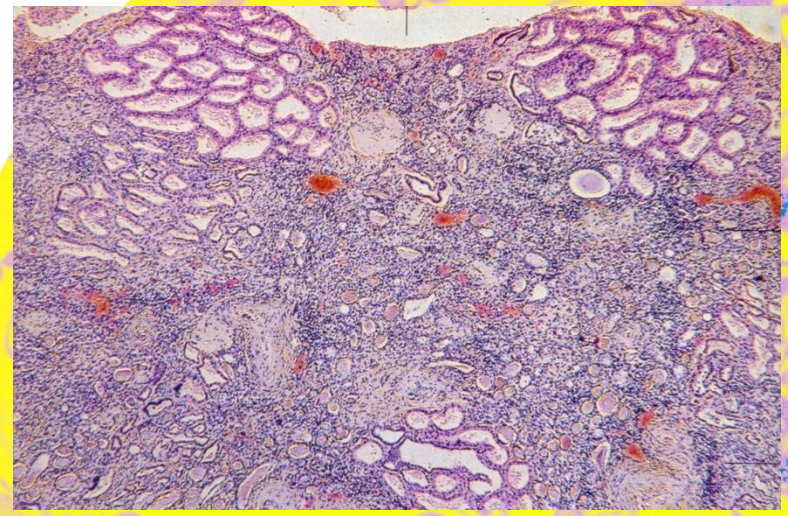
NEPHRITIS

CHRONIC GLOMERULONEPHRITIS

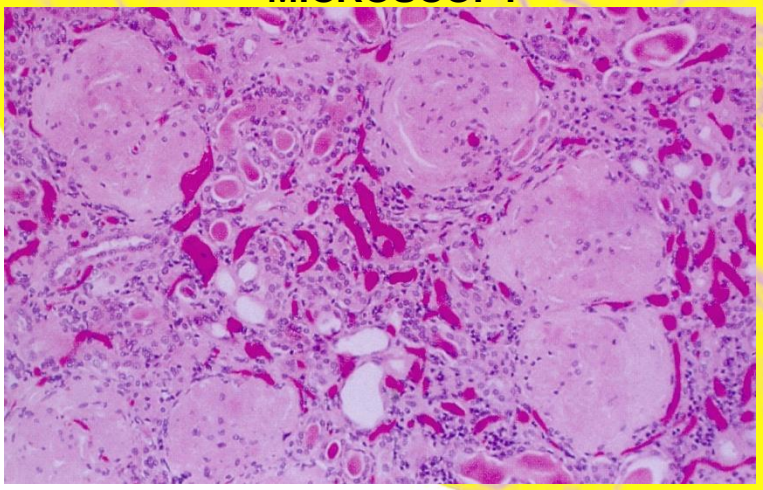


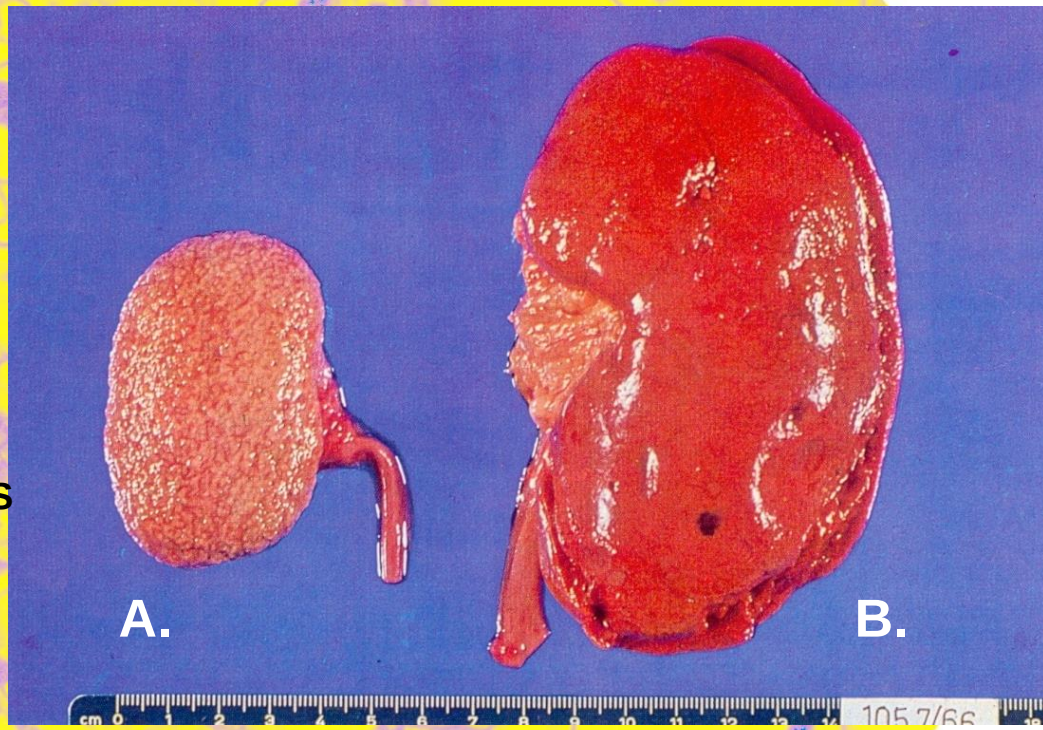
% OF GNs THAT ENDS AS A CHRONIC GN

NEPHRITIS
CHRONIC GLOMERULONEPHRITIS



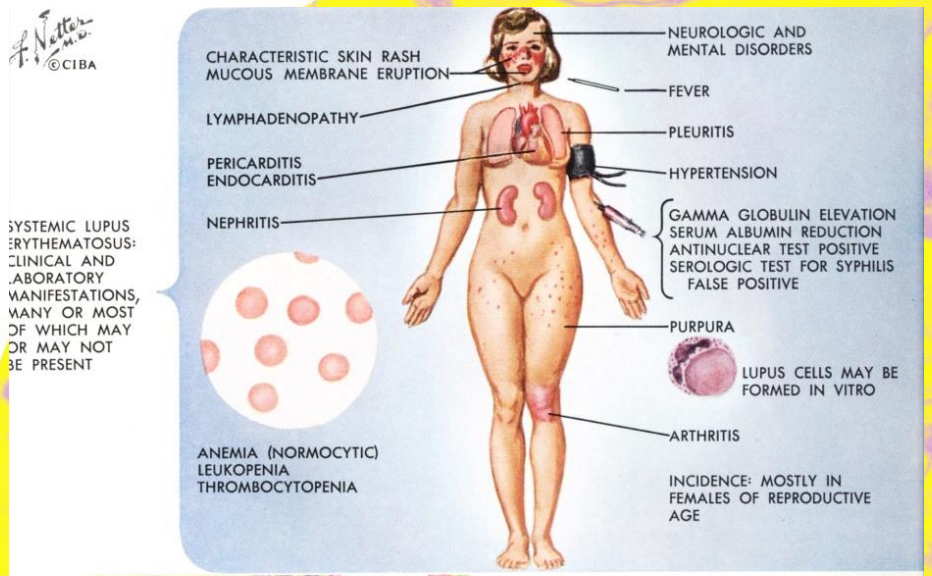
KIDNEYS IN CHRONIC GLOMERULONEPHRITIS - MICROSCOPY

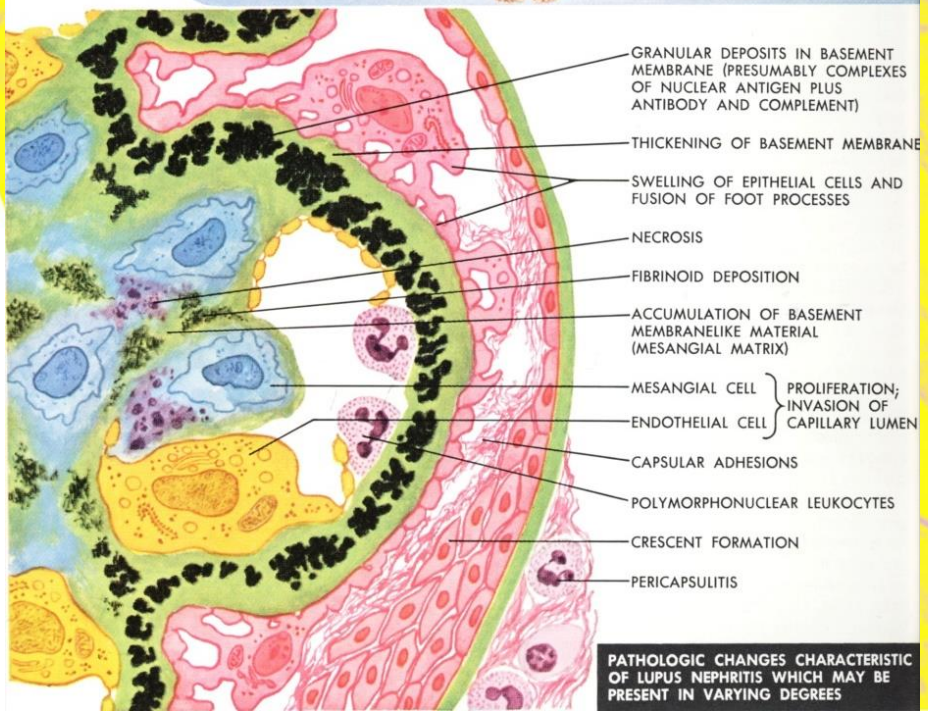


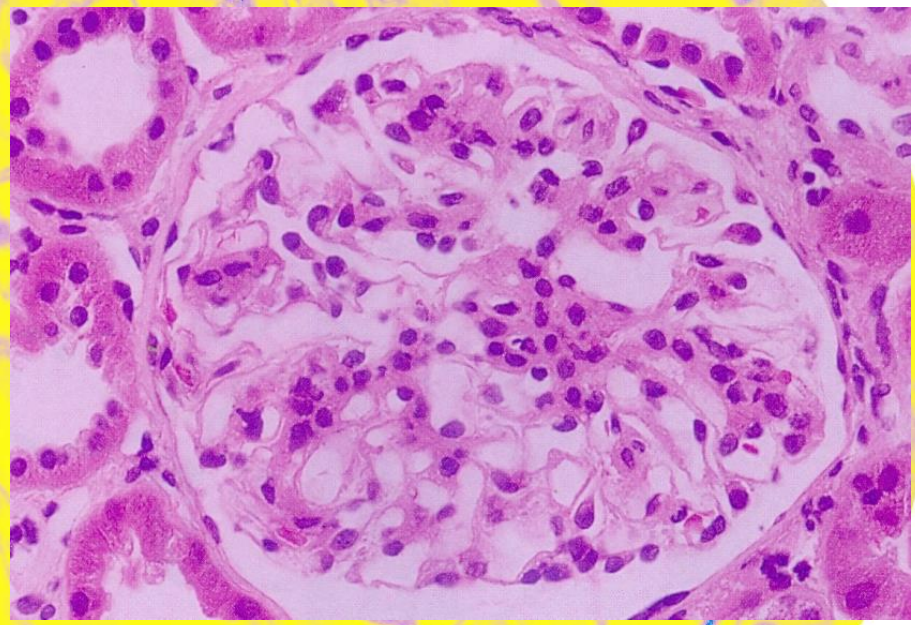


A. KIDNEY IN CHRONIC GLOMERULONEPHRITIS AND B. NORMAL KIDNEY

DAMAGE OF GLOMERULI IN SYSTEMIC DISEASES
LUPUS ERYTHEMATOSUS



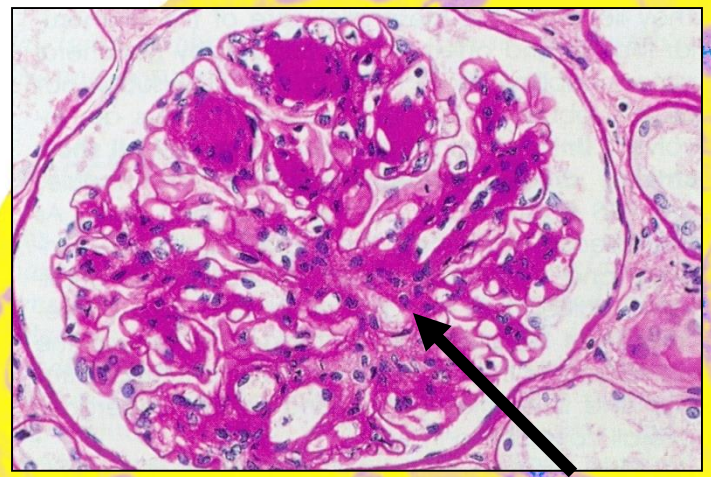




II CLASS OF LE – SMALL CHANGES WITH PRODUCTION OF MESANGIUM. ACCORDING TO WHO: 6 CLASSES OF CHANGES IN GLOMERULI IN LE

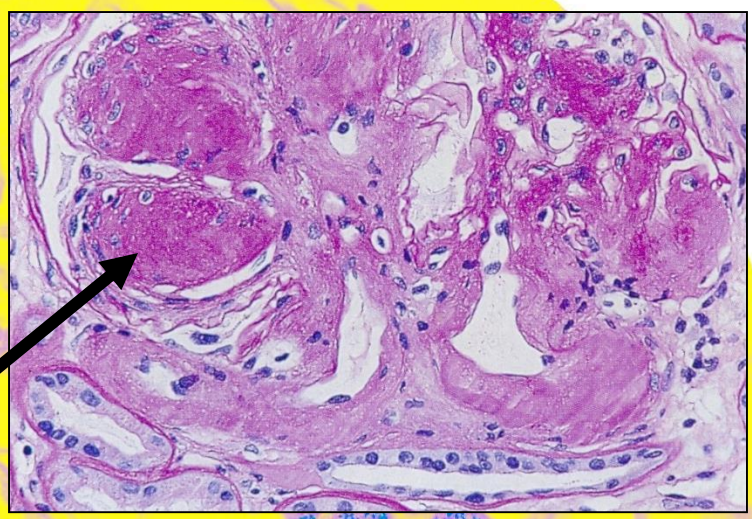
DAMAGE OF GLOMERULI IN SYSTEMIC DISEASES

DIABETIC GLOMERULOPATHY

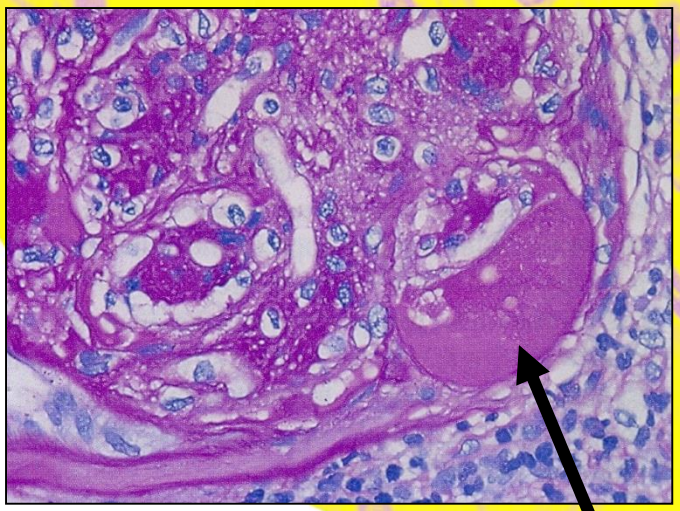


DIFFUSE CHANGES IN MESANGIUM

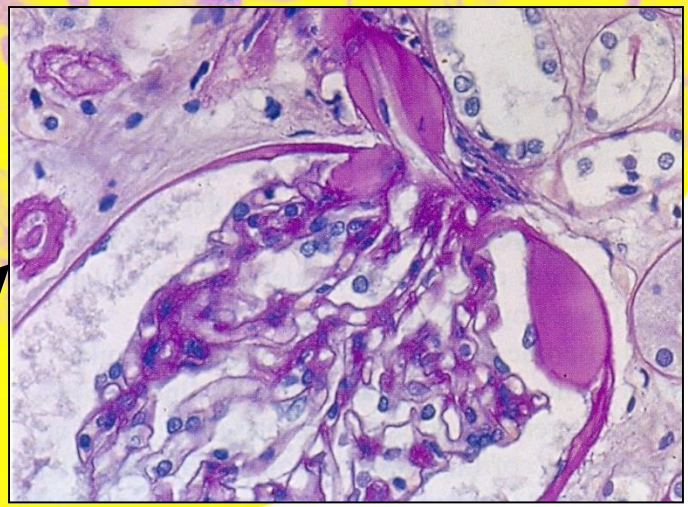
GLOMERULAR CHANGES IN DIABETES



INTERCAPILLARY GLOMERULOSCLEROSIS
KIMMELSTIEL-WILSON



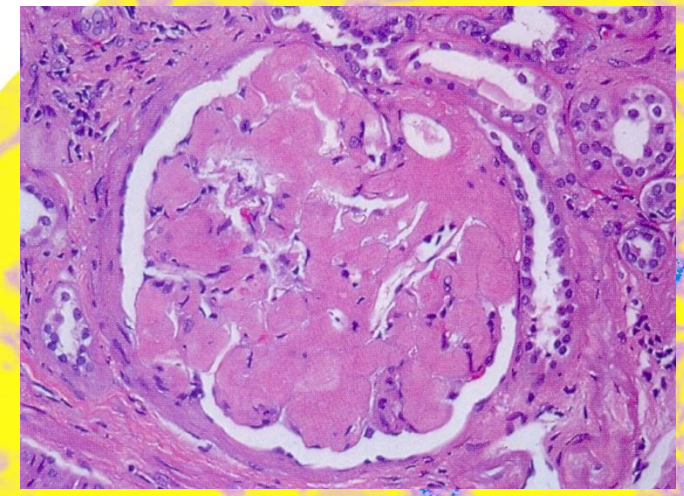
FIBRINOUS CAPS



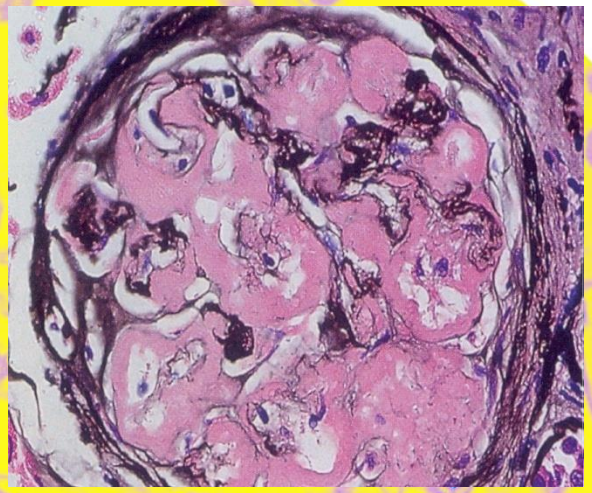
SCLEROSIS OF ARTERIOLES

DAMAGE OF GLOMERULI IN SYSTEMIC DISEASES

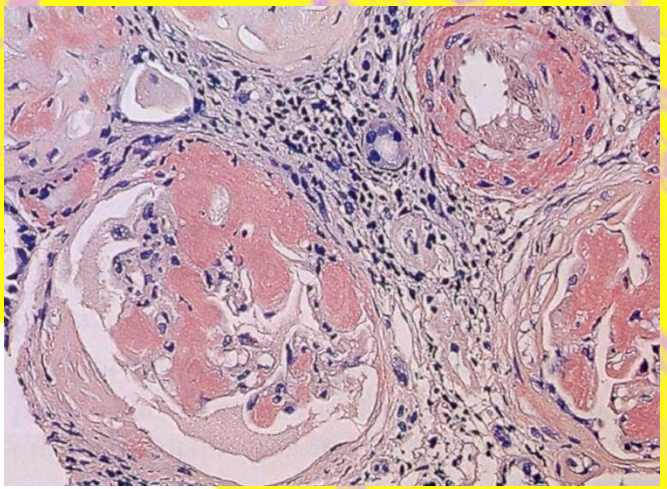
AMYLOIDOSIS



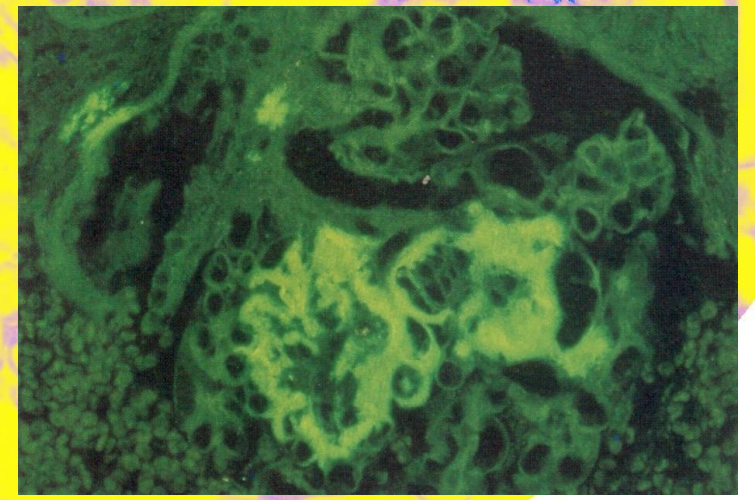
AMYLOID DEPOSITS IN GLOMERULI (HE)



AMYLOID DEPOSITS IN GLOMERULI (silver)



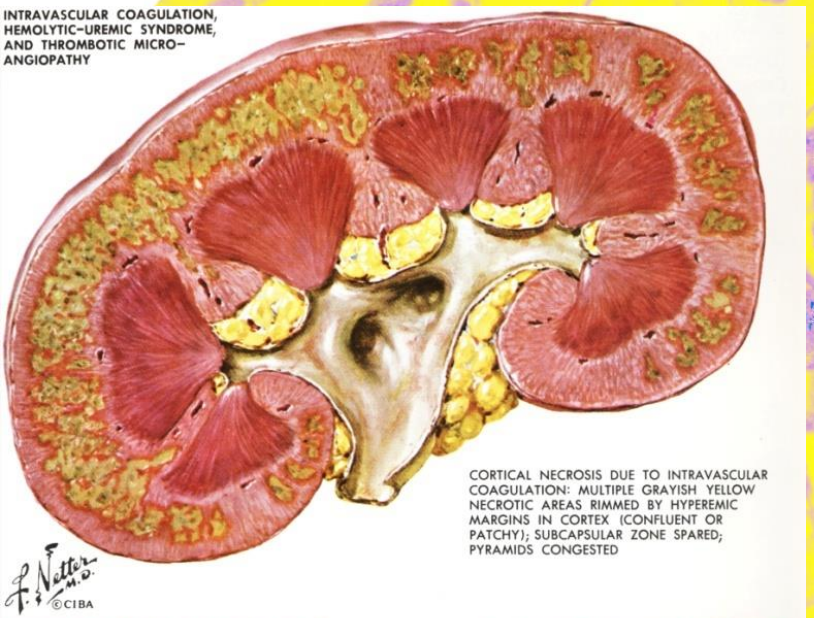
AMYLOID DEPOSITS IN GLOMERULI (Kongo red)

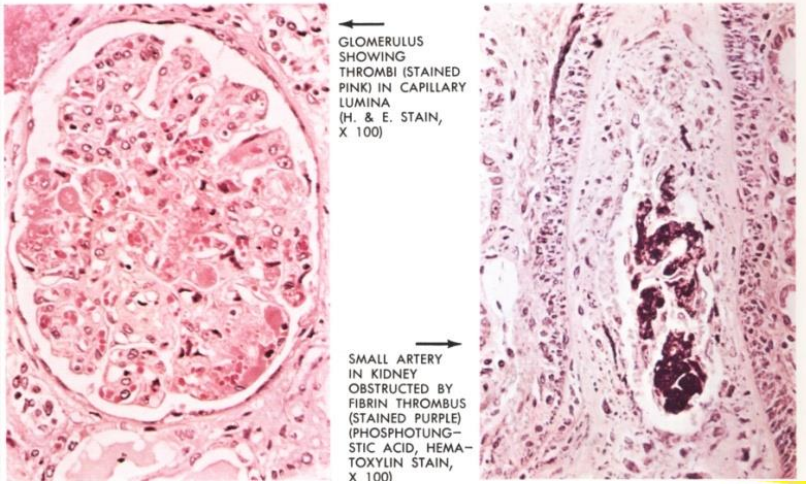


AMYLOID DEPOSITS IN GLOMERULI (fluorescent microscopy)

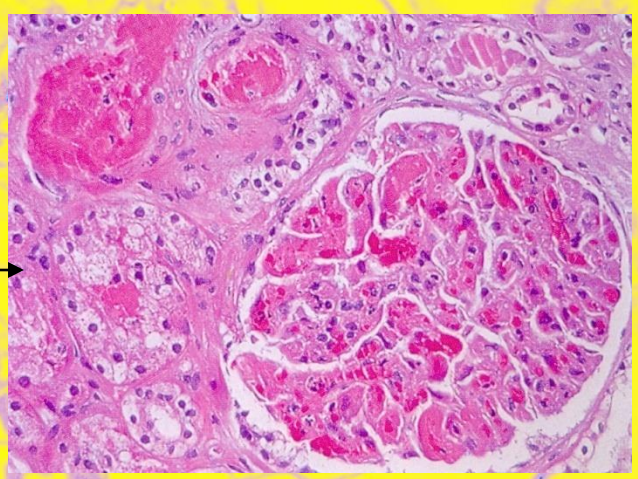
ACUTE NECROSIS OF RENAL CORTEX

THE MOST COMMON FORM OF KIDNEY DAMAGE, RELATED TO INTRAVASCULAR COAGULATION. A COMPLICATION IN THE 3rd TRIMESTER OF PREGNANCY (ABLATION OF THE PLACENTA), SEPTIC ANEMIA, BURNING, TRAUMA, INTOXICATION, CHANGES ARE SYMMETRICAL AND IRREVERSIBLE.

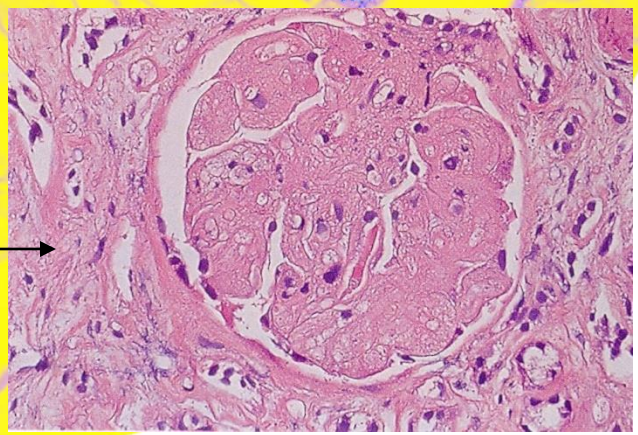




THROMBOTIC MICROANGIOPATHY



NECROTIC GLOMERULUS



(TUBULO)-INTERSTITIAL NEPHRITIS

GROUP OF DISEASES THAT ARE HISTOLOGICALLY CHARACTERISTIC (LESIONS OF CANALICULI AND STROMA)

INFECTIOUS FACTORS

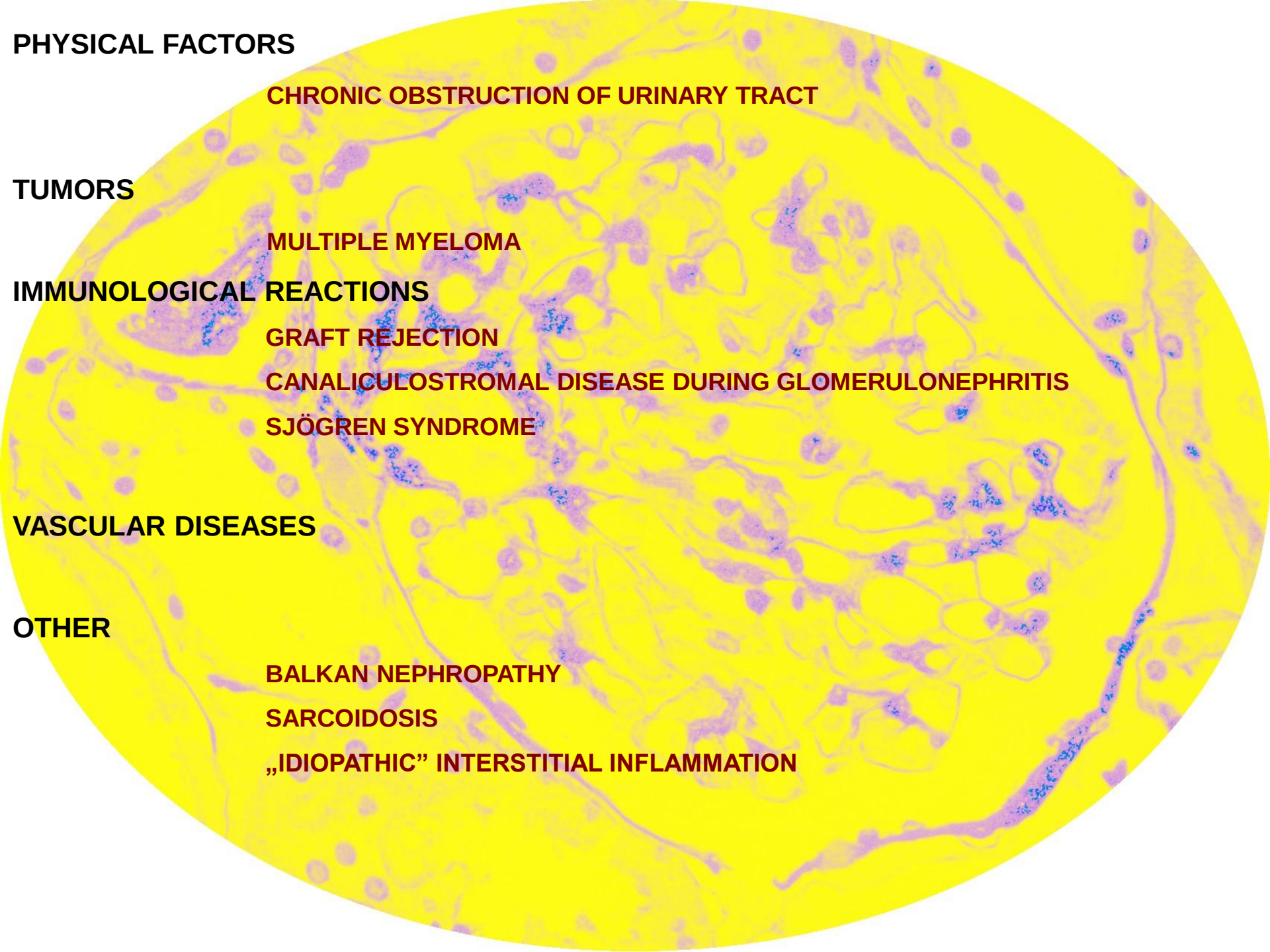
- ACUTE BACTERIAL INFLAMMATION OF KIDNEYS
- CHRONIC NEPHRITIS
- OTHER INFECTIONS (VIRAL, PARASITIC)

TOXINS

- DRUGS
  - ACUTE ALLERGIC INTERSTITIAL NEPHRITIS
  - NEPHRITIS BECAUSE OF THE OVERUSE OF ANALGESICS
- HEAVY METALS
  - LEAD, MERCURY, CADMIUM

METABOLIC DISEASES

- URIC NEPHROPATHY
- CALCIUM NEPHROPATHY
- HYPOKALEMIC NEPHROPATHY
- OXALATE NEPHROPATHY



PHYSICAL FACTORS

- CHRONIC OBSTRUCTION OF URINARY TRACT

TUMORS

- MULTIPLE MYELOMA

IMMUNOLOGICAL REACTIONS

- GRAFT REJECTION
- CANALICULOSTROMAL DISEASE DURING GLOMERULONEPHRITIS
- SJÖGREN SYNDROME

VASCULAR DISEASES

OTHER

- BALKAN NEPHROPATHY
- SARCOIDOSIS
- „IDIOPATHIC” INTERSTITIAL INFLAMMATION

PYELONEPHRITIS

PYELONEPHRITIS IS A DISEASE MAINLY INVOLVING THE STROMA AND RENAL PELVIS

INFECTION OF URINARY TRACT

VERY COMMON INFECTION OF THE BLADDER OR KIDNEY OR BOTH

ETIOLOGY AND PATHOGENESIS OF PYELONEPHRITIS

BACTERIAL FACTORS (85% GRAM-NEGATIVE BACTERIA FROM INTESTINES)

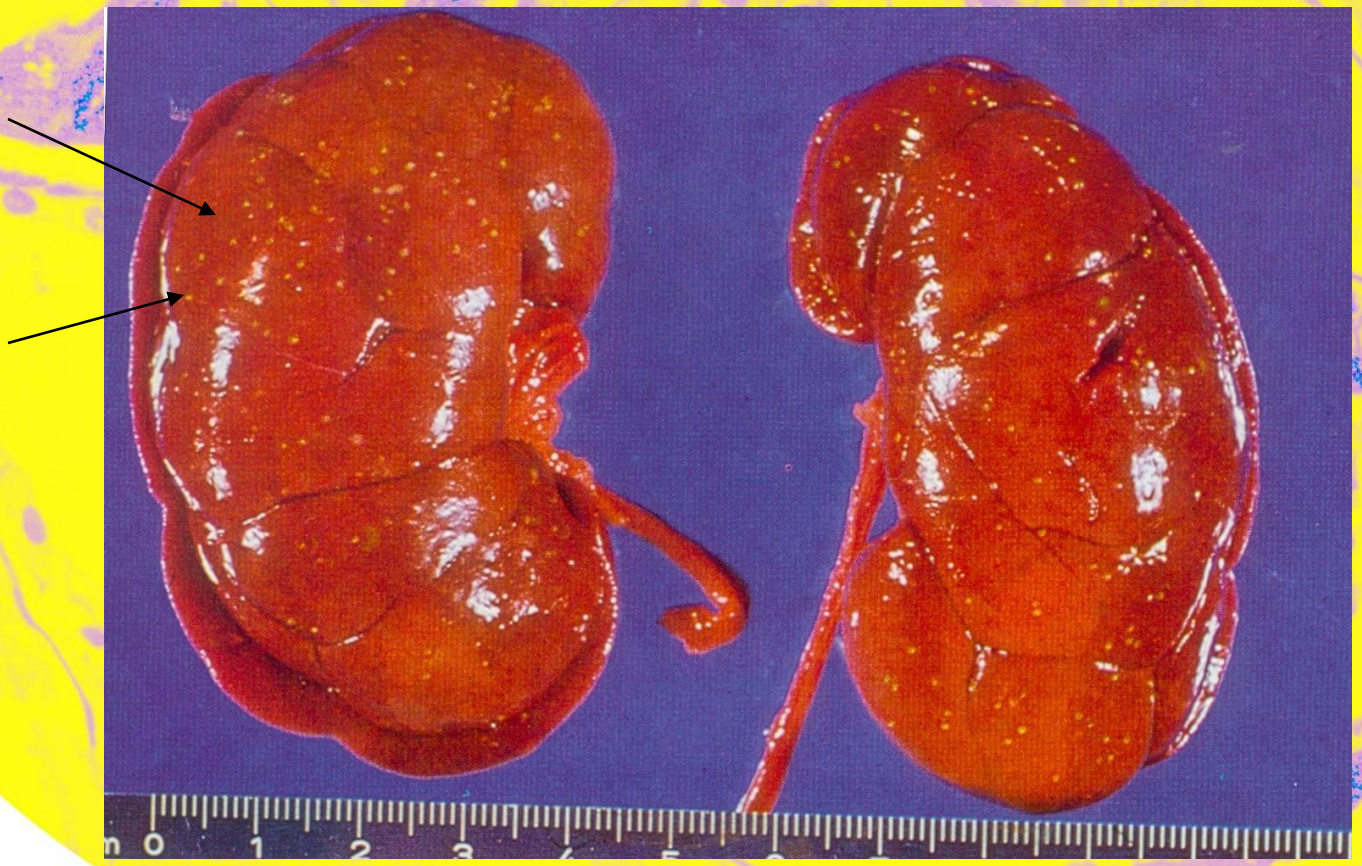
DESCENDING INFECTIONS (HEMATOGENIC)

ASCENDING INFECTIONS

FACTORS FAVORING COLONIZATION OF URINARY TRACT BY BACTERIA: ANATOMICAL FACTORS e.g., SHORT, STRAIGHT URETHRA IN WOMEN, INSTRUMENTATION OF THE URINARY TRACT e.g., CATHETERIZATION, OBSTRUCTIONS, REFLUX, IMMUNOLOGICAL MECHANISMS.

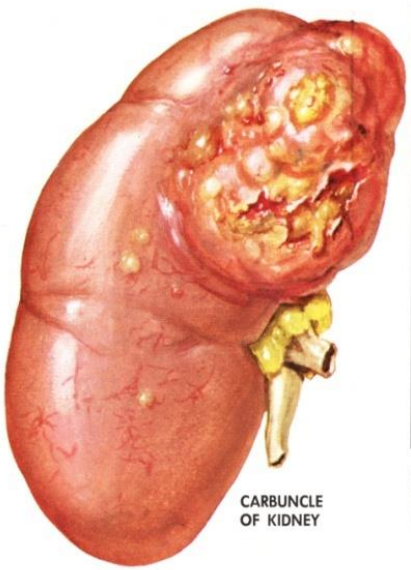
ACUTE PYELONEPHRITIS

ACUTE PYELONEPHRITIS IS A PURULENT FORM OF INFLAMMATION CAUSED BY BACTERIAL INFECTION



METASTATIC ABSCESSUS

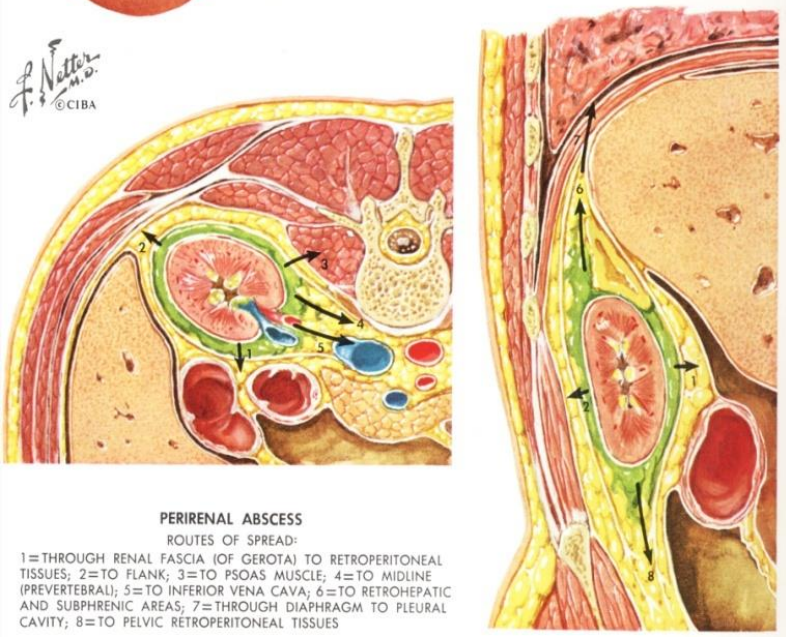
ACUTE PYELONEPHRITIS



CARBUNCLE OF KIDNEY

ARTERIOGRAM: NUMEROUS VESSELS AROUND MASS SURROUNDED BY HOMOGENEOUS BLUSH IN UPPER POLE OF KIDNEY, SUGGESTIVE OF INFLAMMATORY PROCESS (CARBUNCLE); ALSO MARKED LUMBAR SCOLIOSIS

CORTICAL ABSCESSUS



PERIRENAL ABSCESS

ROUTES OF SPREAD:

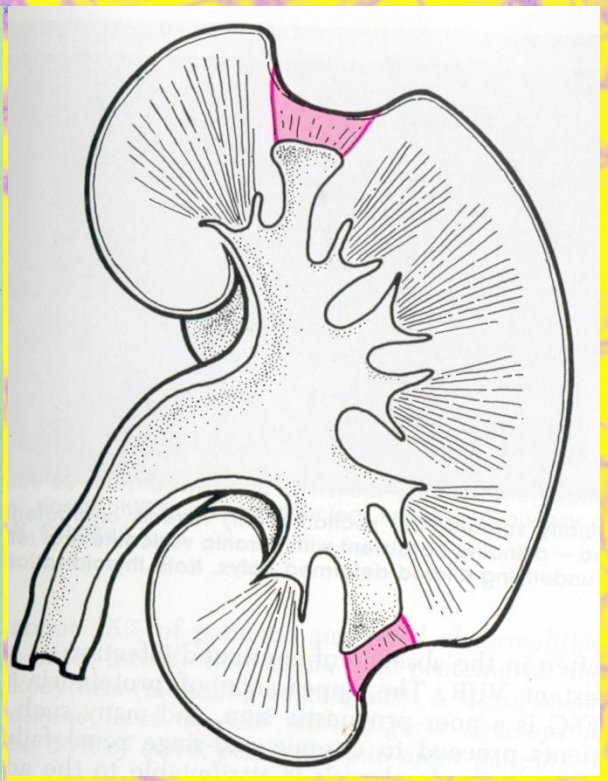
1=THROUGH RENAL FASCIA (OF GEROTA) TO RETROPERITONEAL TISSUES; 2=TO FLANK; 3=TO PSOAS MUSCLE; 4=TO MIDLINE (PREVERTEBRAL); 5=TO INFERIOR VENA CAVA; 6=TO RETROHEPATIC AND SUBPHRENIC AREAS; 7=THROUGH DIAPHRAGM TO PLEURAL CAVITY; 8=TO PELVIC RETROPERITONEAL TISSUES

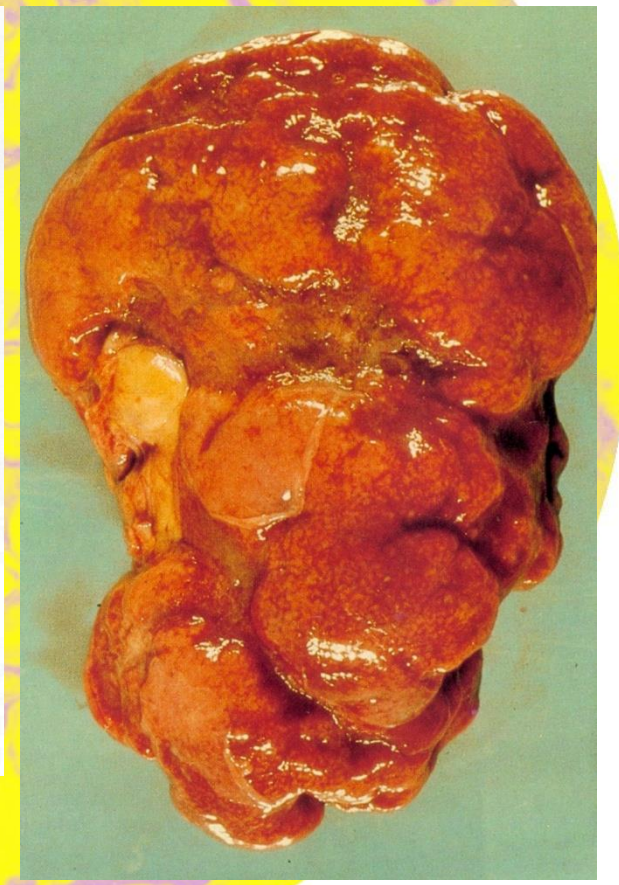
PERI- AND PARANEPHRITIC ABSCESSUS

DIFFERENT PHASES OF NECROSIS

CHRONIC PYELONEPHRITIS

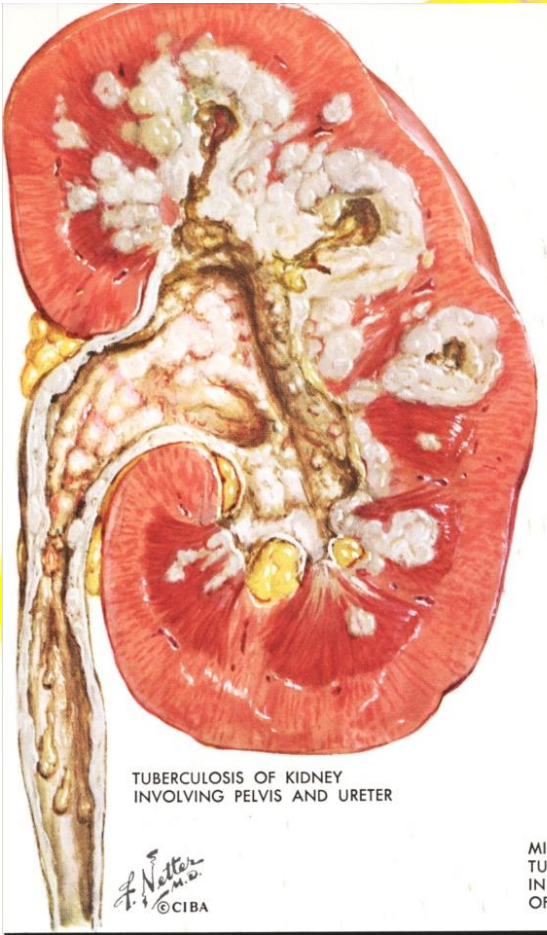
CHRONIC PYELONEPHRITIS IS AN INFLAMMATORY PROCESS IN WHICH BACTERIA ARE NOT ALWAYS PRESENT





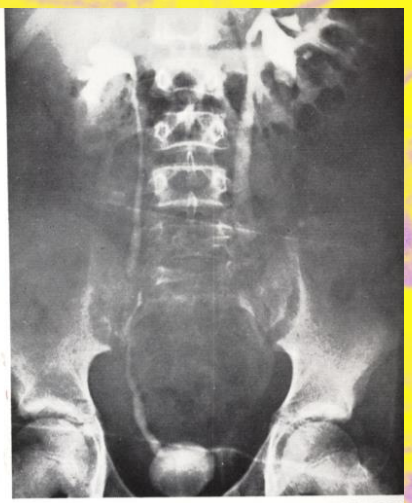
MACROSCOPIC PICTURE OF CHRONIC PYELONEPHRITIS – CHANGE OF SHAPE (!)

TUBERCULOSIS OF KIDNEYS

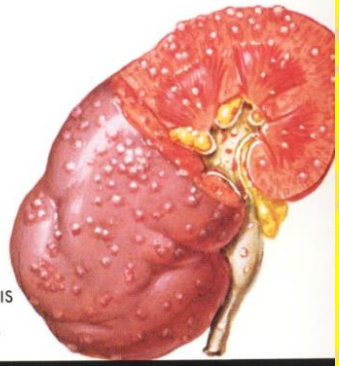


TUBERCULOSIS OF KIDNEY
INVOLVING PELVIS AND URETER

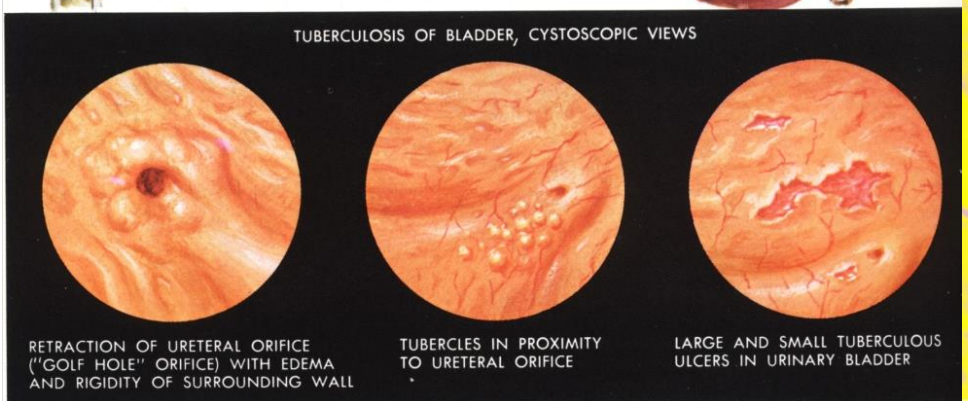
F. Netter M.D. ©CIBA

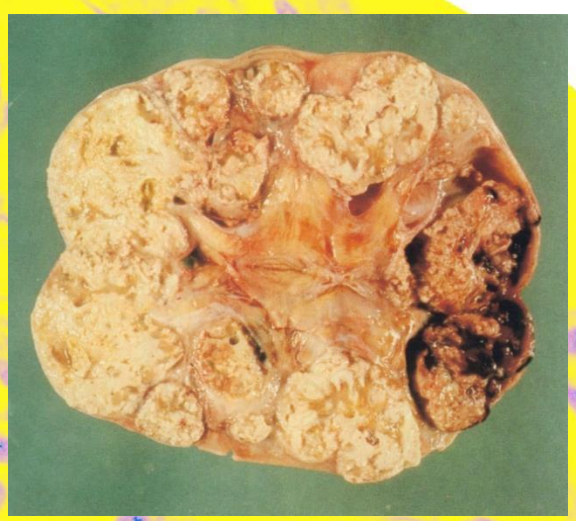


INTRAVENOUS PYELOGRAM: RENAL TUBERCULOSIS
DISTORTION OF COLLECTING SYSTEM AND
DILATATION OF URETER, MOST MARKED ON LEFT



MILIARY
TUBERCULOSIS
IN KIDNEY
OF A CHILD





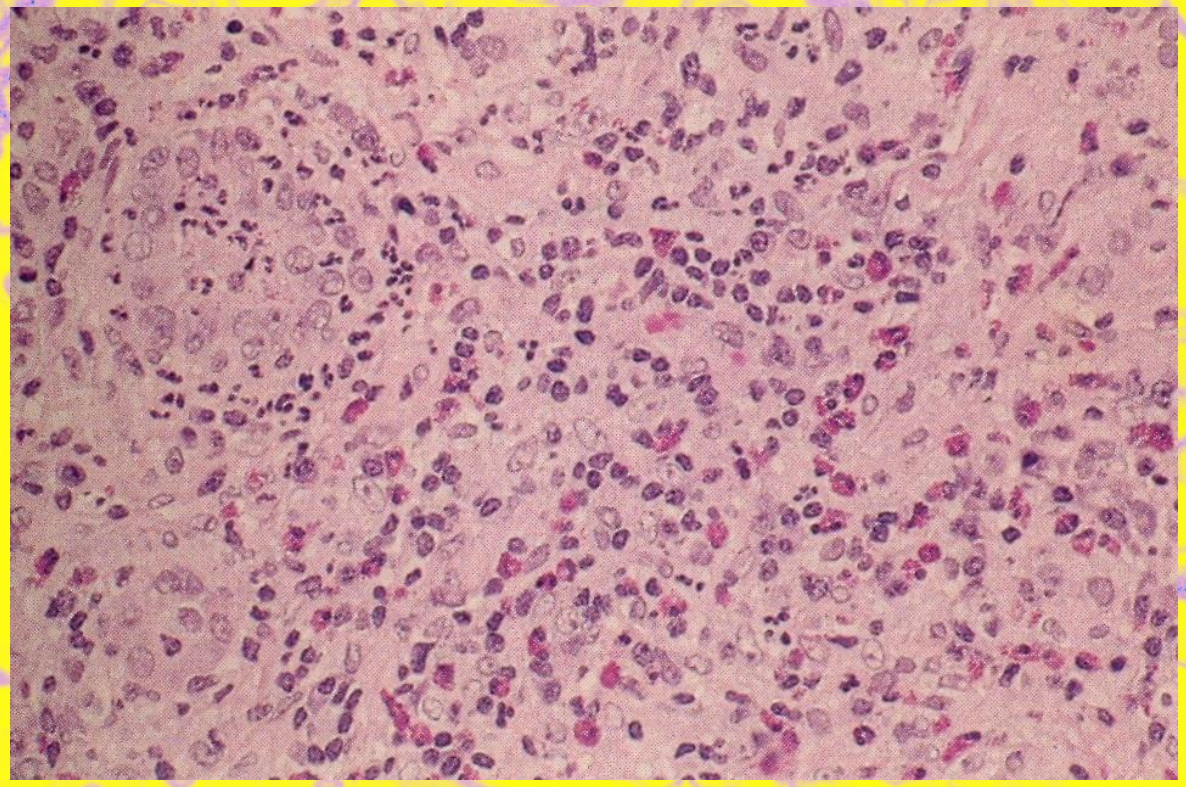
CASEOUS TUBERCULOSIS

SURGICAL FORMS OF TBC IN KIDNEYS

CAVERNOUS TUBERCULOSIS

INTERSTITIAL INFLAMMATION INDUCED BY DRUGS AND TOXINS

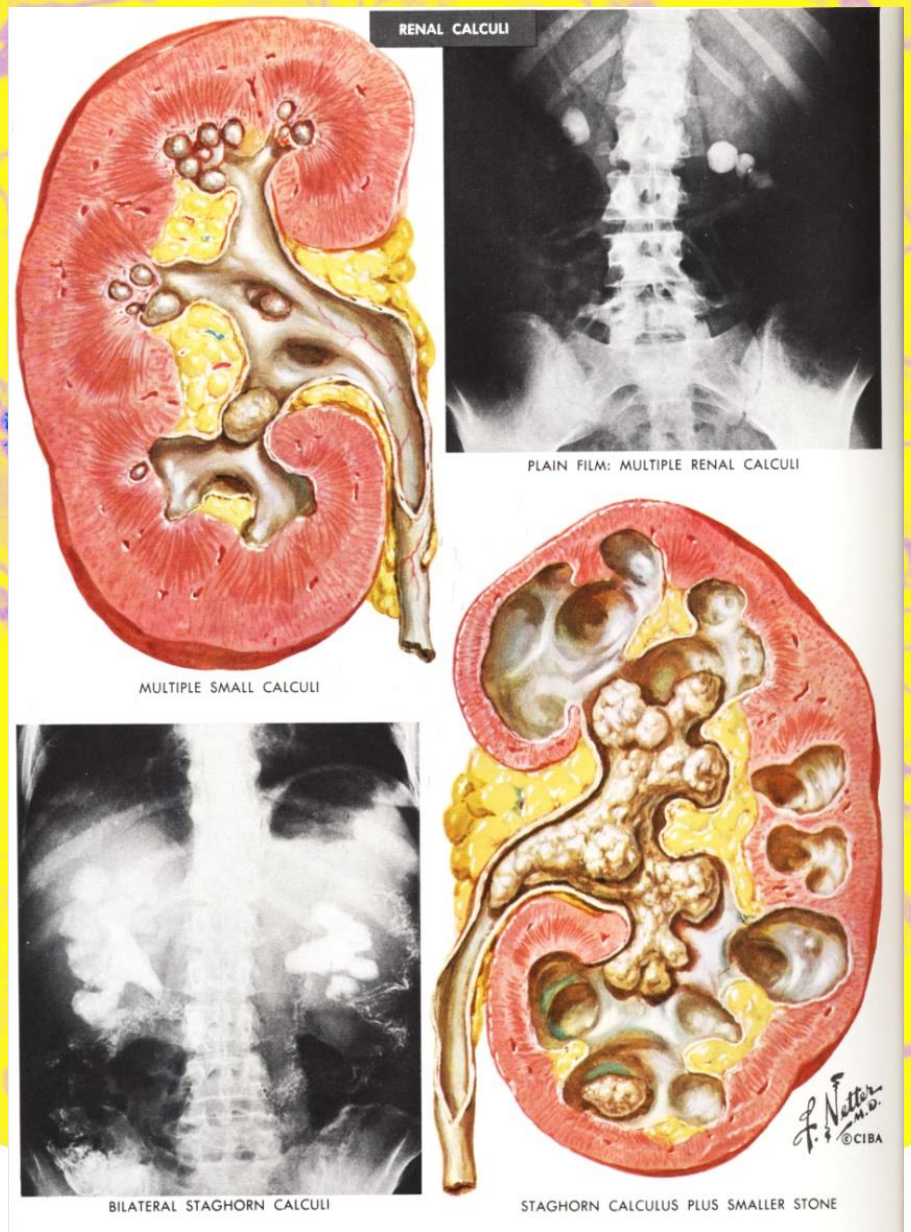
DESTRUCTION OF KIDNEYS INDUCED BY SULPHONAMIDES, SYNTHETIC ANTIBIOTICS (e.g., PENICILLIN), DIURETICS, NONSTEROID ANTI-INFLAMMATORY DRUGS



INFLAMMATORY INFILTRATION IN INTERSTITIAL NEPHRITIS (MONONUCLEAR CELLS WITH SIGNIFICANT INVOLVEMENT OF EOSINOPHILS)

CALCIUM NEPHROPATHY

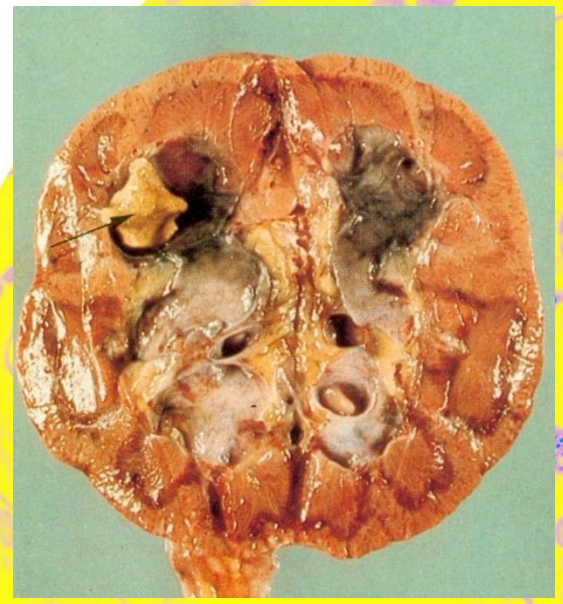
DURING HYPERCALCEMIA (HYPERPARATHYROIDISM, MULTIPLE MYELOMA, BONE METASTASES, HYPERVITAMINOSIS D) - NEPHROLITHIASIS



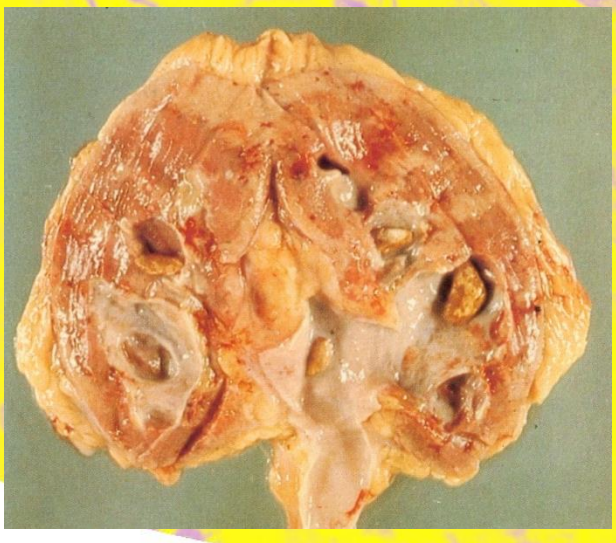
CALCIUM NEPHROPATHY

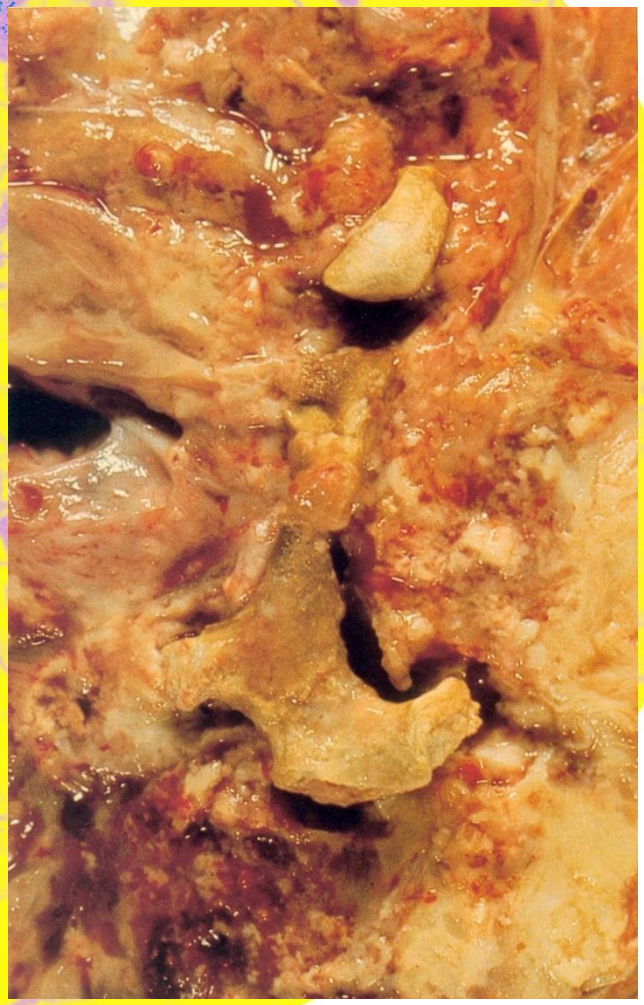
DURING HYPERCALCEMIA (HYPERPARATHYROIDISM, MULTIPLE MYELOMA, BONE METASTASES, HYPERVITAMINOSIS D)

NEPHROLITHIASIS



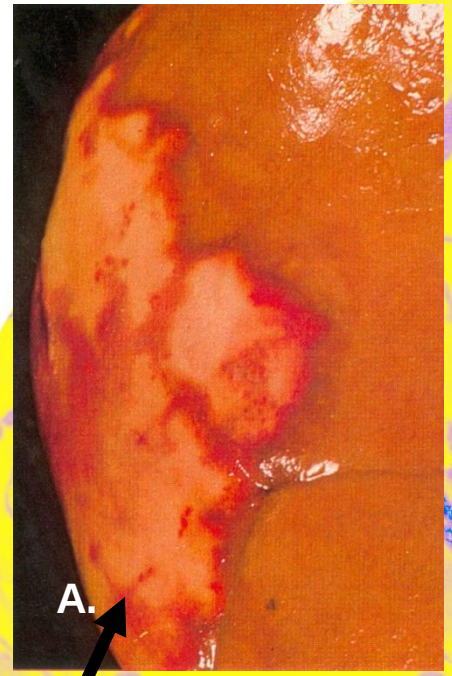
STONES IN KIDNEY

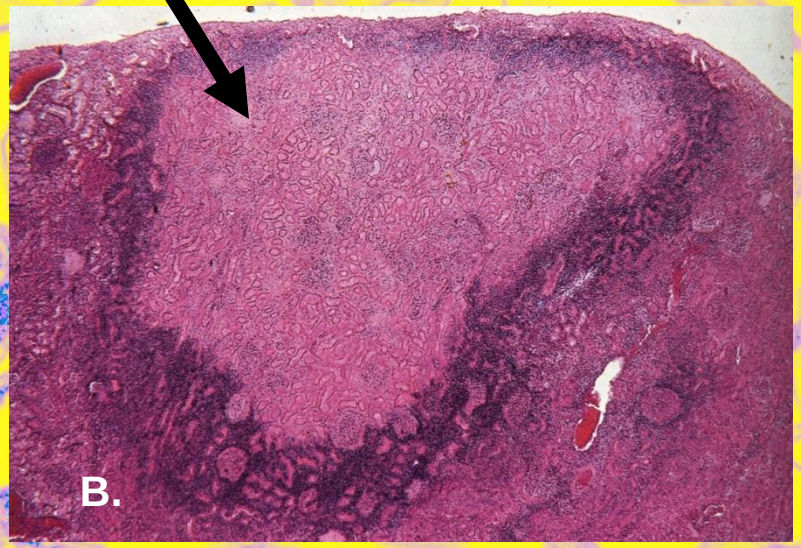


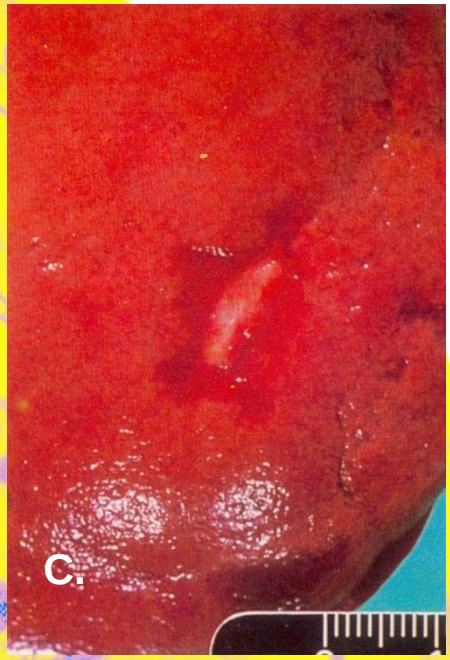


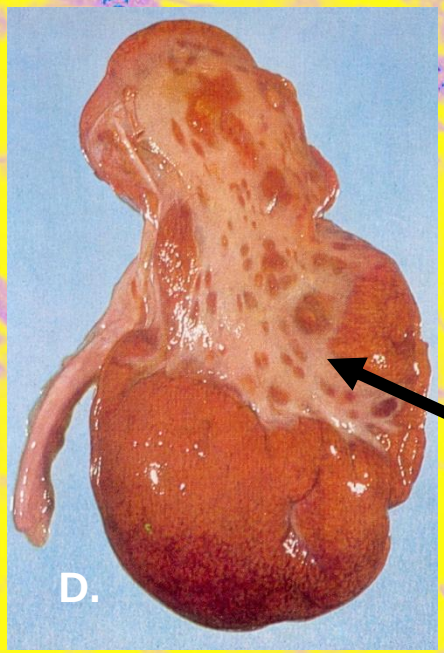
CIRCULATION

INFARCT









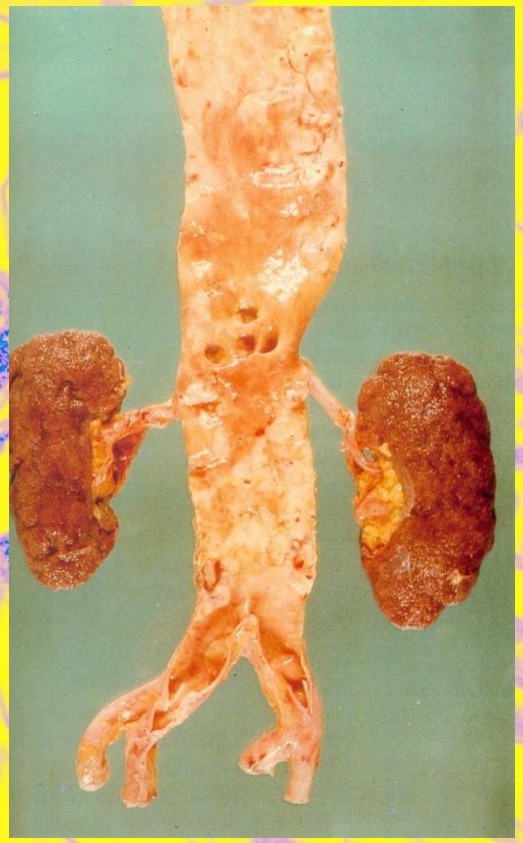
A. RECENT PALE INFARCT WITH DISTINCT RED BORDER

B. MICROSCOPIC PICTURE OF INFARCT

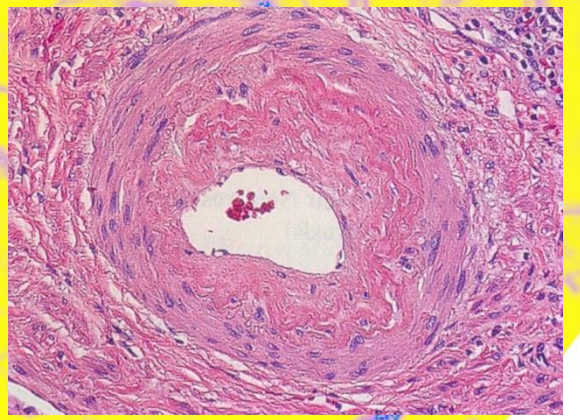
C. INFARCT IN ORGANIZATION

D. DIFFUSE POST-INFARCT SCAR IN KIDNEY

VASCULAR PROBLEMS



HYALINIZATION OF ARTERIOLAR WALLS

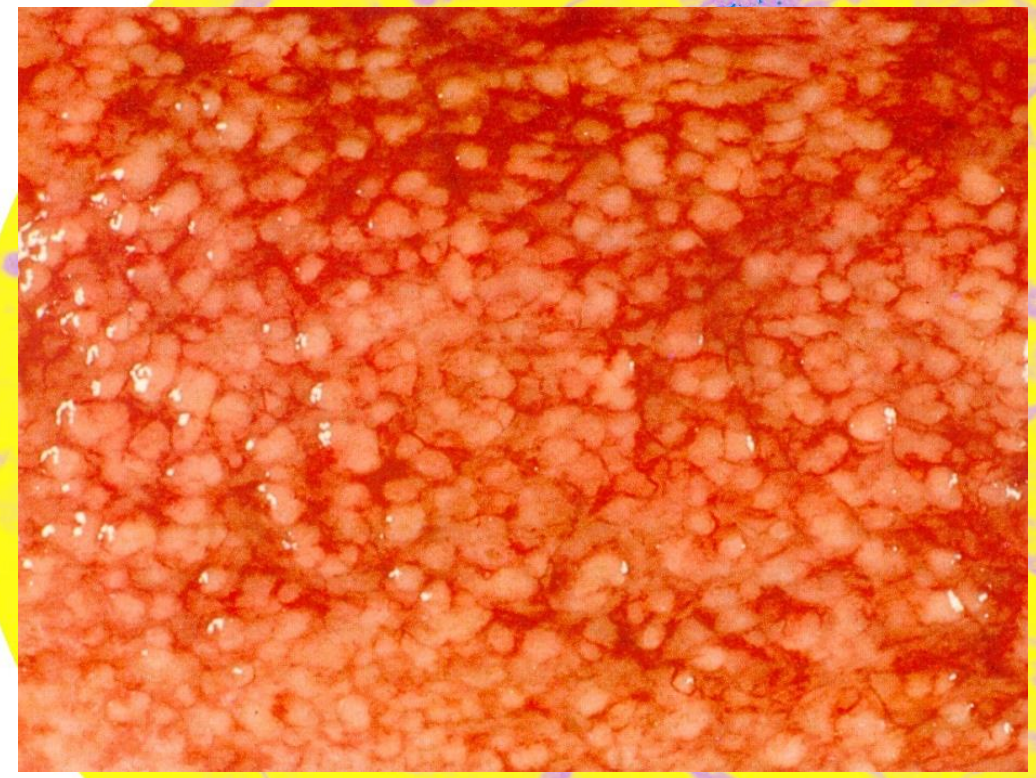


HARDENING OF ARTERIAL WALLS DUE TO MILD HYPERTENSION

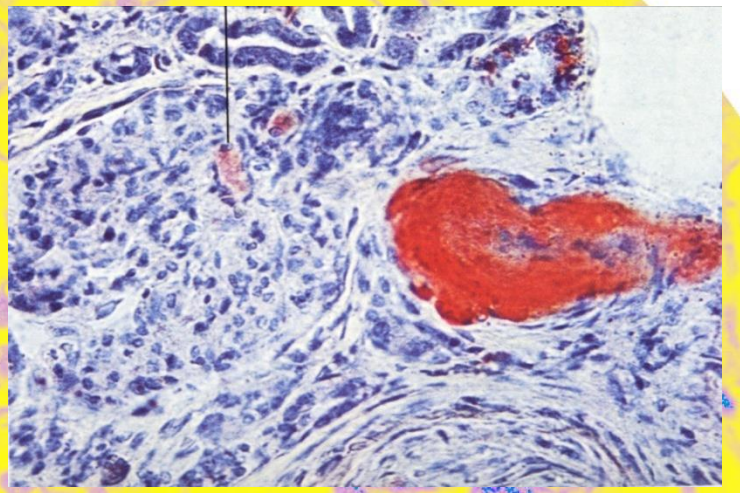
CHANGES IN LARGE ARTERIES

VASCULAR PROBLEMS

ARTERIOLOSCLEROTIC NEPHROCIRRHOSIS

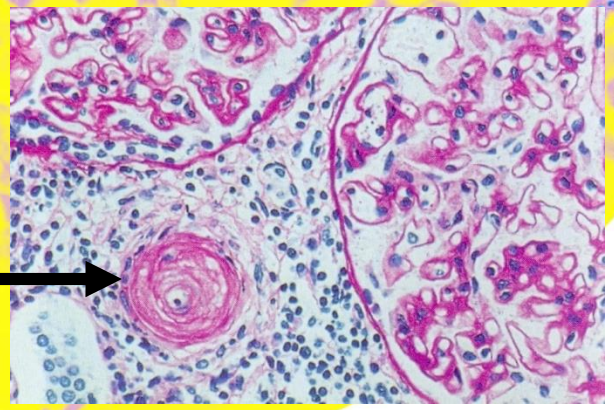


MACROSCOPIC PICTURE OF SURFACE OF KIDNEY (GRANULAR)



HYALINIZATION OF ARTERIOLE

CHANGES OF ARTERIOLES



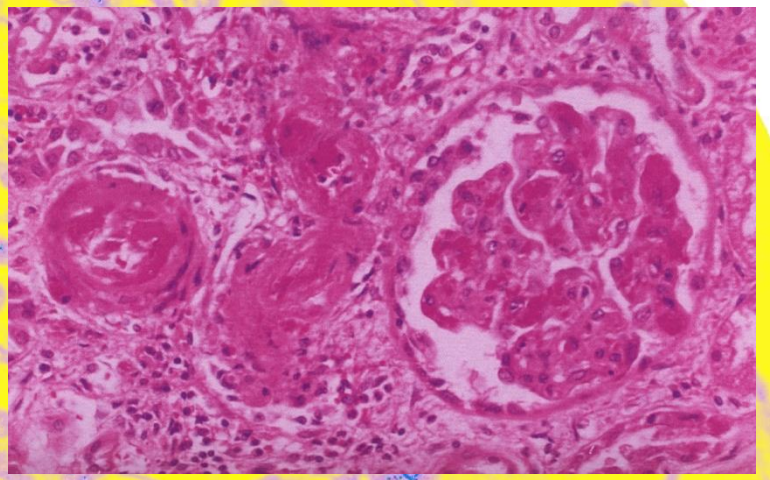
ARTERIOLOSCLEROSIS

VASCULAR PROBLEMS

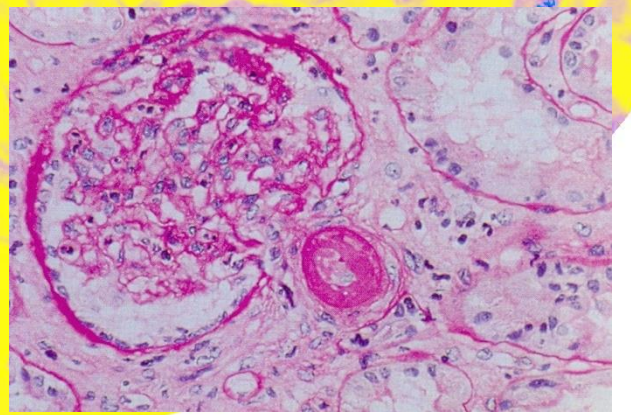
MALIGNANT ARTERIOLOSCLEROTIC NEPHROCIRRHOSIS

MALIGNANT PHASE OF HYPERTENSION

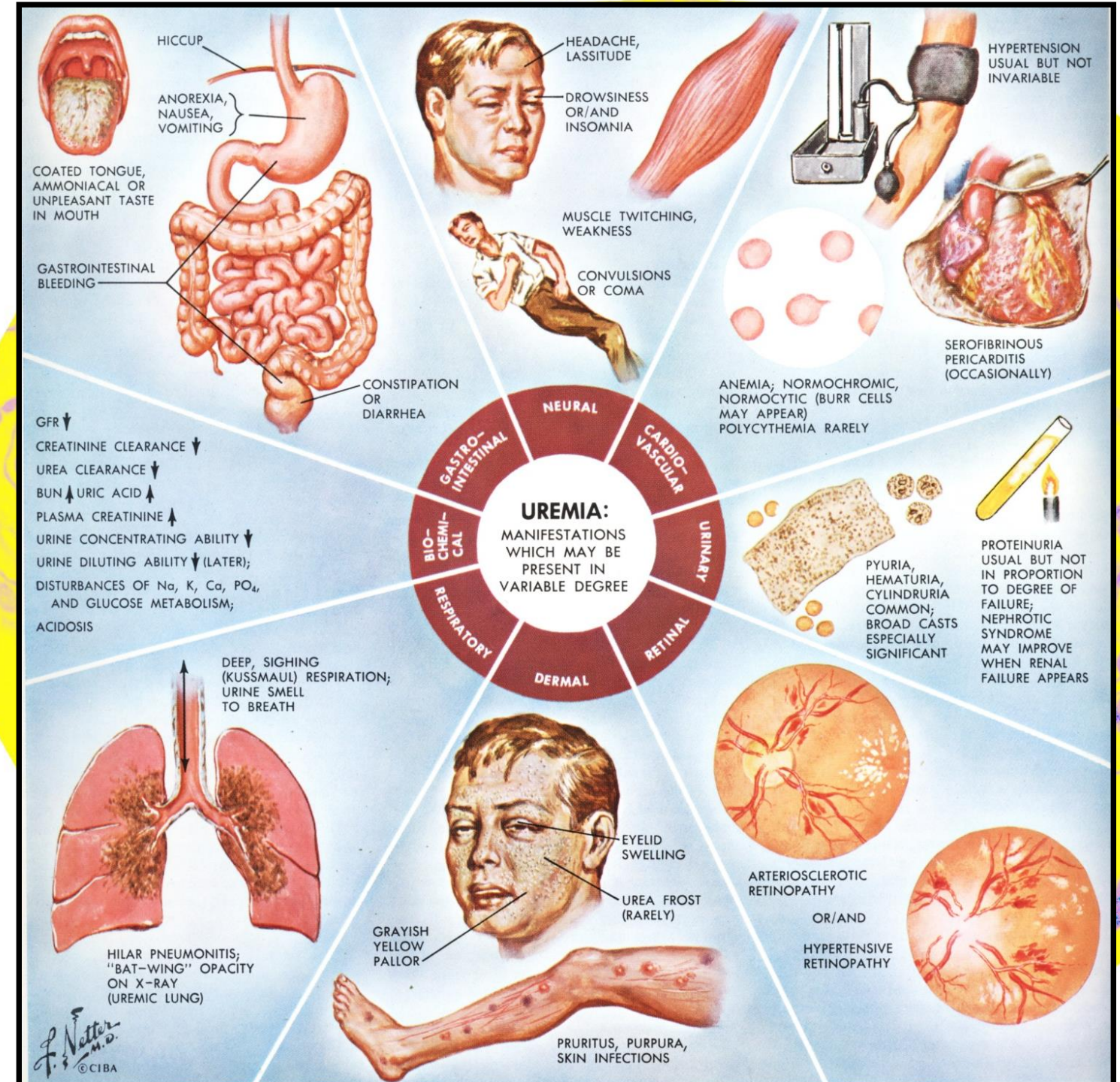
MACROSCOPIC PICTURE
GRANULAR SURFACE OF KIDNEY



FIBRINOID NECROSIS IN ARTERIOLES



UREMIA


HICCUP
ANOREXIA, NAUSEA, VOMITING
COATED TONGUE, AMMONIACAL OR UNPLEASANT TASTE IN MOUTH
GASTROINTESTINAL BLEEDING
CONSTIPATION OR DIARRHEA
HEADACHE, LASSITUDE
DROWSINESS OR/AND INSOMNIA
MUSCLE TWITCHING, WEAKNESS
CONVULSIONS OR COMA
HYPERTENSION USUAL BUT NOT INVARIABLE
SEROFIBRINOUS PERICARDITIS (OCCASIONALLY)
ANEMIA; NORMOCHROMIC, NORMOCYTIC (BURR CELLS MAY APPEAR)
POLYCYTHEMIA RARELY
GFR ↓
CREATININE CLEARANCE ↓
UREA CLEARANCE ↓
BUN ↑ URIC ACID ↑
PLASMA CREATININE ↑
URINE CONCENTRATING ABILITY ↓
URINE DILUTING ABILITY ↓ (LATER);
DISTURBANCES OF Na, K, Ca, PO4, AND GLUCOSE METABOLISM;
ACIDOSIS
NEURAL
CARDIO-VASCULAR
URINARY
RETINAL
DERMAL
RESPIRATORY
BIO-CHEMICAL
GASTRO-INTESTINAL
UREMIA:
MANIFESTATIONS WHICH MAY BE PRESENT IN VARIABLE DEGREE
PYURIA, HEMATURIA, CYLINDRURIA COMMON; BROAD CASTS ESPECIALLY SIGNIFICANT
PROTEINURIA USUAL BUT NOT IN PROPORTION TO DEGREE OF FAILURE; NEPHROTIC SYNDROME MAY IMPROVE WHEN RENAL FAILURE APPEARS
DEEP, SIGHING (KUSSMAUL) RESPIRATION; URINE SMELL TO BREATH
HILAR PNEUMONITIS; "BAT-WING" OPACITY ON X-RAY (UREMIC LUNG)
EYELID SWELLING
UREA FROST (RARELY)
GRAYISH YELLOW PALLOR
PRURITUS, PURPURA, SKIN INFECTIONS
ARTERIOSCLEROTIC RETINOPATHY
OR/AND
HYPERTENSIVE RETINOPATHY
F. Netter M.D.
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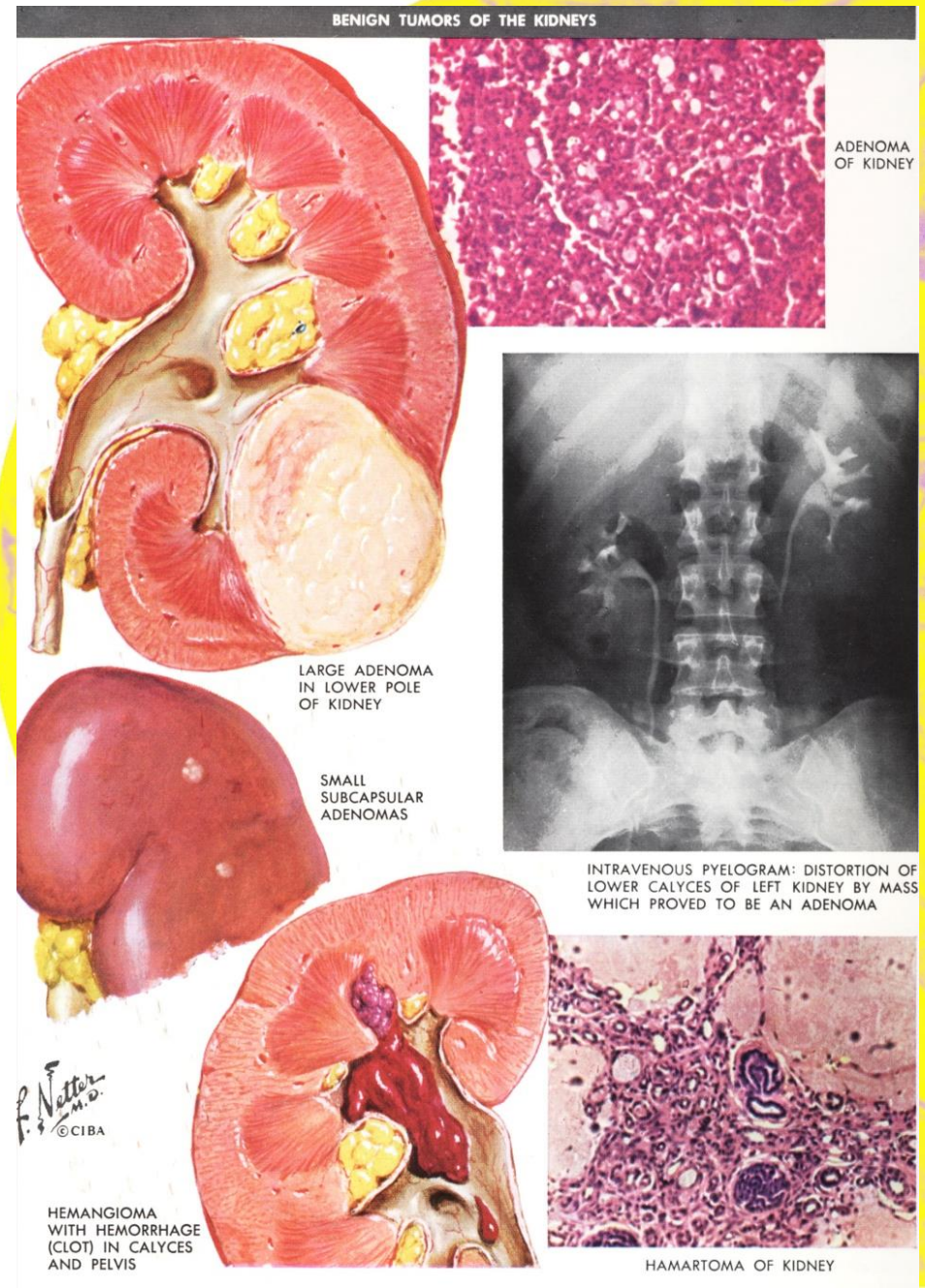
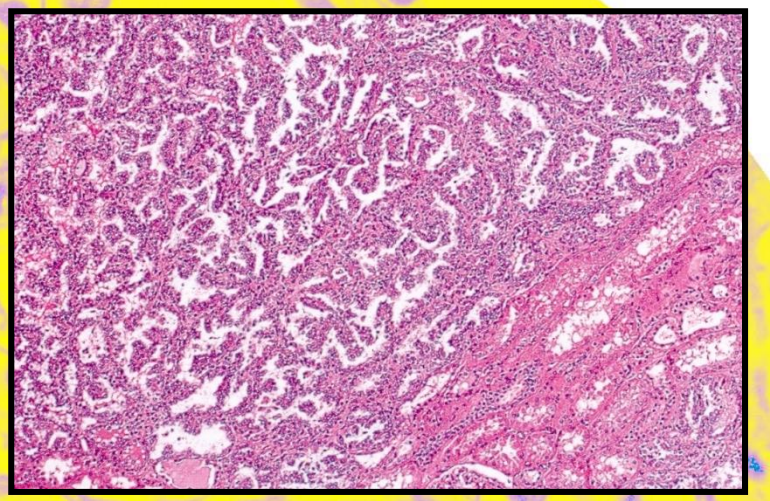
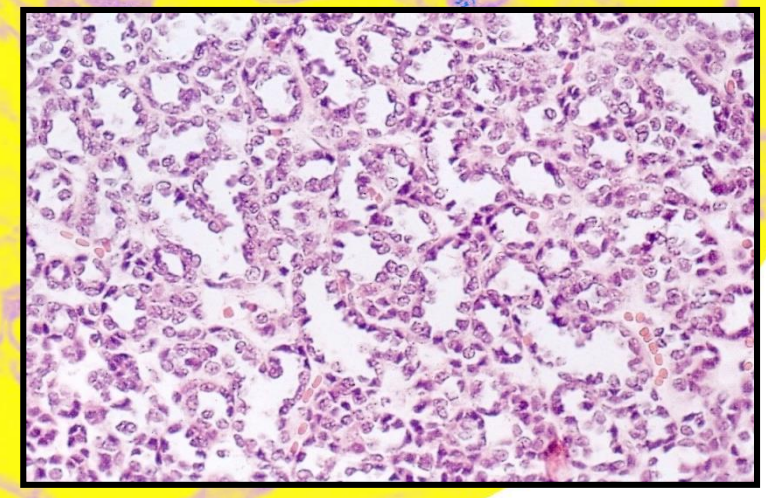
TUMORS OF KIDNEY

BENIGN





PAPILLARY ADENOMA



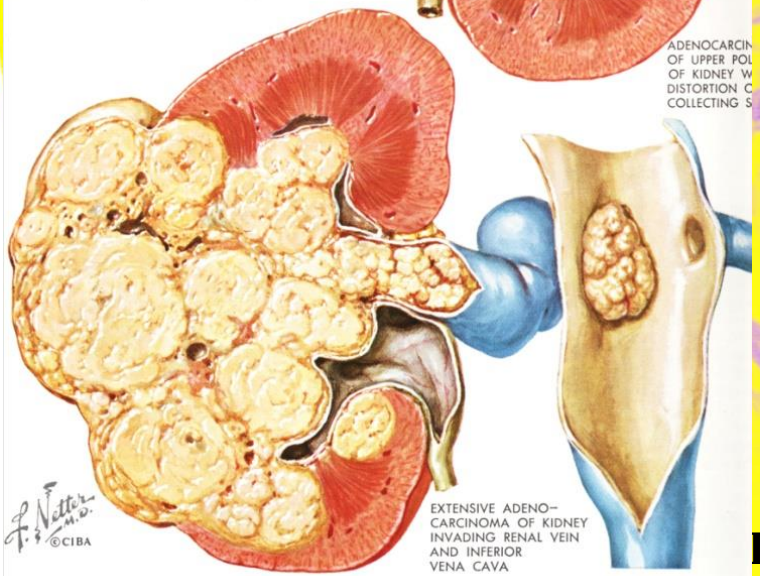
METANEPHRIC ADENOMA

TUMORS OF KIDNEYS IN ADULTS

CLEAR CELL ADENOCARCINOMA

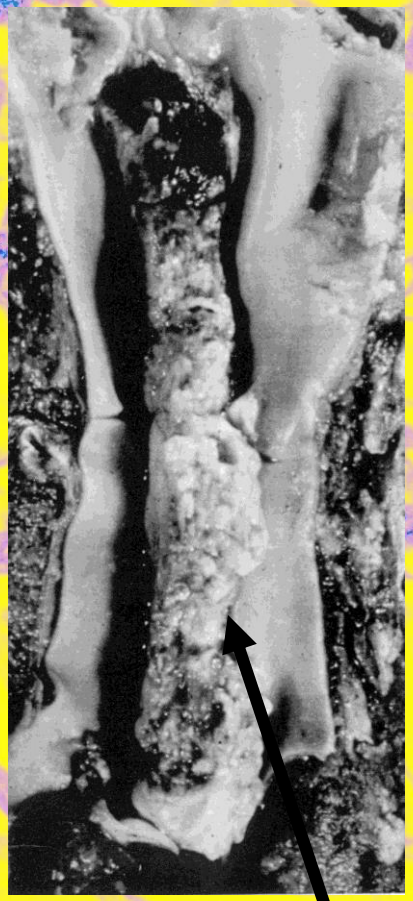
SELECTIVE RIGHT RENAL ARTERIOGRAM SHOWING TYPICAL TUMOR VESSEL PATTERN CHARACTERISTIC OF ADENOCARCINOMA (HYPERNEPHROMA)

ADENOCARCIN
OF UPPER POL
OF KIDNEY W
DISTORTION C
COLLECTING S



EXTENSIVE ADENO–CARCINOMA OF KIDNEY INVADING RENAL VEIN AND INFERIOR VENA CAVA

F. Netter, M.D. ©CIBA



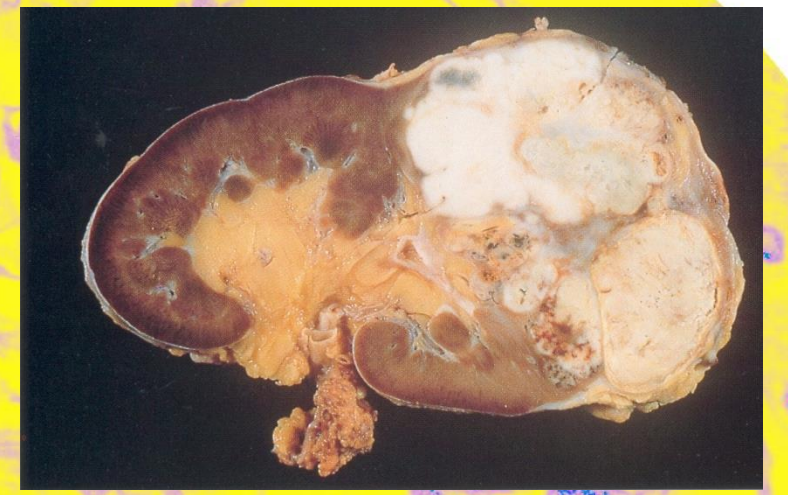
INFILTRATION OF VENA CAVA INFERIOR

NEOPLASTIC THROMBOSIS IN PULMONARY VEINS

TUMORS OF KIDNEYS IN ADULTS

CLEAR CELL ADENOCARCINOMA

EARLY STAGE: TUMOR WITH DISTINCT BORDERS



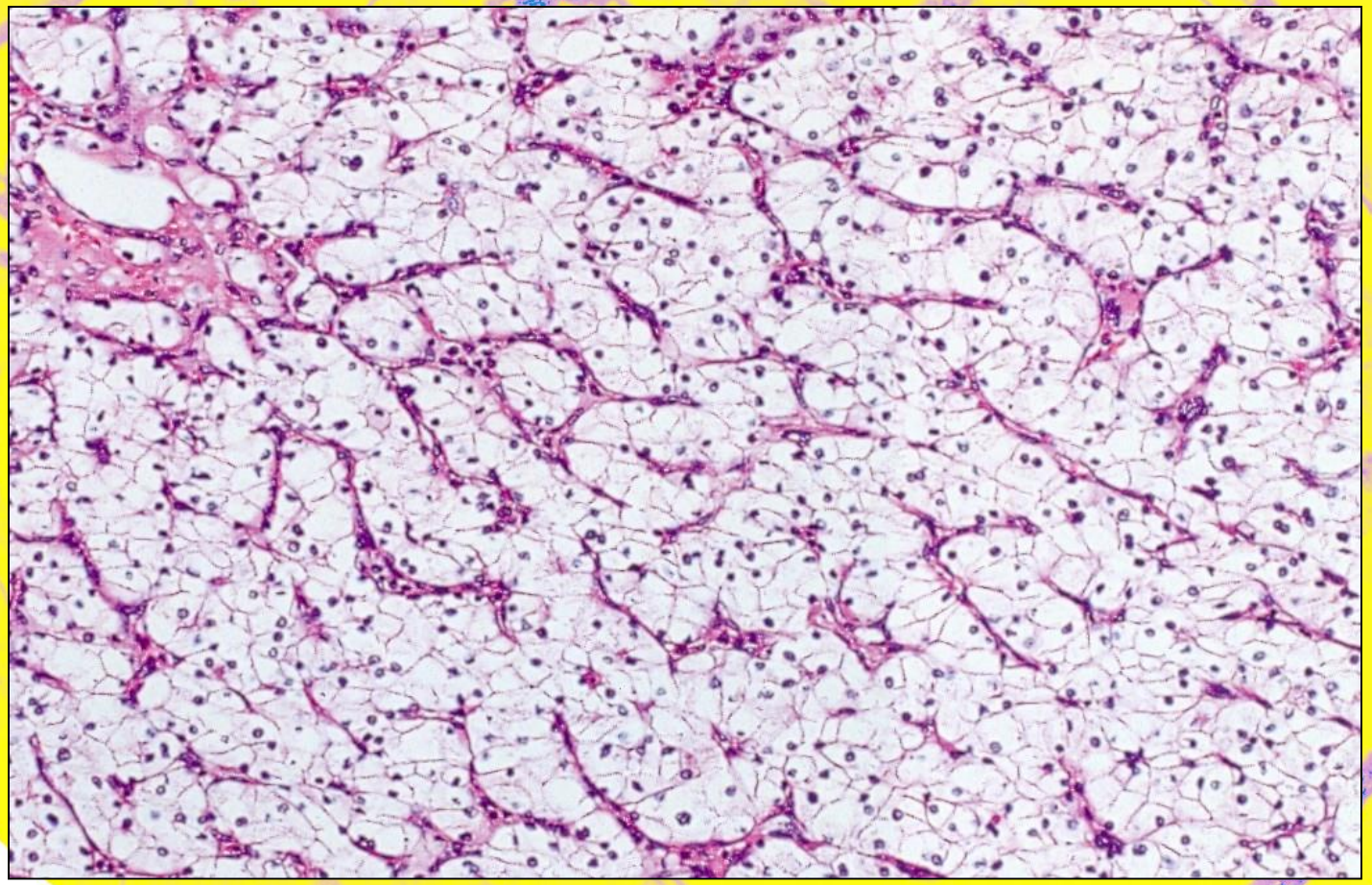
WHITE SARCOMATOUS TISSUE

TYPICAL PICTURE OF ADVANCED TUMOR WITH INFILTRATION TO RENAL VEIN

CYSTIC FORM OF CANCER

TUMORS OF KIDNEYS IN ADULTS

CLEAR CELL ADENOCARCINOMA

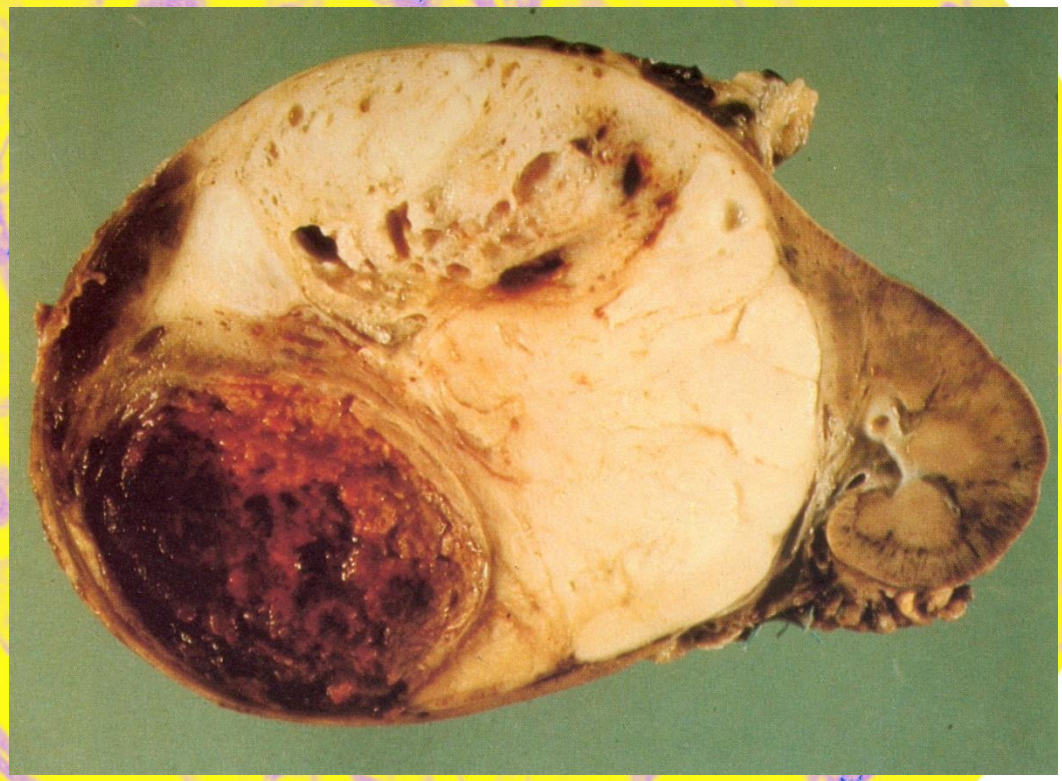


CLASSICAL MICROSCOPIC PICTURE OF CLEAR CELL ADENOCARCINOMA

TUMORS IN CHILDREN

NEPHROBLASTOMA

ASYMMETRICAL TUMOR IN ABDOMEN

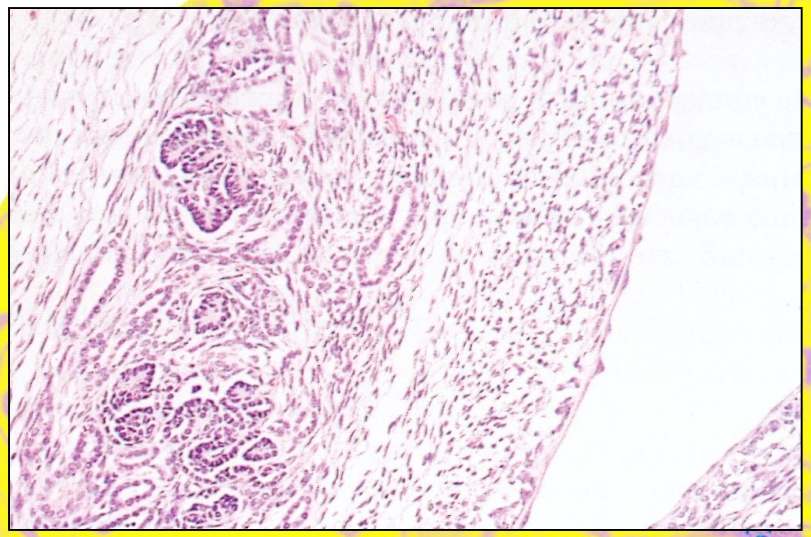


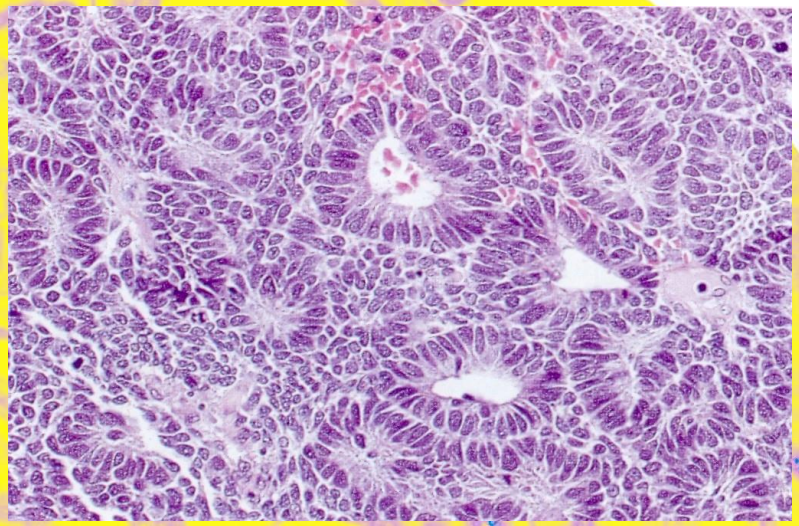
MACROSCOPIC PICTURE OF TUMOR WITH FOCAL HEMORRHAGIC NECROSIS

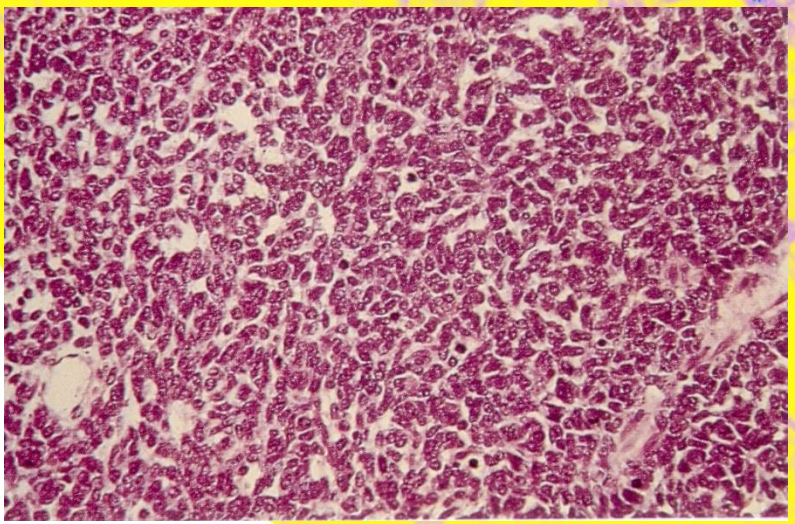
USUALLY ONE-SIDED TUMOR. 60% DEVELOP BEFORE THE 3RD YEAR OF LIFE. GENETIC DELETION IN THE SHORT ARM OF THE 11TH CHROMOSOME.

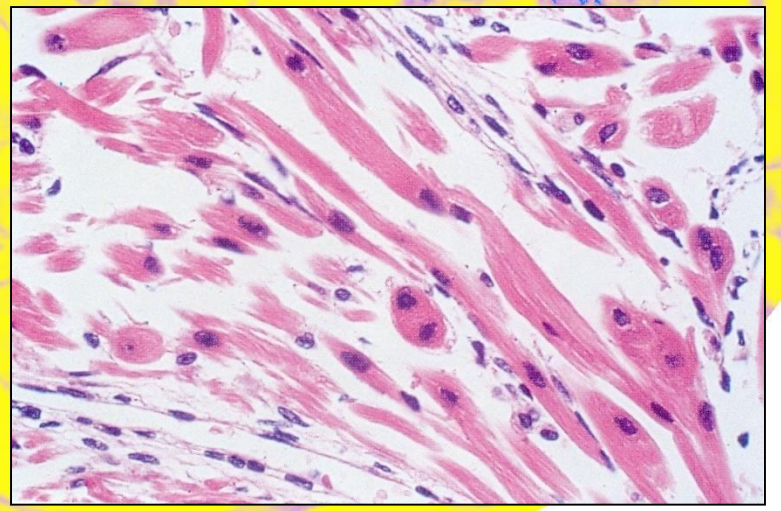
TUMORS IN CHILDREN

NEPHROBLASTOMA









THERE IS EMBRYONIC TISSUE IN STRUCTURE OF TUMOR, RARELY PRIMITIVE BLASTEMA, EPITHELIAL AS WELL AS MESODERMAL STRUCTURES – SMOOTH AND STRIATED MUSCLES, FIBROBLASTS AND CARTILAGE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