L'URINA SOTTO LA LENTE

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NEFROCURE

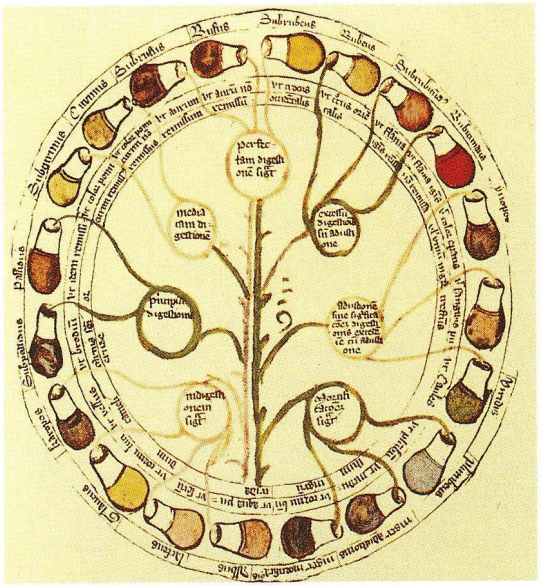
Centro Dialisi

Clinica Moncucco, Lugano

Ringrazio: Dr. Olivier Giannini, OBV

Breve storia dell'esame urinario

4000 a.C.	Babilonesi, Egizi	"Uroscopia"
460-355 a.C	Ippocrate	Descrive il sedimento
129-200 d.C.	Galeno	Urina come UF del sangue
1165-1213	Gilles de Corbeil	Scuola medicea di Salerno
1600-2007		Esame urinario



Armstrong JA, Kidney Int 2007.

“ Medico dell’orina”

Figura centrale nel panorama dell'offerta sanitaria a partire dal Basso Medioevo, tanto che alcuni centri obbligavano questi professionisti a restare in casa al mattino, finché non avessero ricevuto "li poveri e le orine".

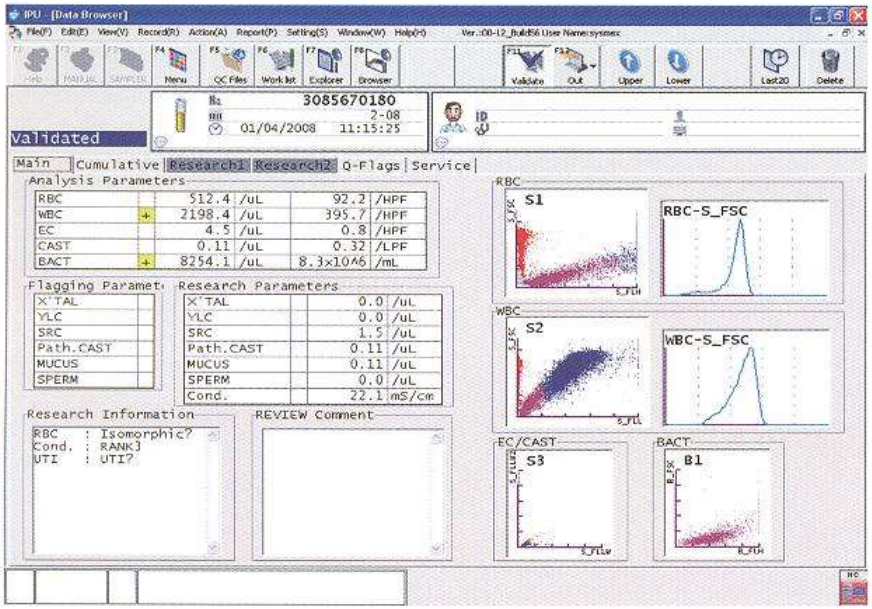
Figure 1 | Physician holding matula into the light for inspection.

Armstrong JA, Kidney Int 2007.

microscopia

- 1830 Rayer a Parigi

Dal 1995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WBC 2198.4 /uL 395.7 /HPF
EC 4.5 /uL 0.8 /HPF
CAST 0.11 /uL 0.32 /LPF
BACT 8254.1 /uL 8.3x1046 /mL
Flagging Paramet
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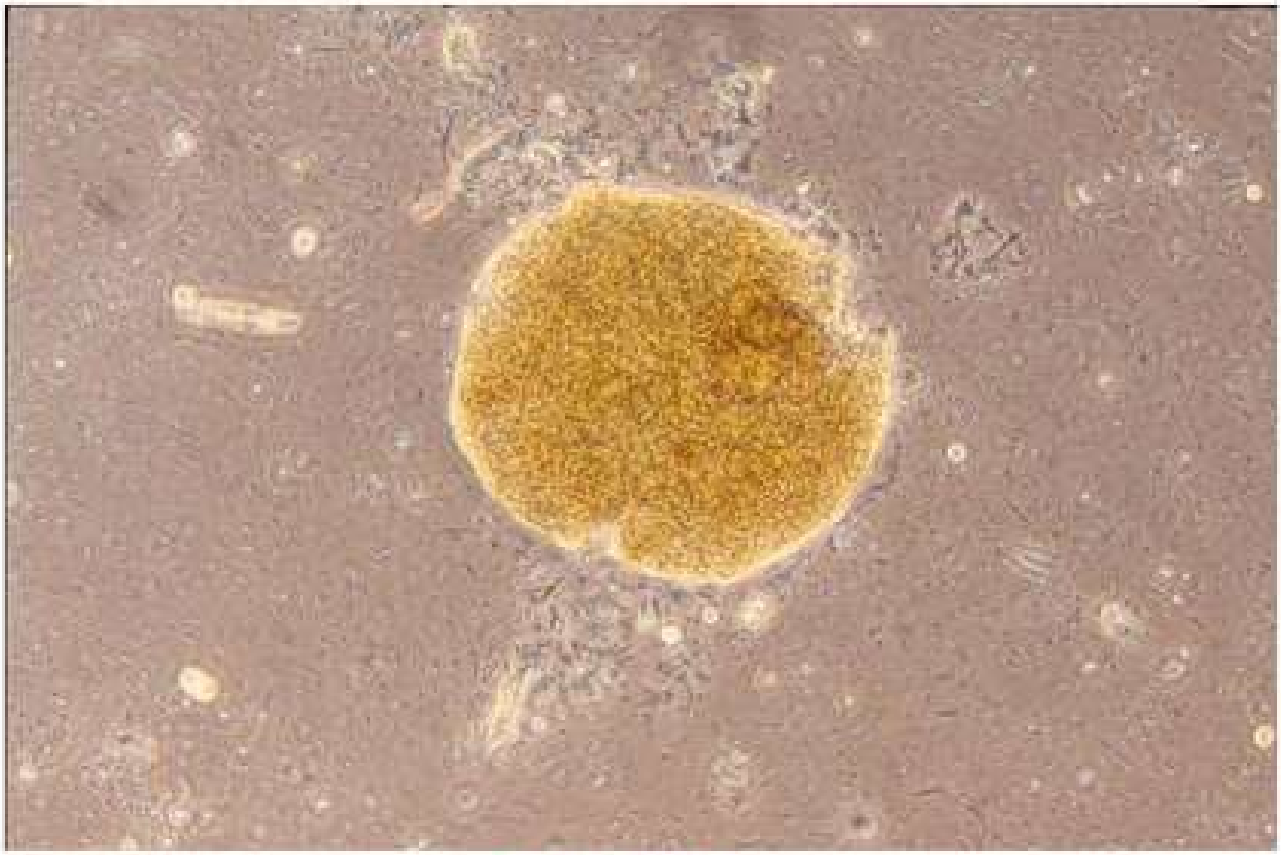
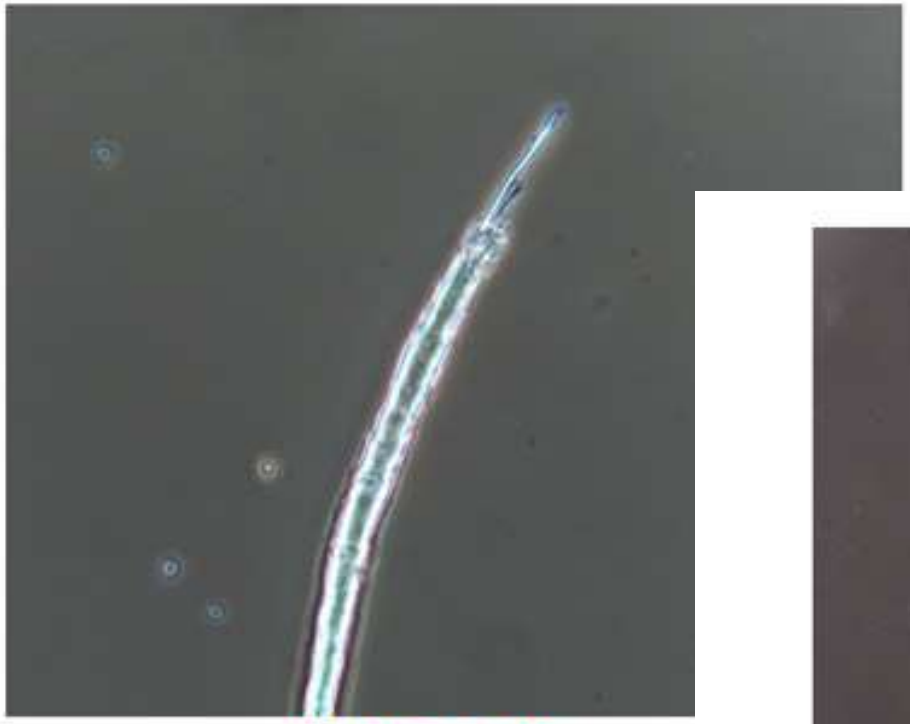
YLC 0.0 /uL
SRC 1.5 /uL
Path.CAST 0.11 /uL
MUCUS 0.11 /uL
SPERM 0.0 /uL
Cond. 22.1 mS/cm
Research Information
RBC : Isomorphic?
Cond. : RANK3
UTI : UTI?
REVIEW Comment
RBC
S1
RBC-S_FSC
WBC
S2
WBC-S_FSC
EC/CAST
S3
BACT
B1

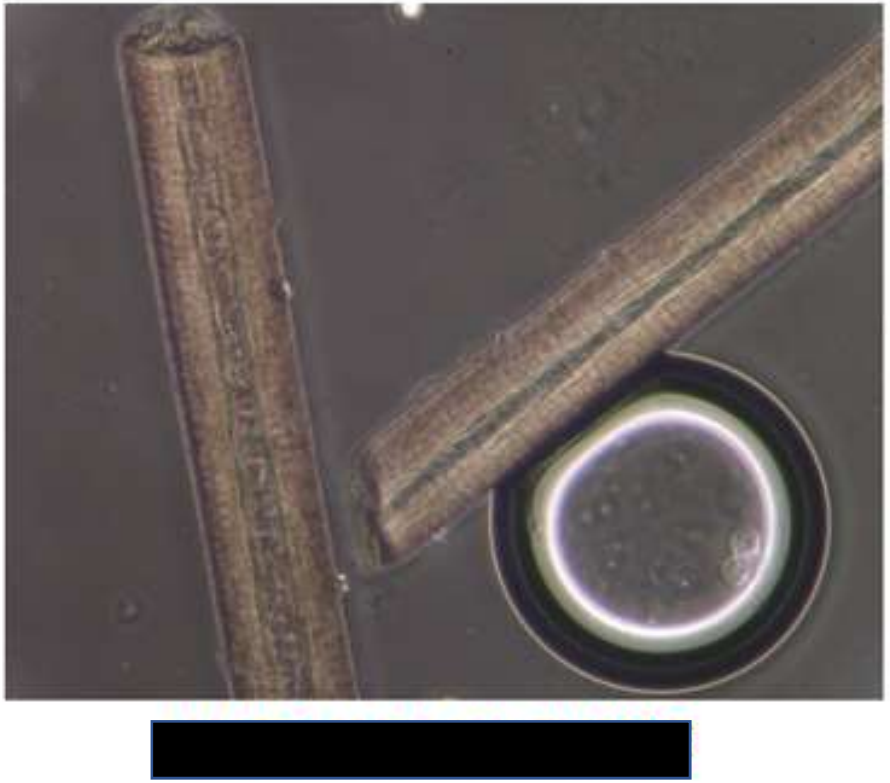
Raccolta adeguata…

…in condizioni adeguate



G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org





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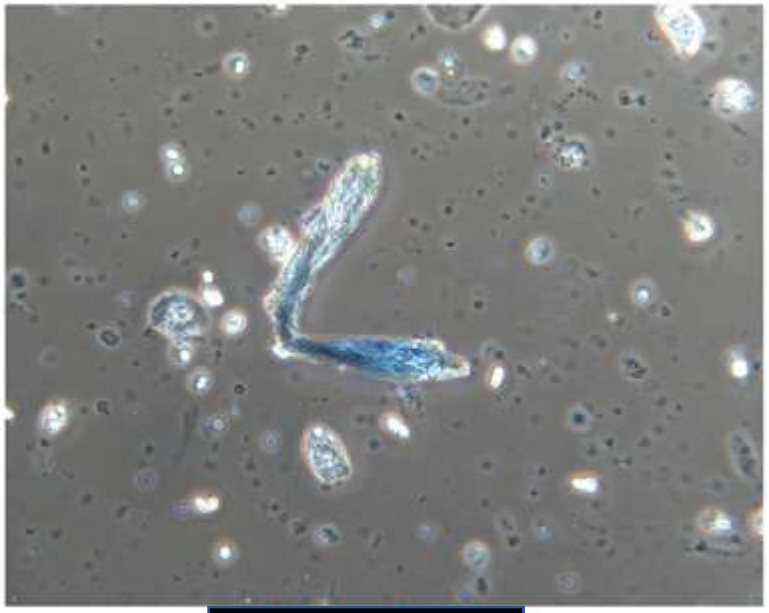
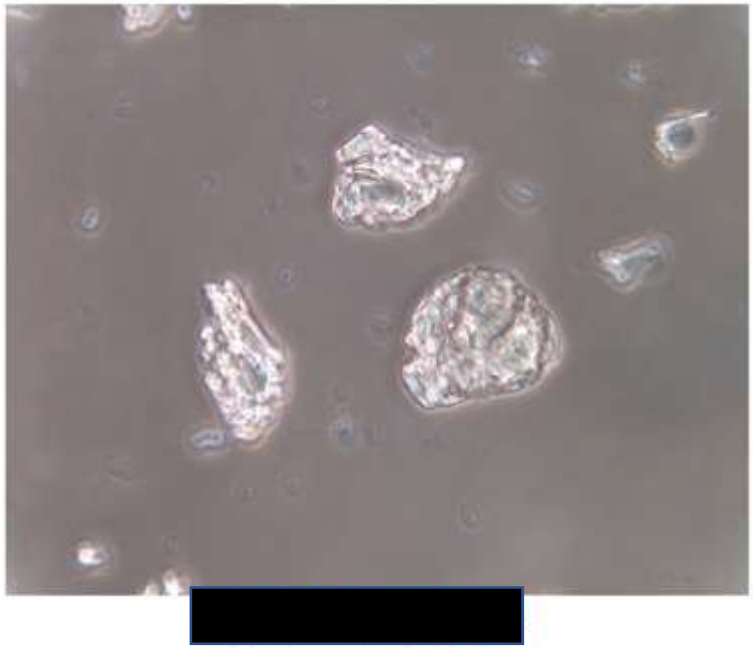
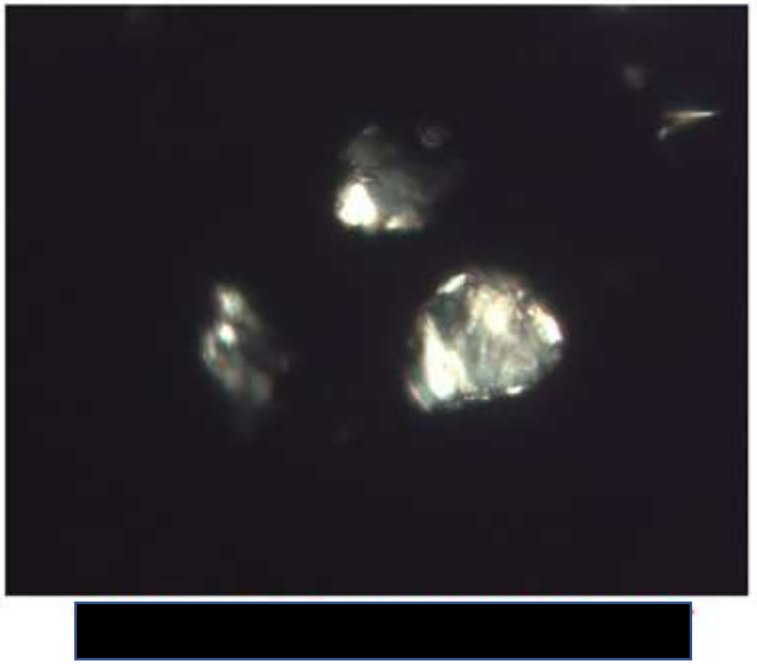






G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org

Raccolta adeguata

- Seconda urina del mattino
- Mitto intermedio
- Evitare sforzi fisici intensi
- Igiene genitale esterna importante
- Evitare raccolta urina durante ciclo mestruale
- Contenitore adeguato, quantità adeguata (12 ml)

Conservazione e trasporto

- Molte componenti stabili per 2 ore
- Urocultura: entro 1 ora dalla raccolta
- Refrigerare se non analizzato entro 2 ore
- La stabilità dipende da:
  - Intensità della luce
  - Temperatura
  - pH
  - Peso
  - Specifiche caratteristiche chimico-fisiche

Macroscopia: nozioni cliniche

Purple Urine

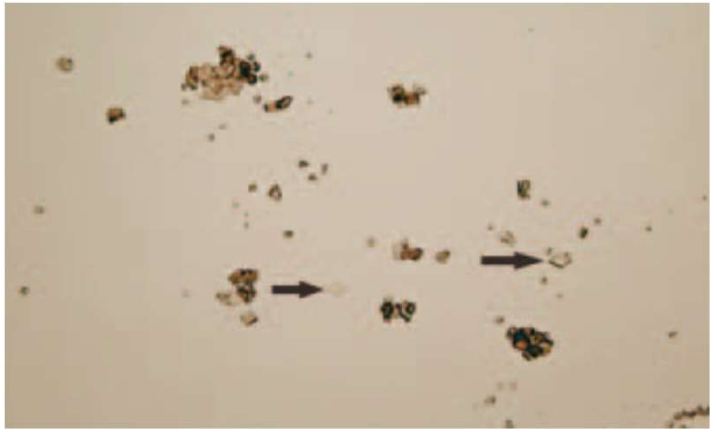
(...)
in the absence of antibiotic treatment. Purple discoloration can occur in alkaline urine as a result of the degradation of indoxyl sulfate (indican), a metabolite of dietary tryptophan, into indigo (which is blue) and indirubin (which is red) by bacteria such as *Providencia stuartii*, *Klebsiella pneumoniae*, *P. aeruginosa*, *Escherichia coli*, and enterococcus species. The clinical course is benign, and the urine typically clears with resolution of the bacteriuria and acidification of the urine.

N ENGL J MED 357;13 WWW.NEJM.ORG SEPTEMBER 27, 2007

Pink urine after propofol anesthesia

Kidney International (2010) 78, 1193; doi:10.1038/ki.2010.363

Container with voided urine (background) and centrifuged specimen (foreground) with pink pellet (arrow).



Urine sediment demonstrating rhomboid uric acid crystals, original magnification10.

L’esame urinario

Esame fisico

Volume
Peso specifico
Colore
Odore

Esame chimico

Glucosio
Corpi chetonici
Bilirubina
Urobilinogeno
Nitriti
pH
Proteine
Eritrociti
Leucociti

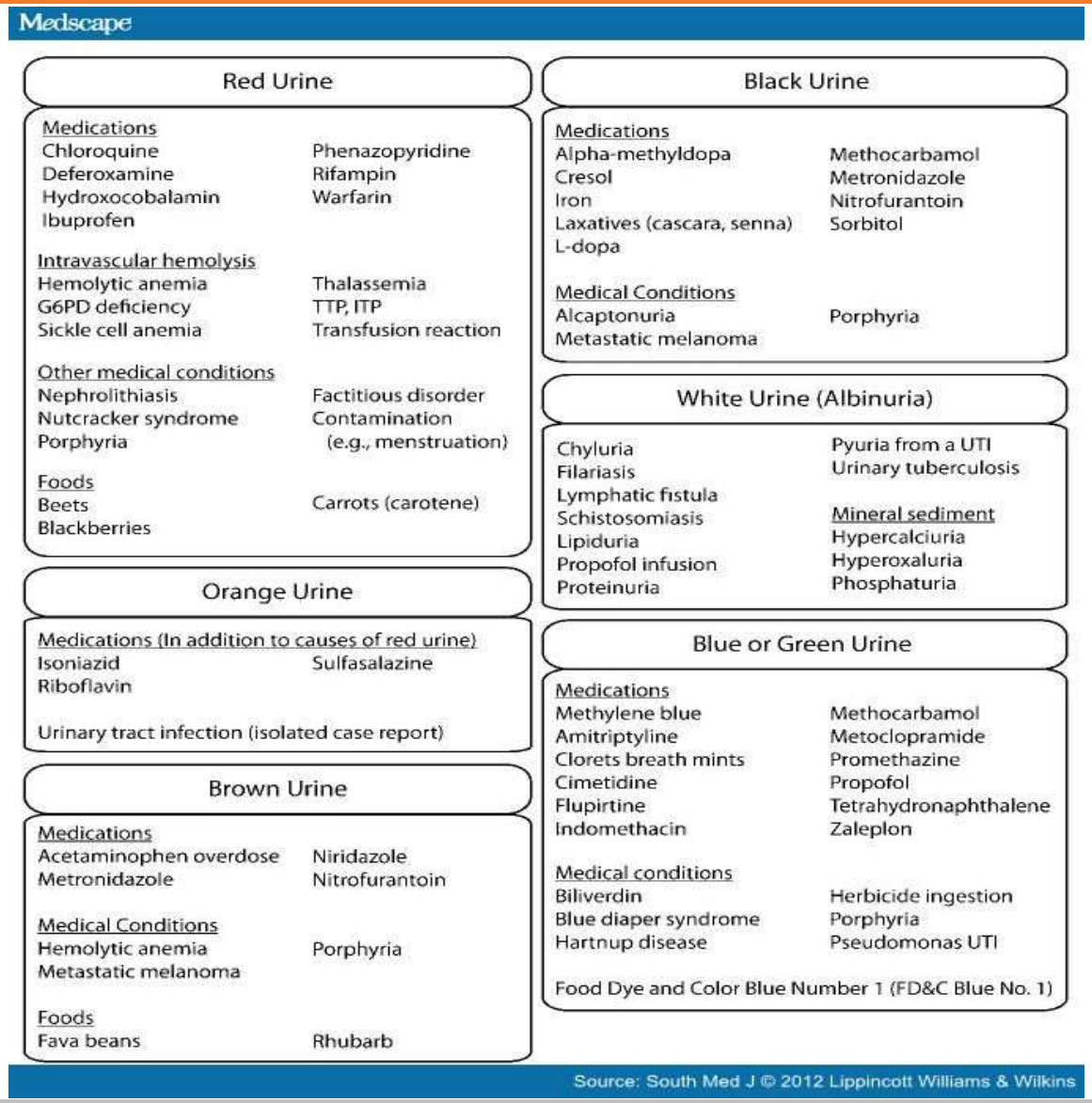
Elettroliti
Crea, Urea

Microscopia

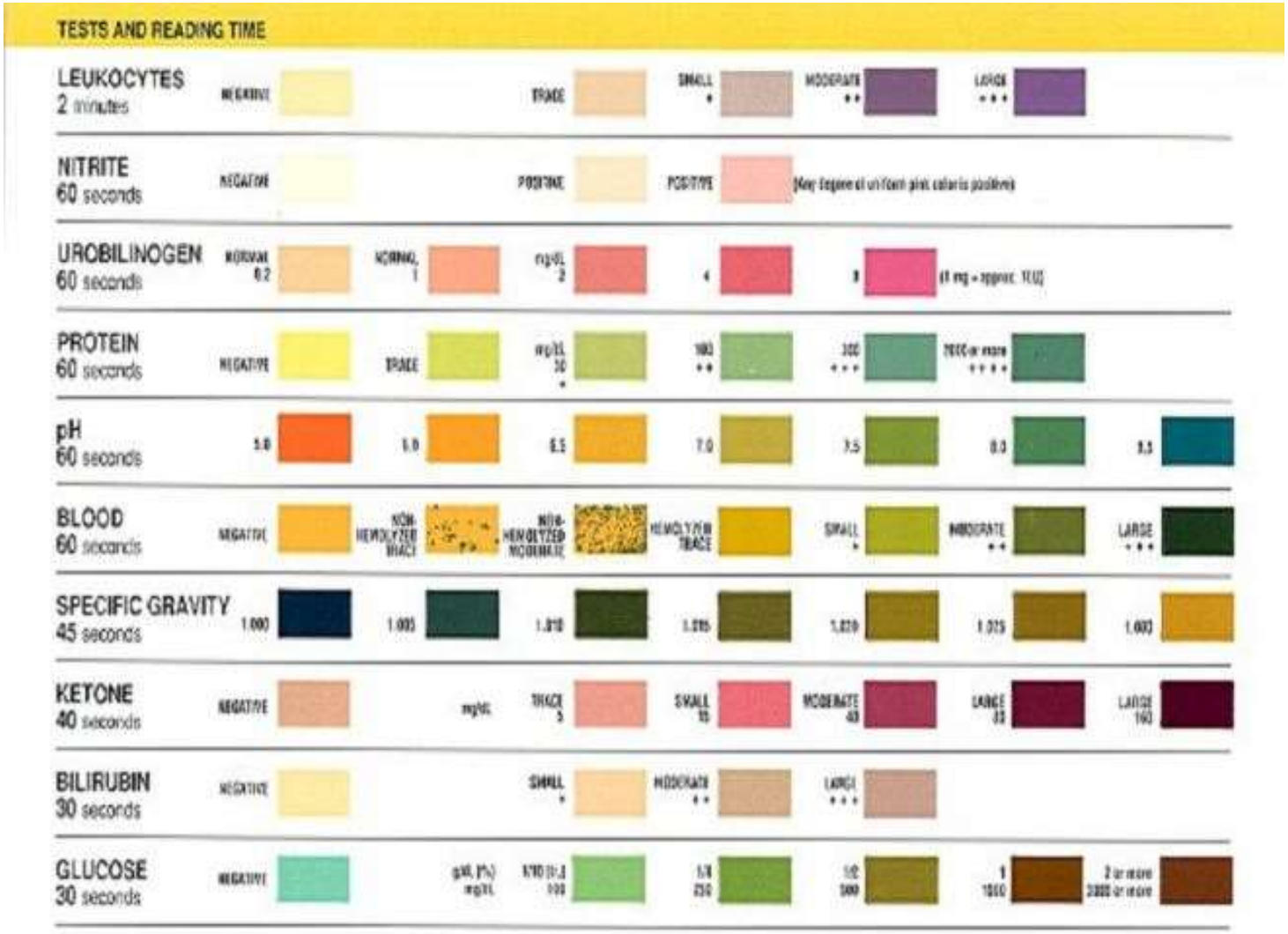
Eritrociti
Leucociti
Cellule renali
Cilindri
Microorganismi
Cellule extrarenali
Altro

Malattie d‘organo o sistemiche

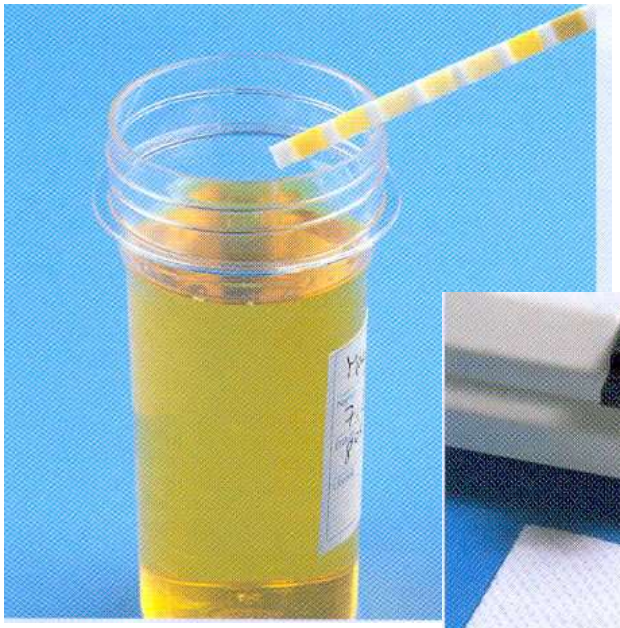
Nefropatia, Infetto

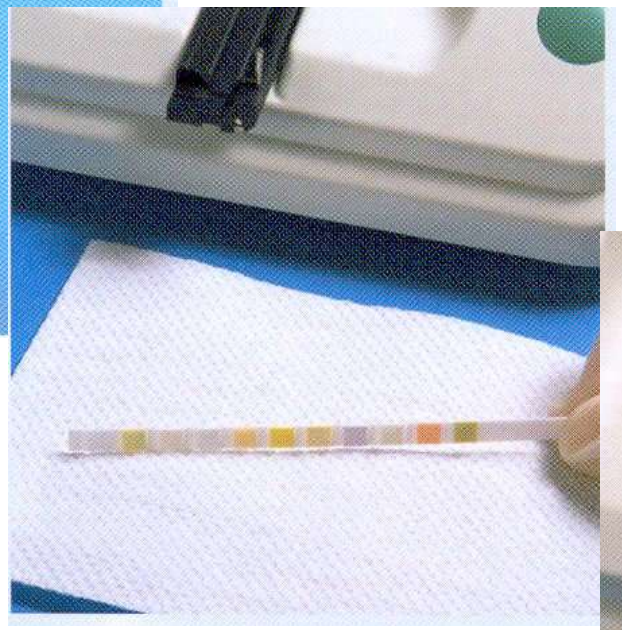

Medscape
Red Urine
Medications
Chloroquine
Deferoxamine
Hydroxocobalamin
Ibuprofen
Phenazopyridine
Rifampin
Warfarin
Intravascular hemolysis
Hemolytic anemia
G6PD deficiency
Sickle cell anemia
Thalassemia
TTP, ITP
Transfusion reaction
Other medical conditions
Nephrolithiasis
Nutcracker syndrome
Porphyria
Factitious disorder
Contamination
(e.g., menstruation)
Foods
Beets
Blackberries
Carrots (carotene)
Orange Urine
Medications (In addition to causes of red urine)
Isoniazid
Riboflavin
Sulfasalazine
Urinary tract infection (isolated case report)
Brown Urine
Medications
Acetaminophen overdose
Metronidazole
Niridazole
Nitrofurantoin
Medical Conditions
Hemolytic anemia
Metastatic melanoma
Porphyria
Foods
Fava beans
Rhubarb
Black Urine
Medications
Alpha-methyldopa
Cresol
Iron
Laxatives (cascara, senna)
L-dopa
Methocarbamol
Metronidazole
Nitrofurantoin
Sorbitol
Medical Conditions
Alcaptonuria
Metastatic melanoma
Porphyria
White Urine (Albinuria)
Chyluria
Filariasis
Lymphatic fistula
Schistosomiasis
Lipiduria
Propofol infusion
Proteinuria
Pyuria from a UTI
Urinary tuberculosis
Mineral sediment
Hypercalciuria
Hyperoxaluria
Phosphaturia
Blue or Green Urine
Medications
Methylene blue
Amitriptyline
Clorets breath mints
Cimetidine
Flupirtine
Indomethacin
Methocarbamol
Metoclopramide
Promethazine
Propofol
Tetrahydronaphthalene
Zaleplon
Medical conditions
Biliverdin
Blue diaper syndrome
Hartnup disease
Herbicide ingestion
Porphyria
Pseudomonas UTI
Food Dye and Color Blue Number 1 (FD&C Blue No. 1)
Source: South Med J © 2012 Lippincott Williams & Wilkins

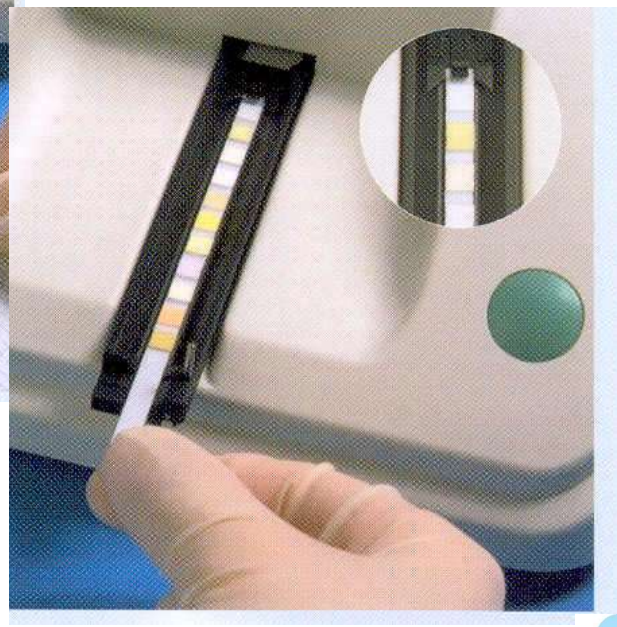
Esame chimico Striscia reattiva



Striscia reattiva







pH urinario


pH
5
6
7
8
9
Leukozyten
Leuk(c)ocytes
Leucocit(i)(os)
neg.
ca. 10-25
ca. 75
ca. 500 Leuko/µl

pH urinario

Pehanon-Streifen 5.2-6.8

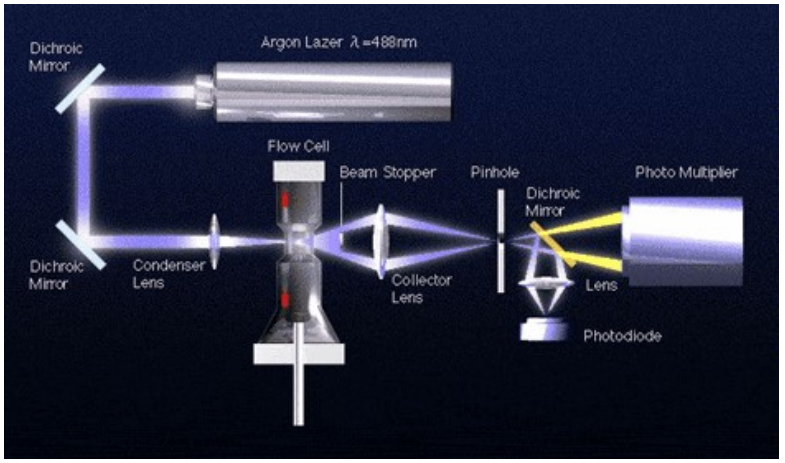
Pehanon-Streifen 6.0-8.1

Striscia reattiva: emoglobina

- Falsi positivi
  - Mioglobina
  - Betadine
  - Perossidasi batterica

- Falsi negativi
  - Vitamina C
    (anche per glucosio)

Citometria di flusso - “Sysmex UF-500i”



Citometria di flusso - “Sysmex UF-100 analyzer”

- Urina non centrifugata
- 2 colorazioni di fluorescenza
  - → Nucleo-DNA
  - → Cariche negatie di mb. cellulari
- Passaggio di particelle attraverso un detettore

Citometria di flusso

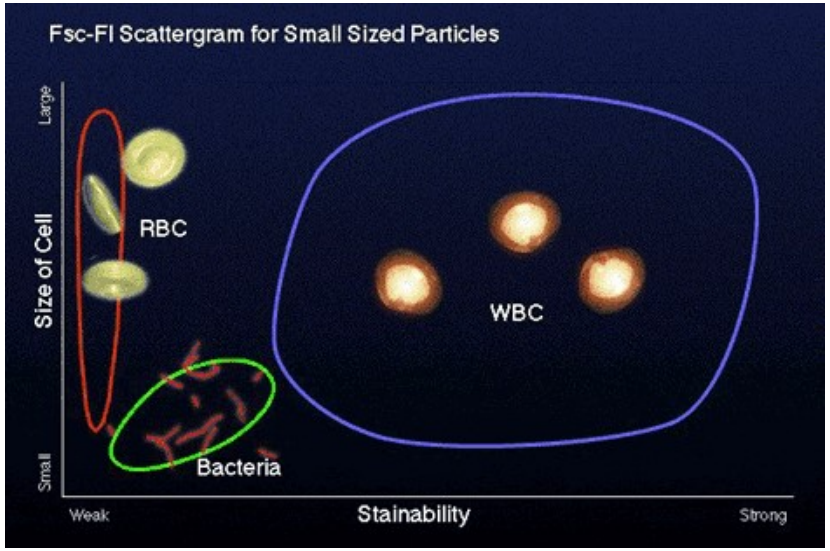
Differenziazione cellulare

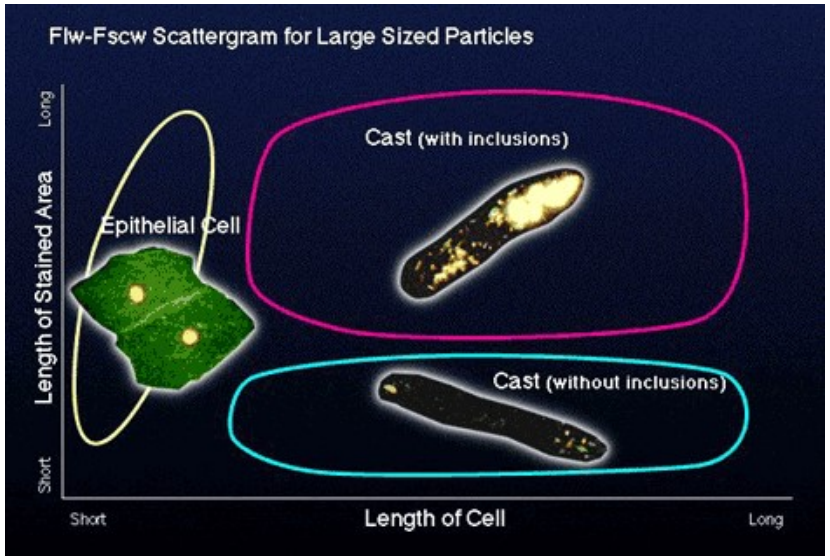
- Eritrociti (CAVE; a volte confusi con batteri)
  - Differenziazione degli ec. (glo vs.non glo)

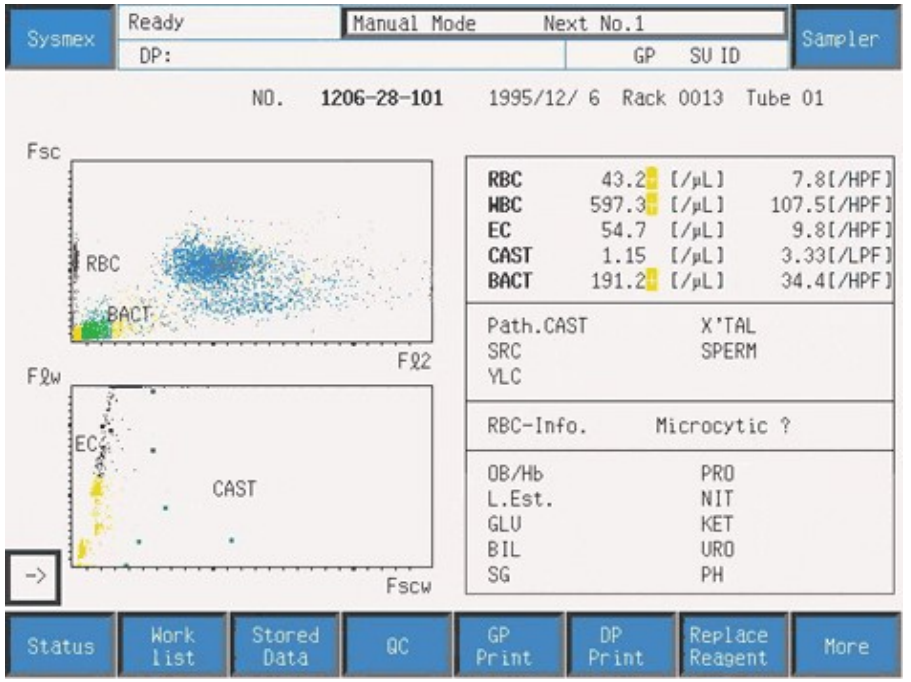
- Leucociti
- Batteri
- Cellule epiteliali

- Cilindri
  - Identificazione di cilindri con inclusioni cellulari

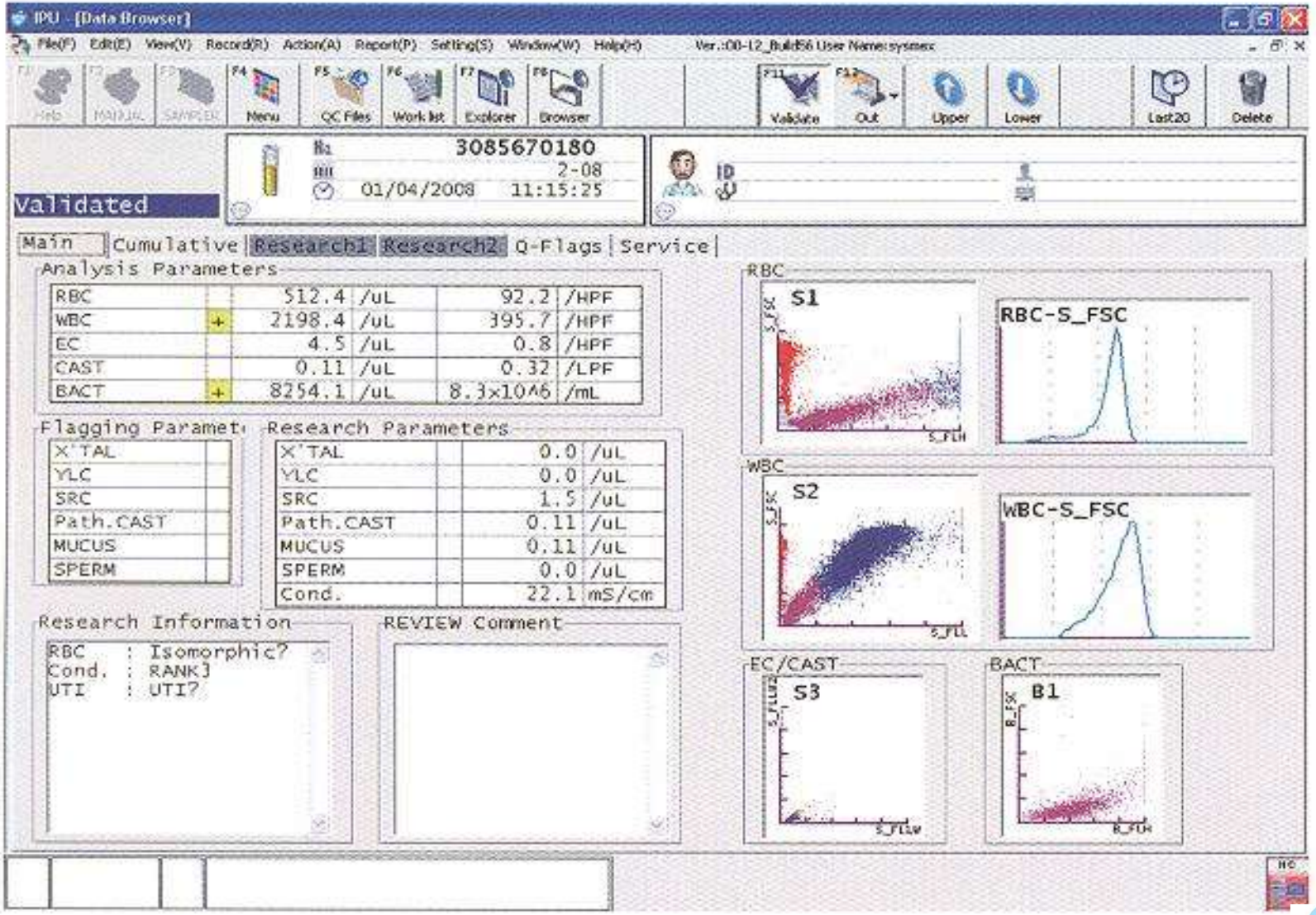
Citometria di flusso - “Sysmex UF-100”







“Sysmex UF-500i”



Striscia reattiva Proteine

Evidenzia prevalentemente Albumina, > 60 mg/L

- **Falsi negativi** (proteine tubulari)
  - CAVE: Catene leggere (Bence Jones)
    → Immunofissazione urinaria

Striscia reattiva Proteine

Falsi positivi

- Leucociti o cellule epiteliali (+++)
- Disinfettanti (Chlorhexidina)
- Infezioni urinarie, setticemia
- Insufficienza cardiaca in fase di scompenso
- Esercizio fisico importante
- Dieta iperproteica
- Ciclo mestruale

La proteinuria

I soggetti normali eliminano quantità molto piccole di proteine. Qualsiasi aumento persistente della escrezione proteica può essere considerato come un segno di danno renale e di danno di organo

Proteinuria: come misurarla ?

Indikation	Methode	Normalwerte	Kommentar
Routineuntersuchung auf Proteinurie	Teststreifen	Spur (≤0,1 g/L) im konzentrierten Urin (spezifisches Gewicht ≥1020)	Falschpositiv bei stark alkalischem (pH >8) oder sehr konzentriertem (>1025) Urin, Verunreinigung durch Antiseptika, Eiter, Sperma oder Vaginalsekret
Quantitative Messung der Proteinurie (und Kreatininclearance)	24-Stunden-Urin zur Untersuchung auf Protein, Albumin und Kreatinin	Proteinausscheidung <150 mg/24 h[1] Albuminausscheidung <30 mg/24 h	Genauer als die Untersuchung einer Einzelprobe; erlaubt auch die Berechnung der glomerulären Filtrationsrate. Schwieriger in der praktischen Durchführung
Quantifizierung der Proteinurie	Einzelprobe zur Bestimmung des Protein/Kreatininquotienten	<0,2 (mg/mg)	Einfachste Methode zur Quantifizierung der Proteinurie; weniger genau als Untersuchung des 24-Stunden-Urins
Nephropathierisiko bei Diabetikern Kardiovaskuläres Risiko bei arterieller Hypertonie	Einzelprobe zur Bestimmung des Protein/Albuminquotienten	<3,4 (mg/mmol)	Bei Patienten mit Diabetes oder Hypertonie muss bei persistierender Mikroalbuminurie die Behandlung intensiviert werden.

[1] Beim 24-Stunden-Urin muss auch die Kreatininkonzentration untersucht werden, um die Zuverlässigkeit der Probensammlung beurteilen zu können. Bei Personen unter 60 Jahren lässt sich die erwartete Kreatininmenge im 24-Stunden-Urin wie folgt abschätzen: bei Frauen 132–176 µmol/kg/d (15–20 mg/kg/d), bei Männern 176–221 µmol/kg/d (20–25 mg/kg/d); bei Patienten über 80 Jahren liegt sie bei 88 µmol/kg/d (10 mg/kg/d).

Bourquin V, Giovannini M. Schweiz Med Forum 2007;7:708-712

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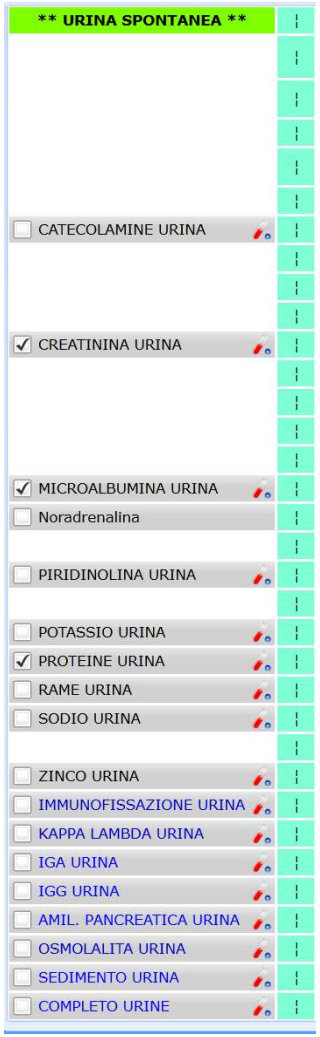
Quoziente P_u : $Crea_u$ = mmol/die

$Proteine_u$(mg) / $Creatinina_u$(mmol)

$Albumina_u$(mg) / $Creatinina_u$(mmol)

Esami chimici



Prognosis of CKD and by eGFR and Albuminuria Categories: KDIGO 2012

eGFR categories (mL/min/1.73m²) Description and range				Persistent albuminuria categories Urine ACR (mg/mmol) Description and range		
				A1	**A2**	**A3**
				Normal	Microalbuminuria	Macroalbuminuria
				male < 2.5 female < 3.5	male 2.5 – 25 female 3.5 – 35	male > 25 female > 35
	G1	Normal or high	>90			
	G2	Mildly decreased	60–89			
	G3a	Mildly to moderately decreased	45–59			
	G3b	Moderately to severely decreased	30–44			
	G4	Severely decreased	15–29			
	G5	Kidney failure	<15			

low risk if no other markers of kidney disease, no CKD) | Moderately increased risk | high risk | very high risk

SCREENING CHI?

- Pazienti a rischio
- Ipertensione arteriosa / malattie cardiache (alla diagnosi,ripetere annualmente)
- Diabete mellito (a partire dal 5° anno di diagnosi di DM tipo 1, immediatamente alla diagnosi di DM tipo 2)
- Malattie sistemiche
- Malattie renali croniche
- Familiarità positiva per malattie renali (annualmente)
- Infetti urinari recidivanti
- Abuso di medicamenti (es. NSAID, Litio)

Esami chimici

Urine Spot	Urine Raccolta		
☐	☐	615	**URINE SPOT**
	☐	616	**RACCOLTA URINE**
	☐	617	**Volume:** ..... mL
	☐	618	**Raccolta** ..... ORE
	☐	620	**Clearance della creatinina**
	☐	621	Clearance dell' urea
☐	☐	622	Microalbuminuria
☐	☐	623	Sodio
☐	☐	624	Potassio
☐		625	Calcio
	☐	626	Calcio (*Acidificare*)
☐		627	Magnesio
	☐	628	Magnesio (*Acidificare*)
☐		629	Fosfati
	☐	630	Fosfati (*Acidificare*)
☐	☐	631	Creatinina
☐	☐	632	Urea
☐	☐	633	Proteine
☐	☐	634	Glucosio
☐	☐	635	Acido urico/Urati
☐		636	Osmolalità
☐	☐	637	Amilasi
☐	☐	638	Amilasi pancreatica
☐	☐	639	Porfobilinogeno
☐	☐	640	Elettroforesi proteine **(10 mL)** 14) se positiva seguita da immunofissazione
☐	☐	642	Immunofissazione **(10 mL)**
☐	☐	643	Catene leggere kappa/lambda 14)
☐	☐	644	IgA
☐	☐	645	IgG
☐	☐	646	IgM
☐	☐	647	ß2-Microglobulina
☐	☐	648	α1-Microglobulina
☐	☐	649	Transferrina
☐	☐	650	Profilo proteico: 14) Creatinina, Albuminuria, IgG, RBP, α1-Microglobulina, α2-Macroglobulina
☐	☐	653	Ricerca paraproteinuria 14) proteine, elettroforesi, se positiva: IF, IgA, IgG ,IgM, Kappa, Lambda
☐		657	Frazione d'escrezione Sodio *(Vedasi Vademecum)*

Proteinuria come differenziarla ?

- Immunoglobuline

120kdal

- Albumina

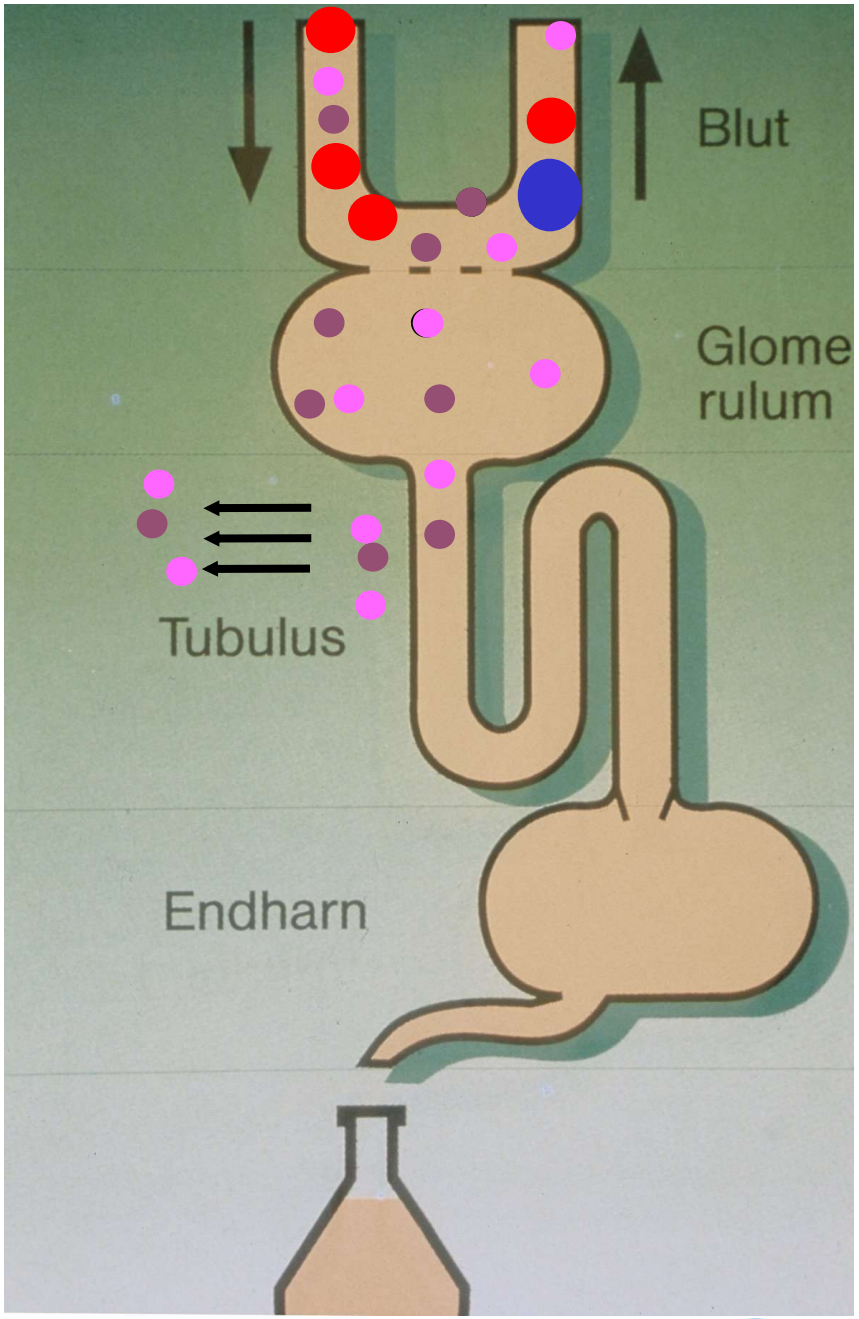
67kdal

- α1-Microglobulina

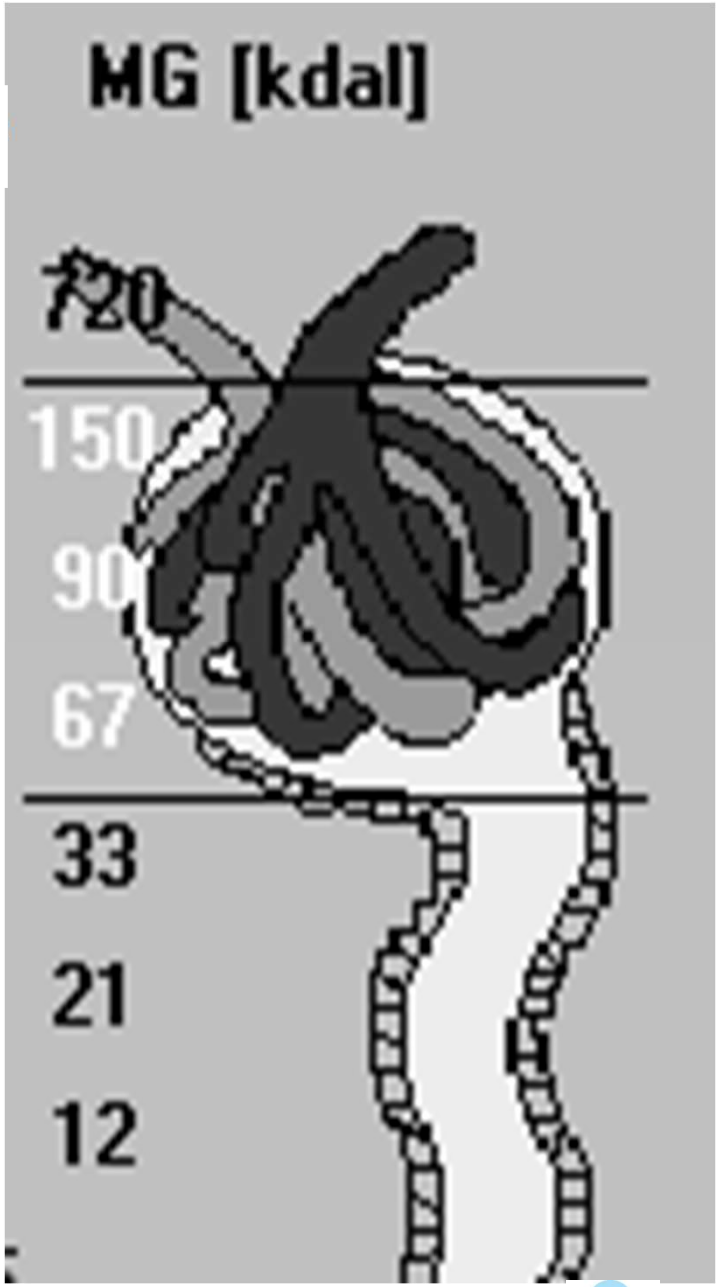
33kdal

- Prot. retinolo legante

21kdal

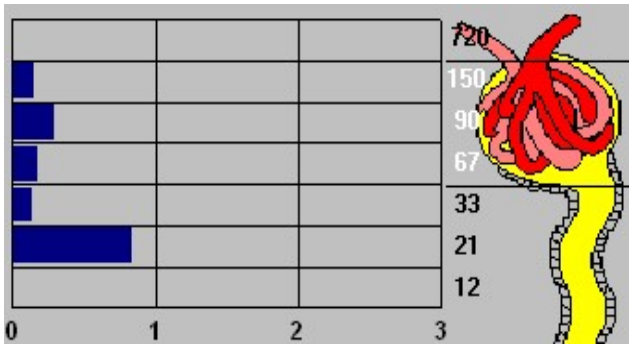


Post-renale	**α2 Macroglobulina**
Glomerulare	**Immunoglobuline**
	Transferrina
	Albumina
Tubulare	**α1 Microglobulina**
	Prot. retinolo legante
Pre-renale	**Catene leggere**
	Myoglobina



Normale

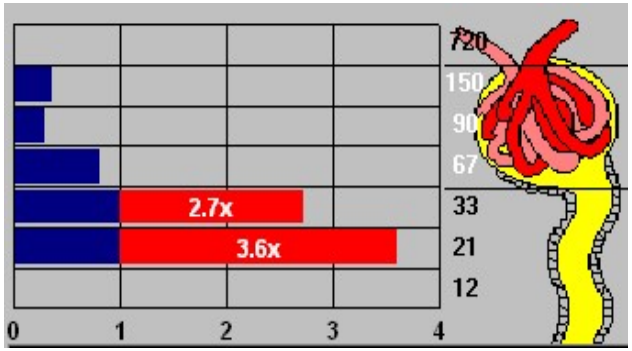
IgG
TF
Alb
a-1-M
RbP



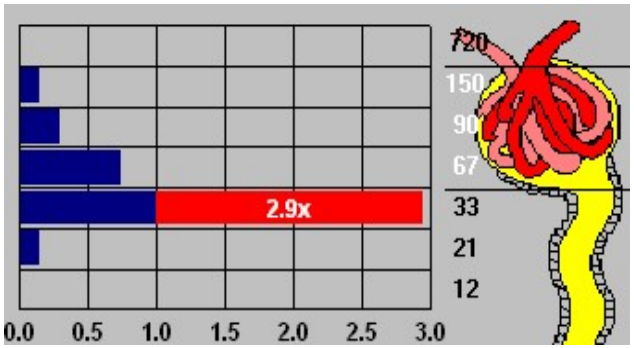
Contaminazione postrenale

Tubulare completa

IgG
TF
Alb
a-1-M
RbP

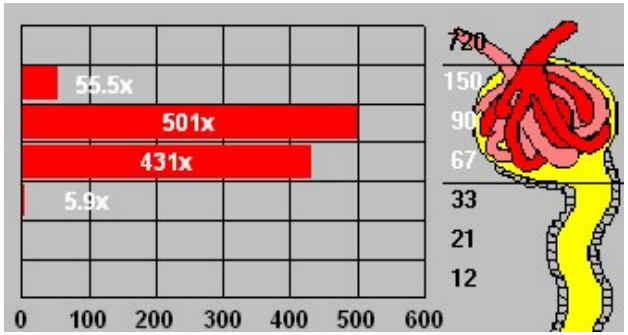


Tubulare incompleta

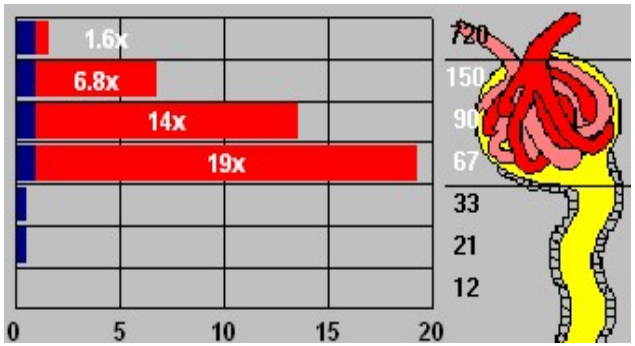


Glomerulare selettiva

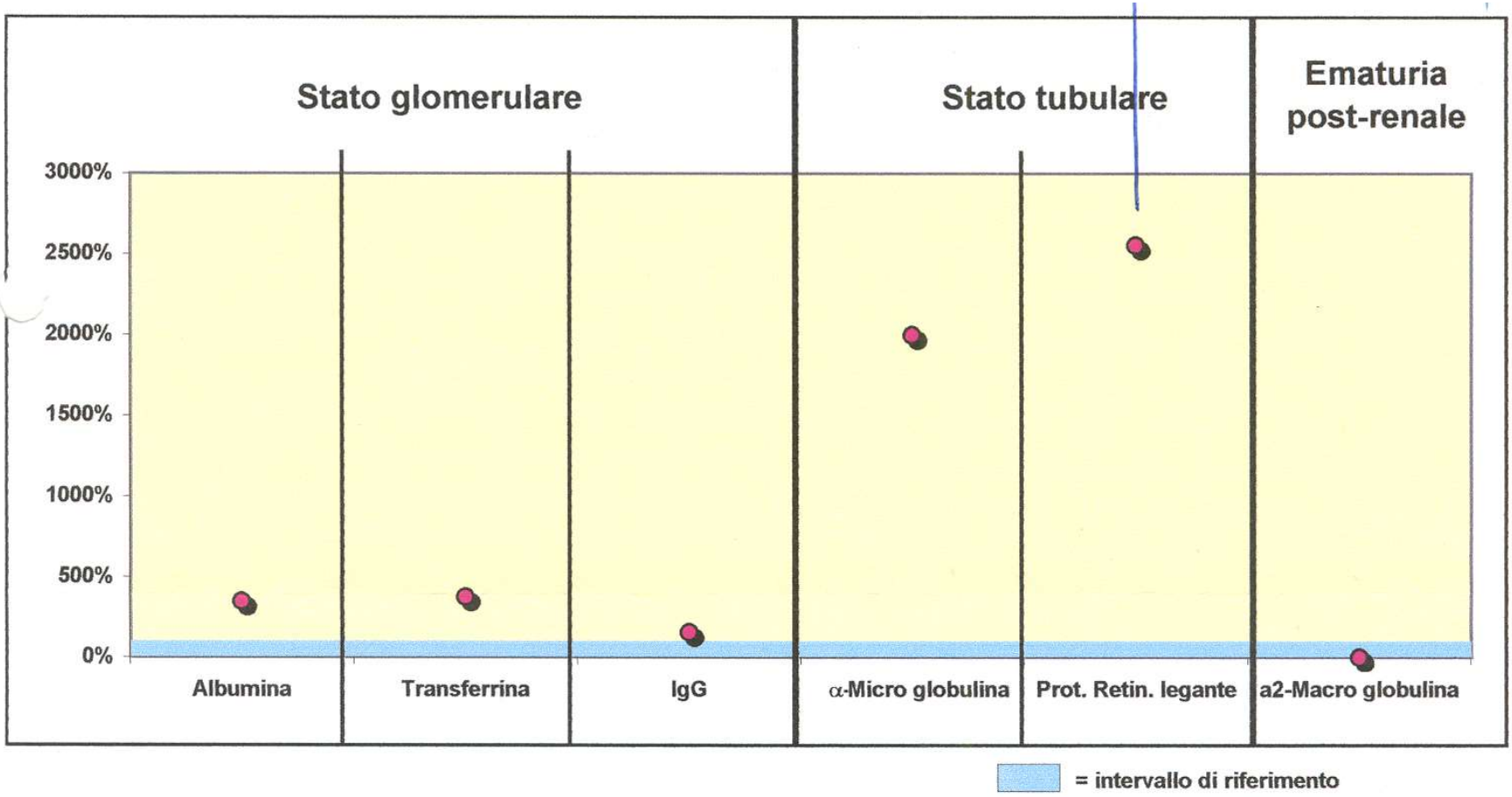
IgG
TF
Alb
a-1-M
RbP



Glomerulare non selettiva



Profilo proteico



Proteinuria = “ Marker “ di nefropatia

Papaver sumniferum

Sedimento urinario

URINE

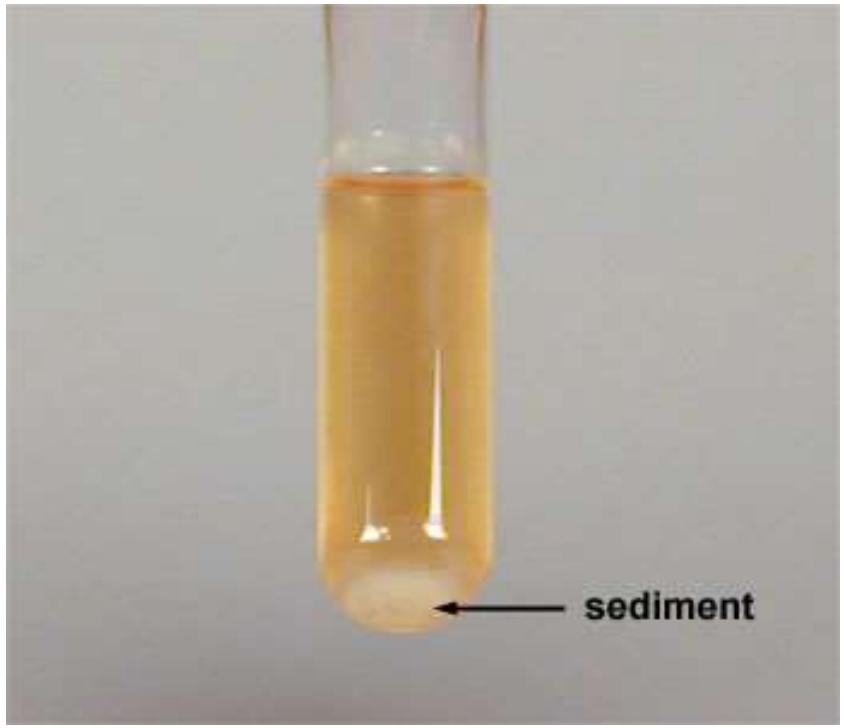
☐	343	***Getto medio***
☐	344	***Catetere vescicale***
☐	345	Striscia reattiva (10 par.)
☐	346	Sedimento
☐	347	Urotube
☐	348	Test di gravidanza (ql)
☐	349	pH
☐	350	Eosinofili

TOSSICOLOGIA

☐	352	*) Etanolo
☐	353	Screening droghe urina
☐	354	Metamfetamina urina

Sedimento urinario

5 min., 3000 rpm



100 x (= LPF)

400 x (= HPF)

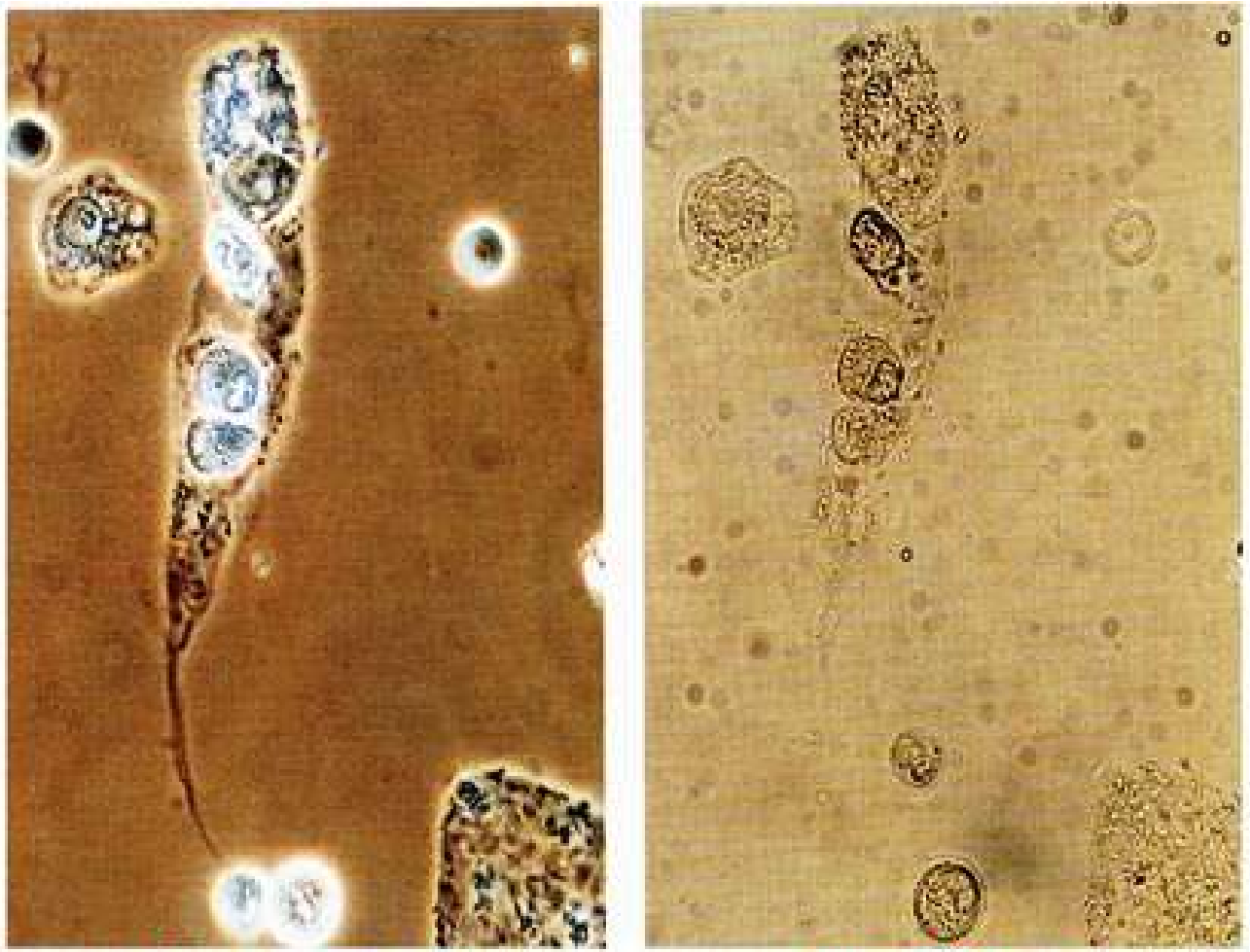
Microscopia

- Buona qualità
  - 160X (LPF)
  - 400X (HPF)
- Contrasto di fase
- Luce polarizzata

Tecniche di microscopia

- Urina nativa
  - Sedimento non colorato, microscopia ottica
- Sedimento con colorazione
  - Sternheimer-Malbin
  - Sudan III (lipidi)
  - Perossidasi (leucociti)
- Luce polarizzata (Sostanze bi-rifrangenti)
- Contrasto di fase
  - Miglior visione di particelle non colorate
  - Miglior differenziazione tra Ec iso- e dismorfi

Microscopia



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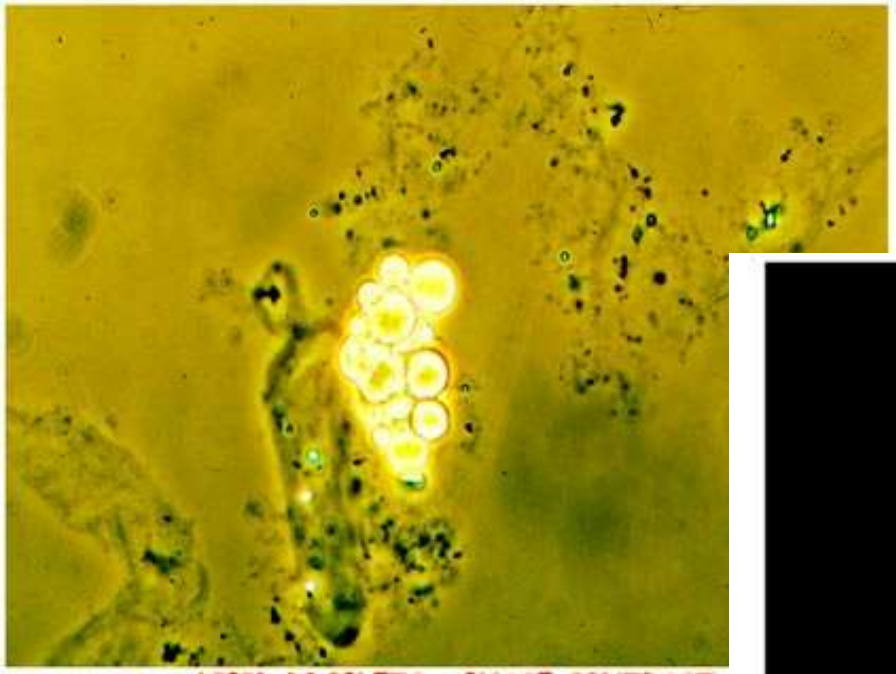
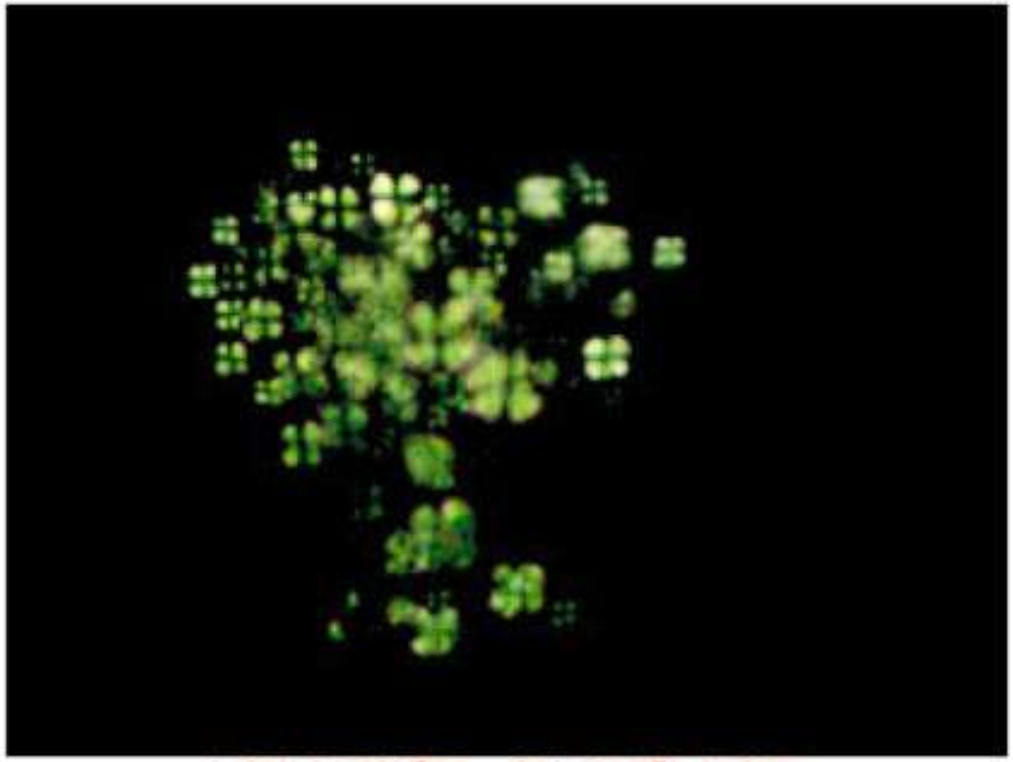
Microscopia



LIPID DROPLETS - PHASE CONTRAST



LIPID DROPLETS - POLARIZED LIGHT

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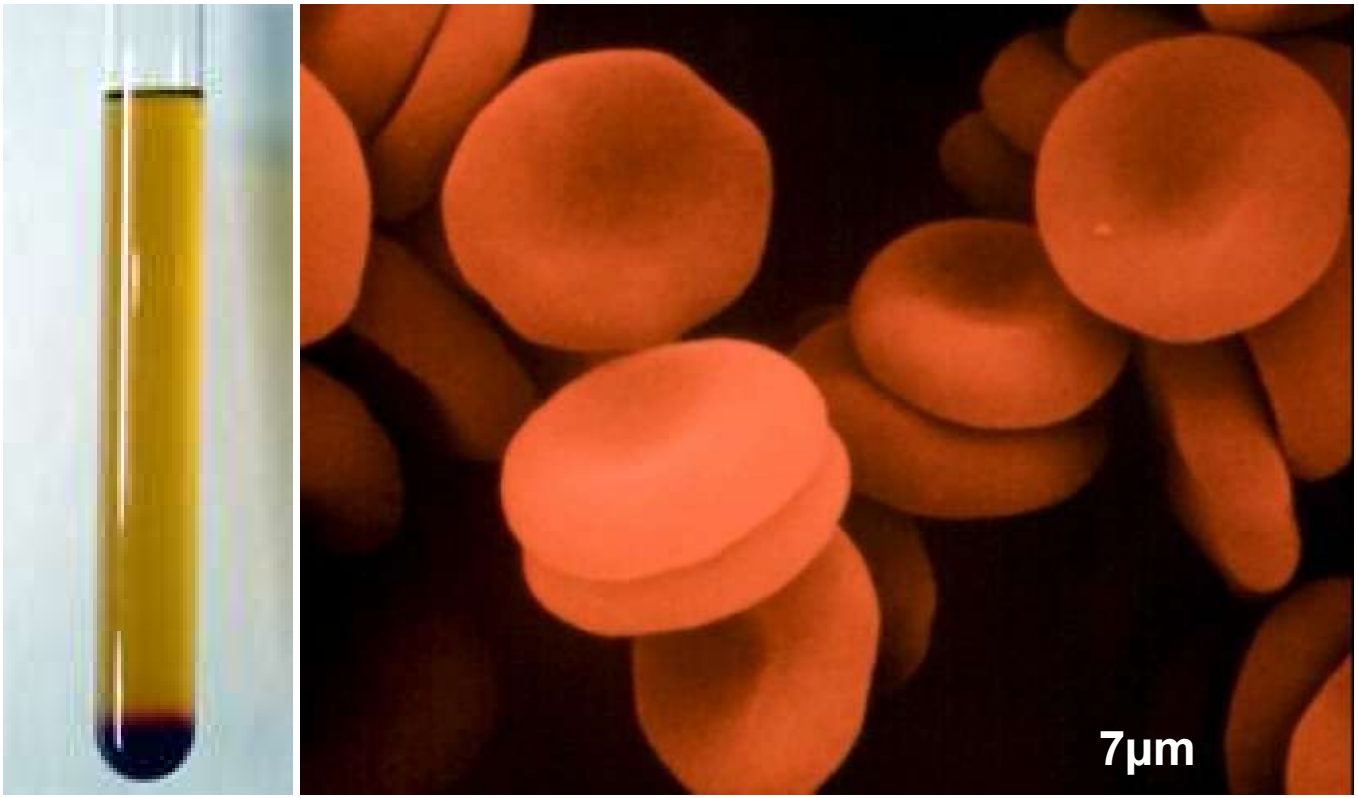
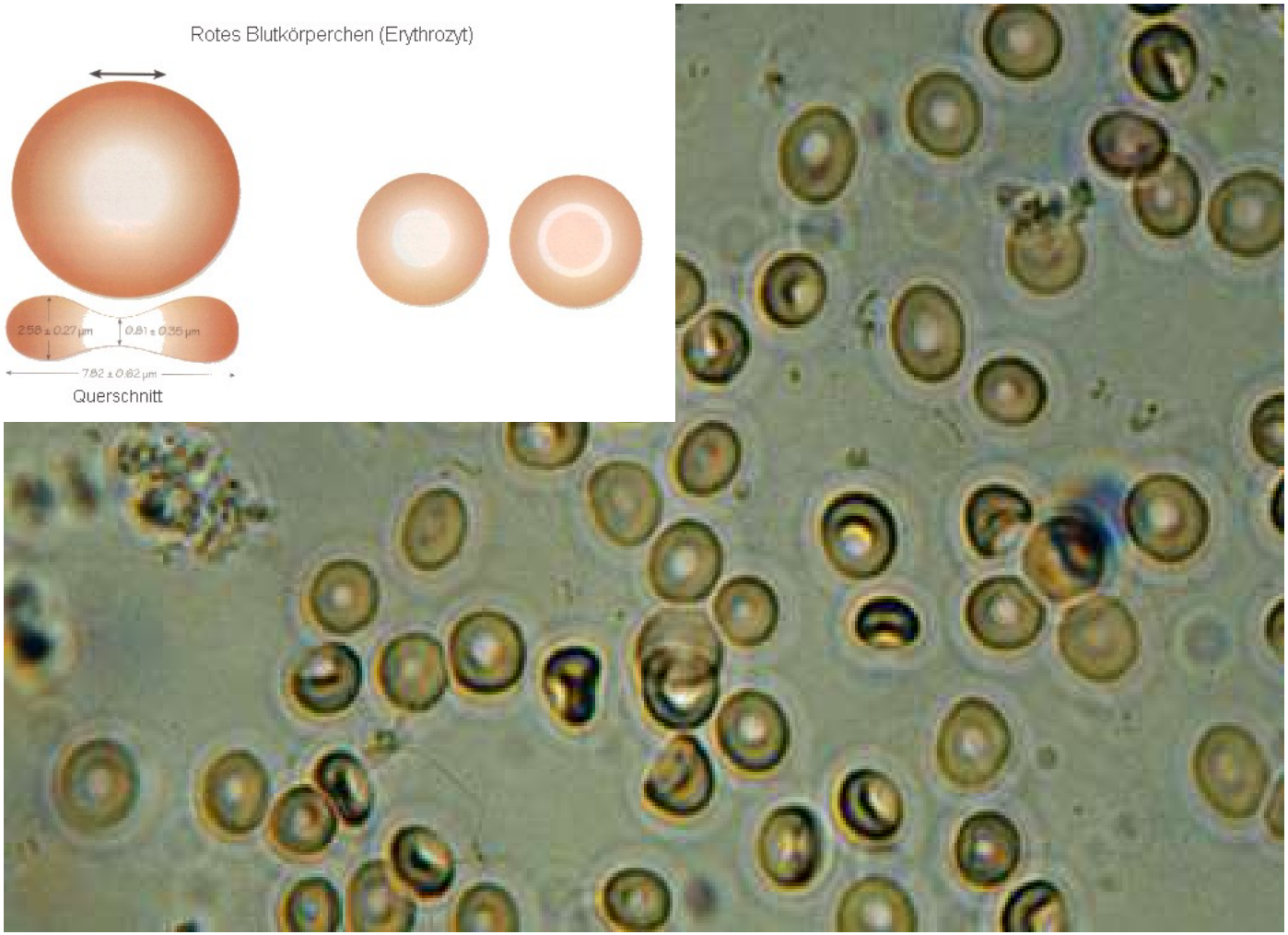
Cellule

Origine ematica	**Eritrociti**	Isomorfi Acantociti
	Leucociti	Neutrofili Linfociti Eosinofili
	Macrofagi	Granulari Omogenei Fagociti
Origine epiteliale	**Tubulari**	Prossimali Distali
	Transizionali	Superficiali Profondi
	Squamose	Superficiali Profondi

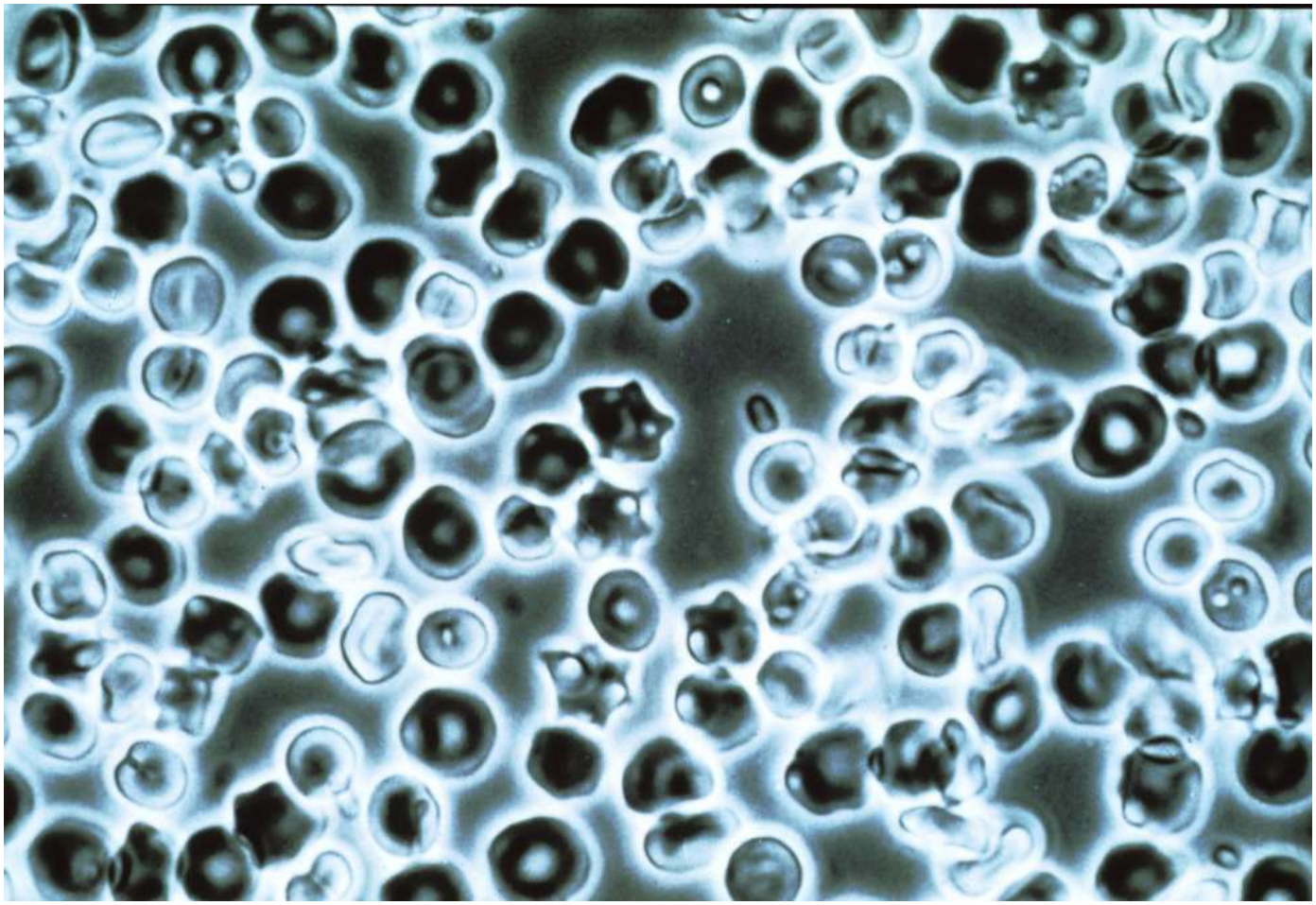
Eritrociti



Eritrociti non glomerulari



Eritrociti pseudo-glomerulari



Eritrociti glomerulari

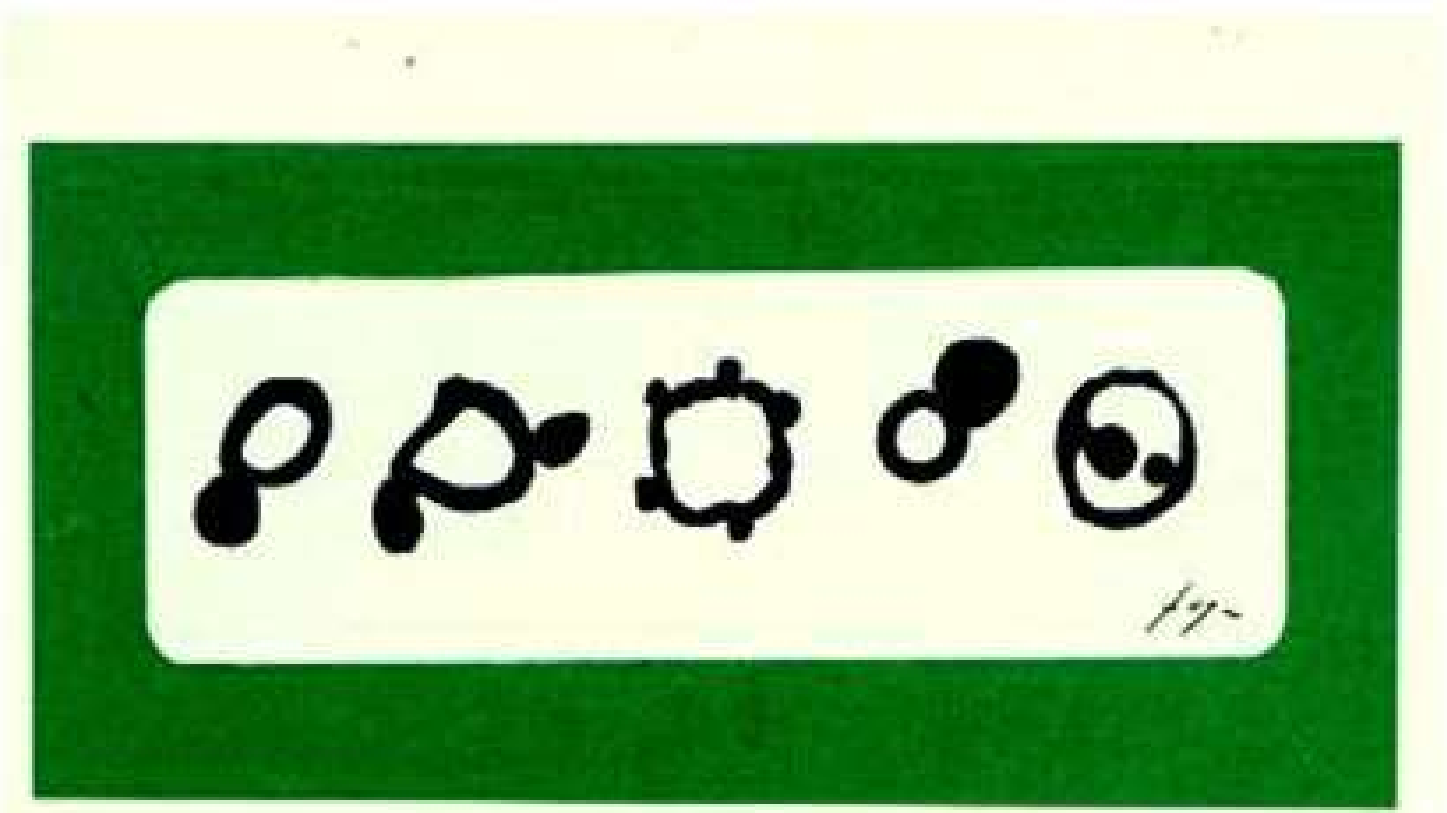


DIAGRAM OF THE COMMONEST TYPES OF ACANTHOCYTES OR G1 CELLS

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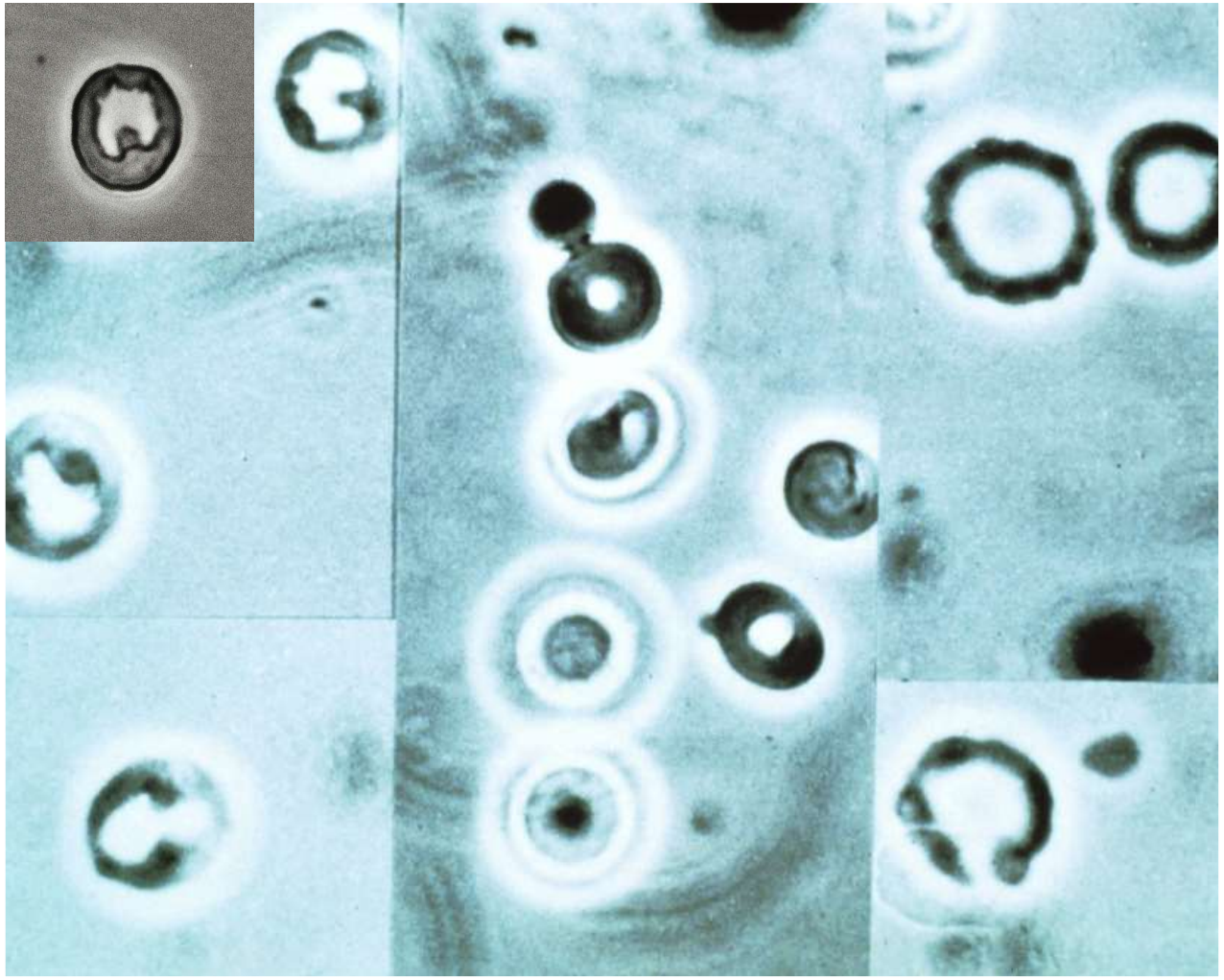
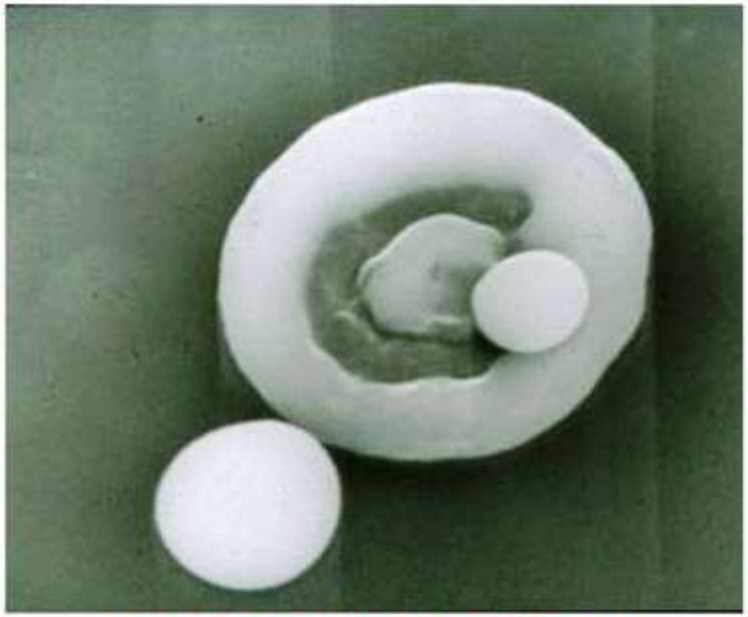
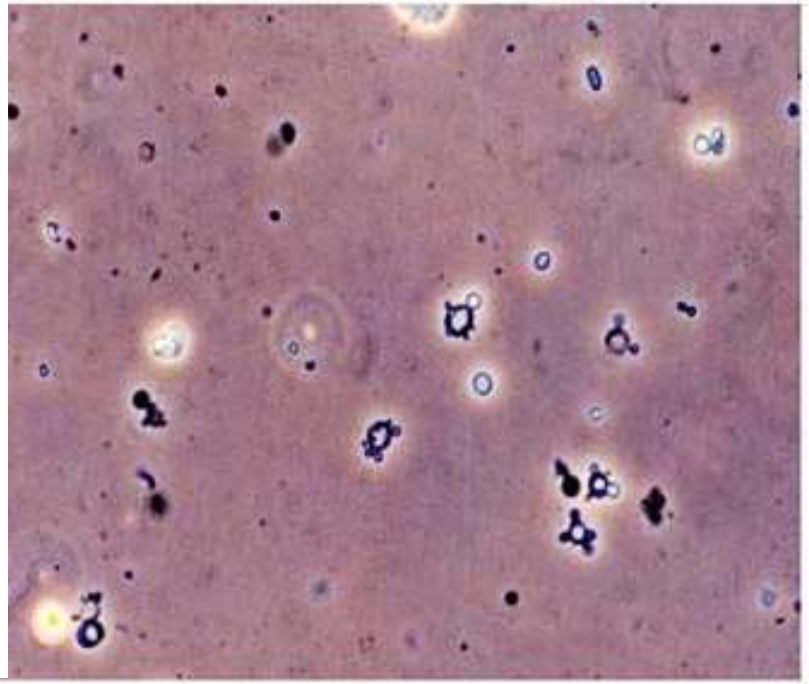
Eritrociti glomerulari



Eritrociti glomerulari

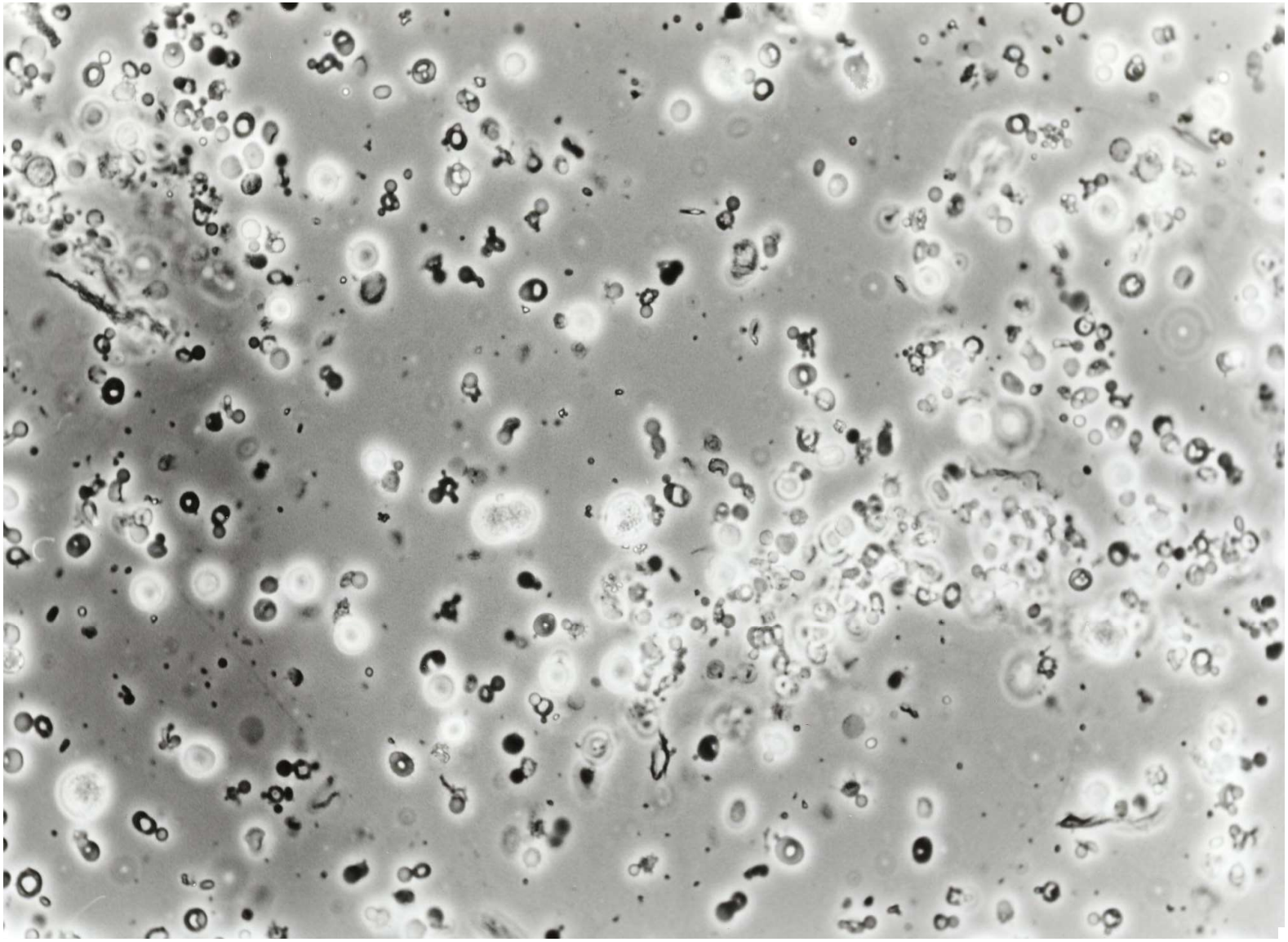


ACANTHOCYTE OR G1 CELL (SEM)

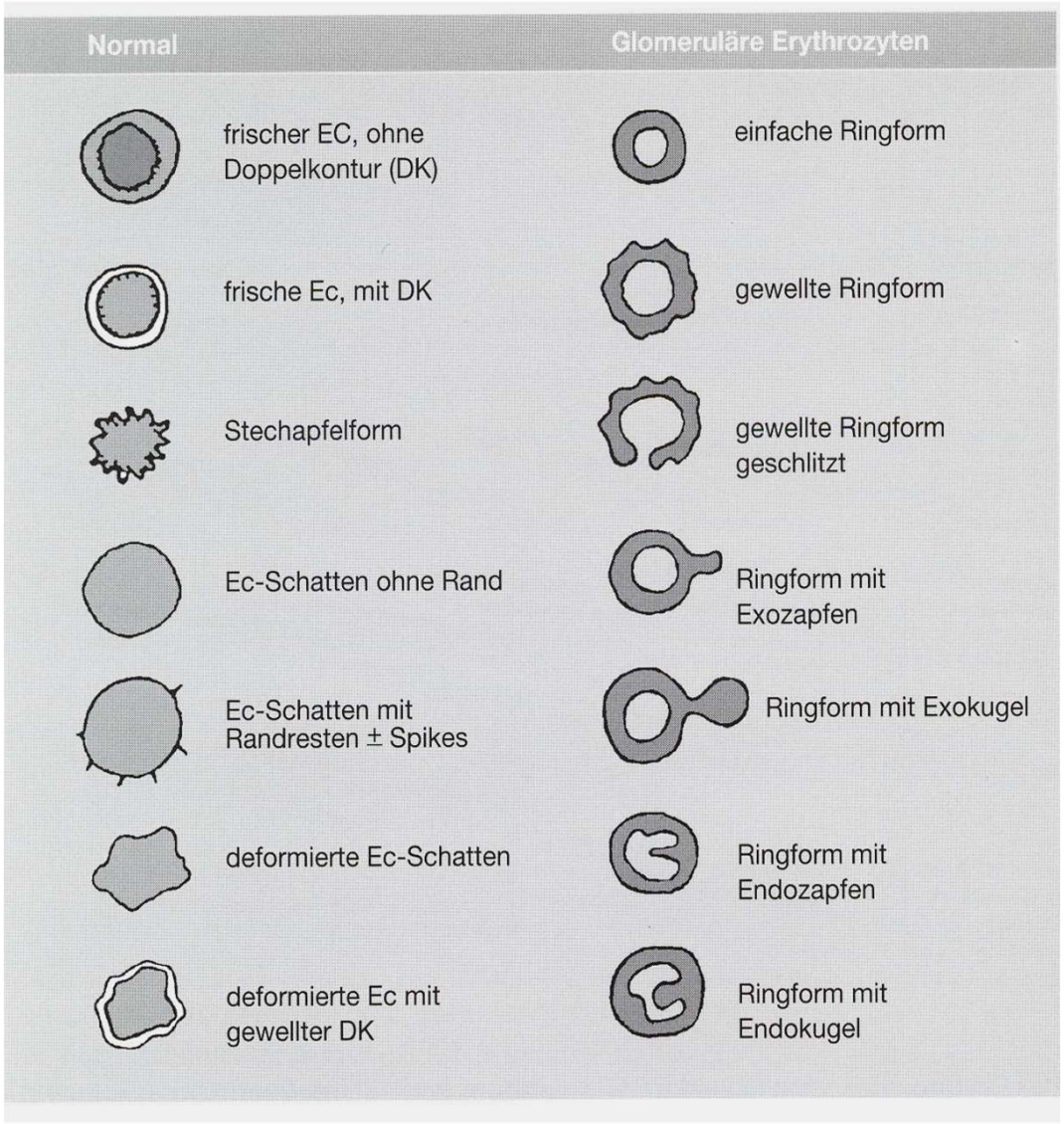


ACANTHOCYTES OR G1 CELLS (PH-CO)

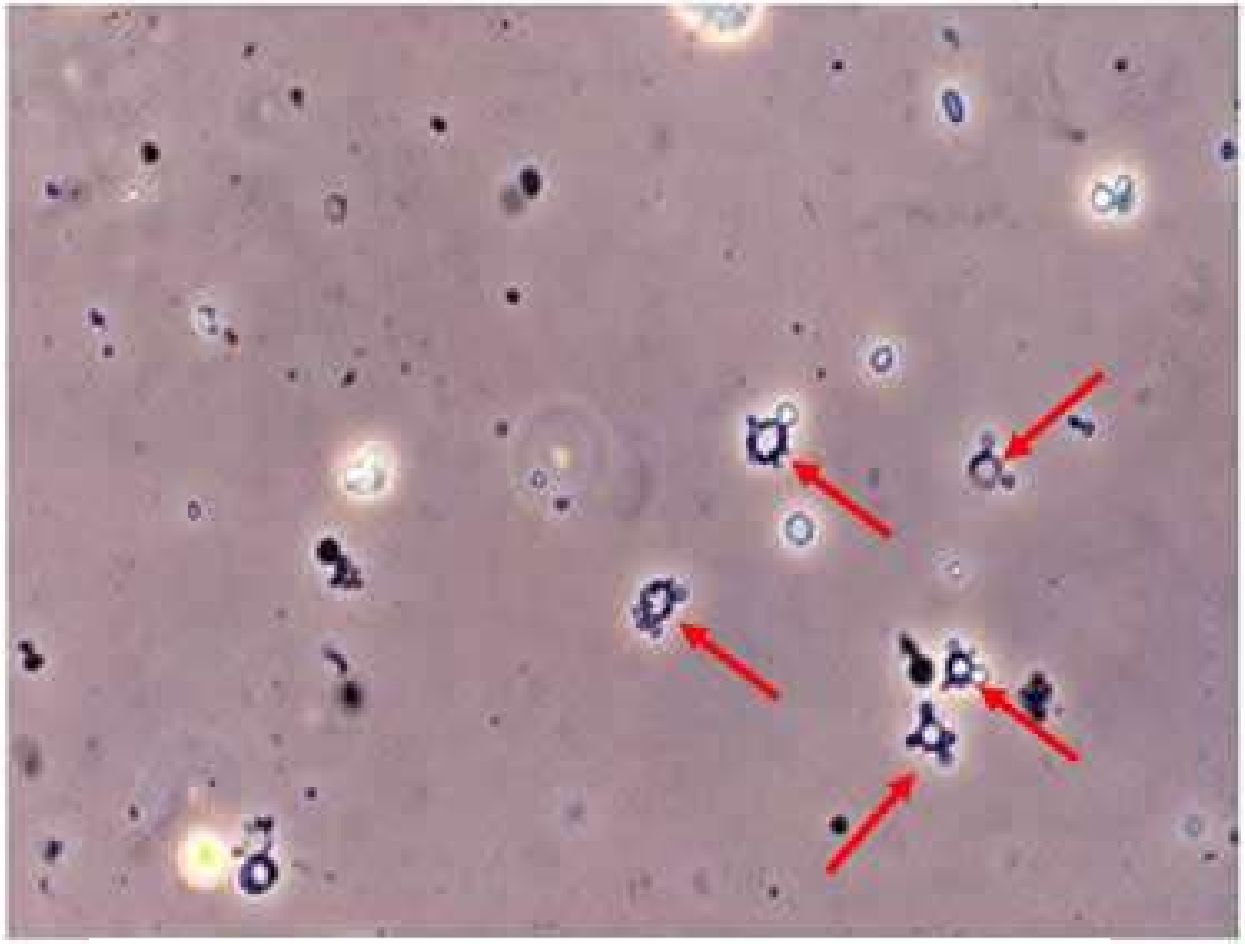
G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org

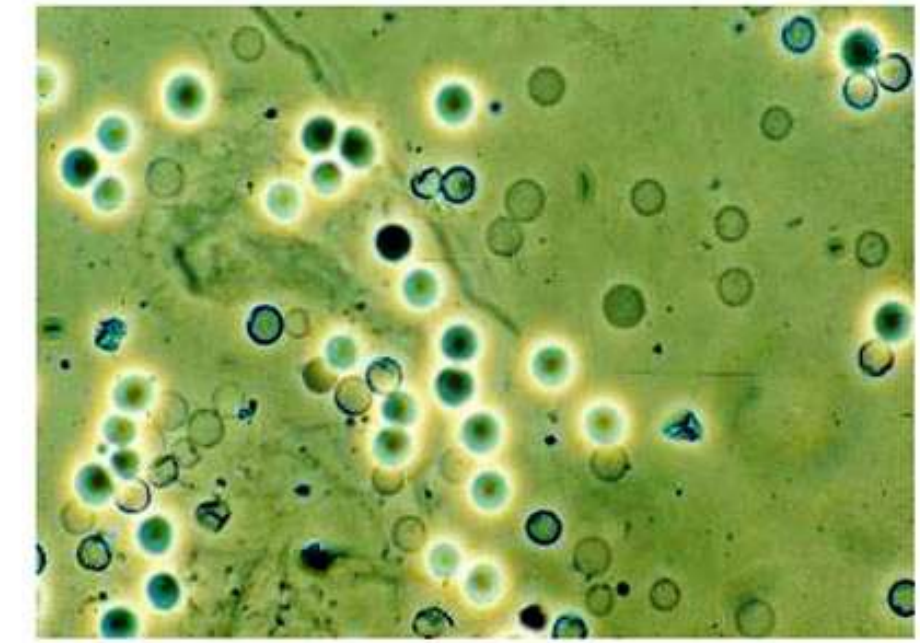


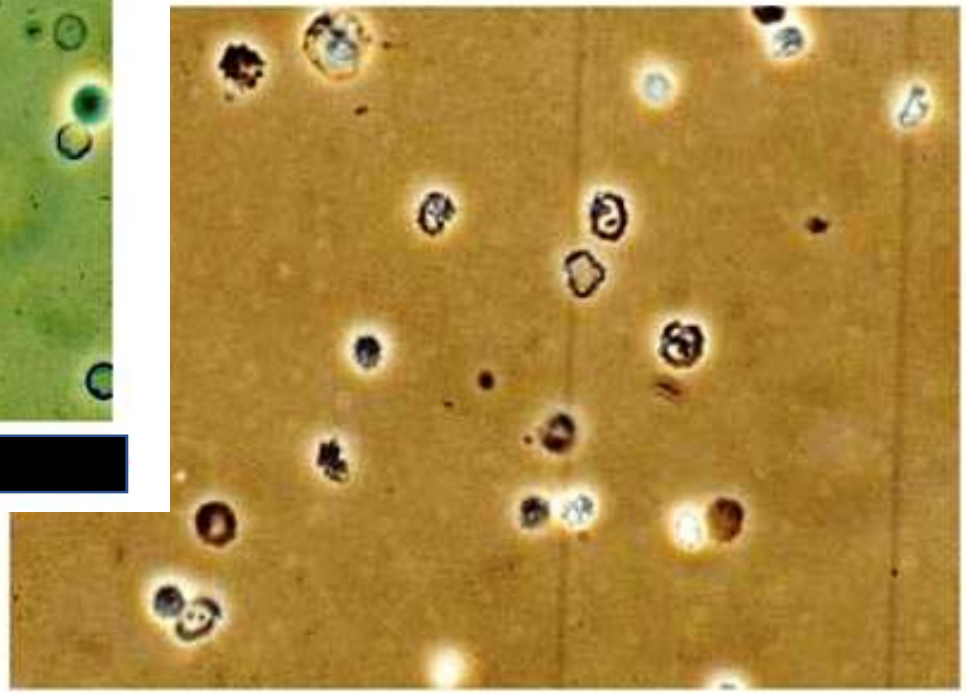
Eritrociti glomerulari



Ematuria glomerulare = Acantocituria







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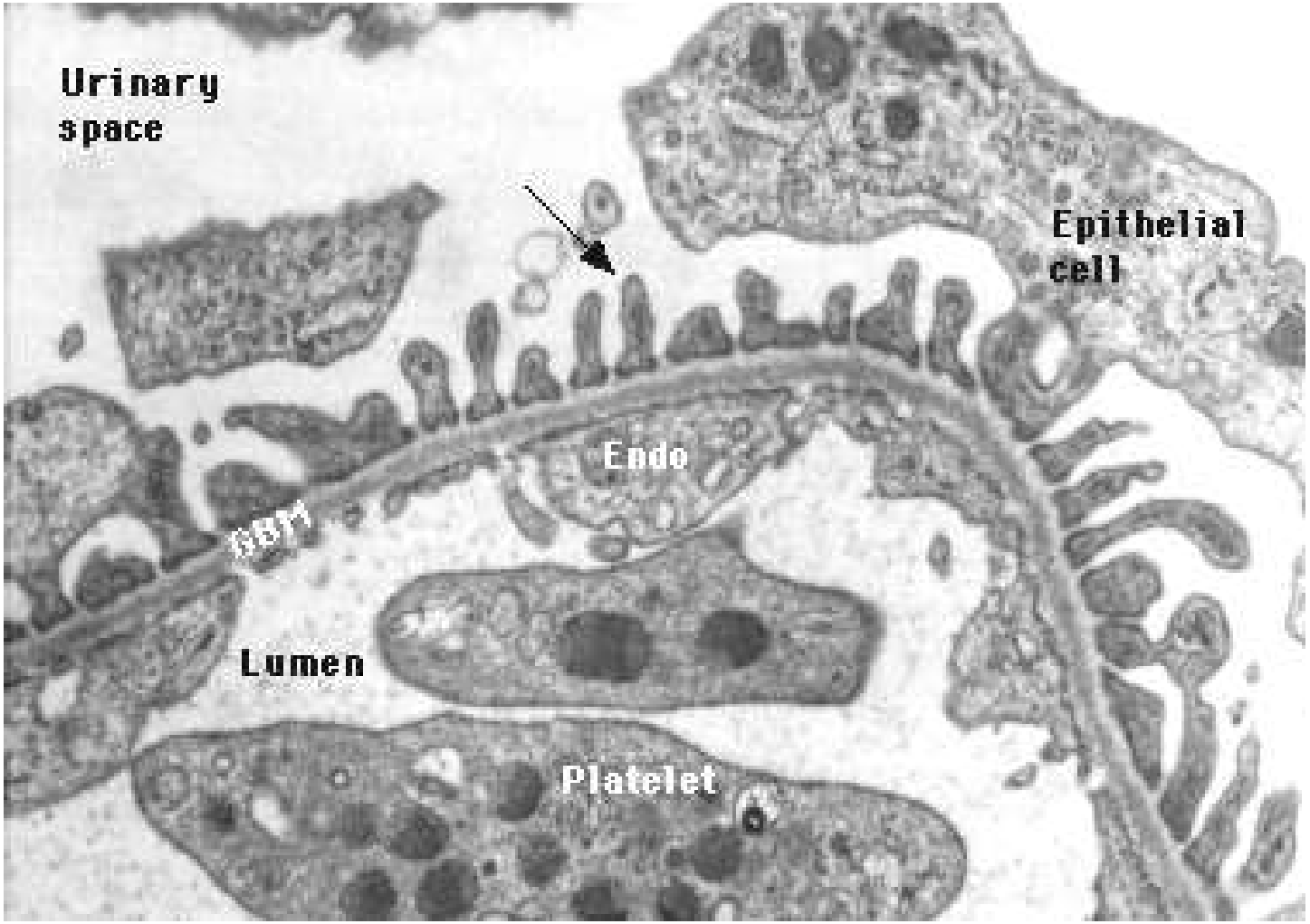
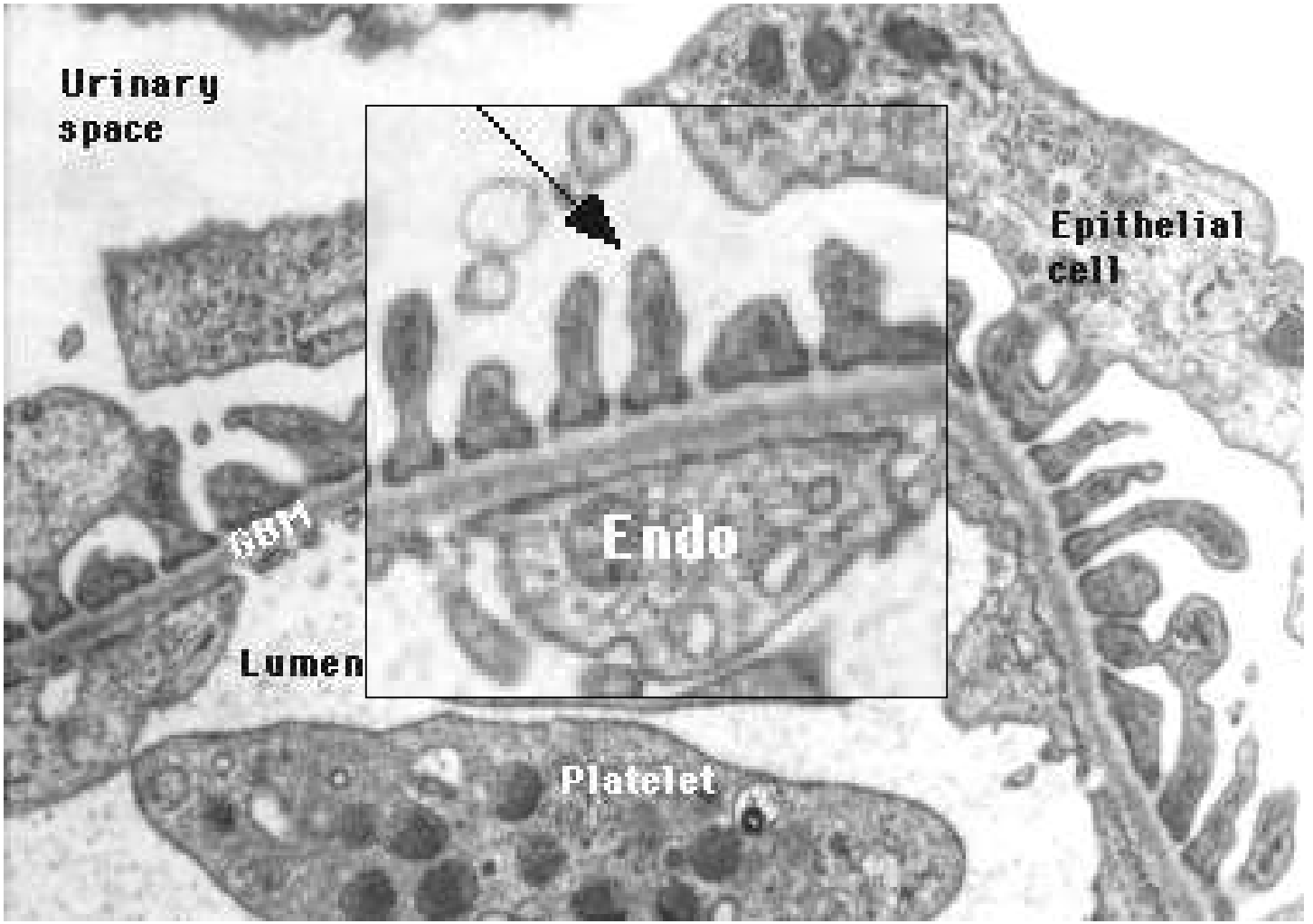
Eritrociti glomerulari; cosa succede ?



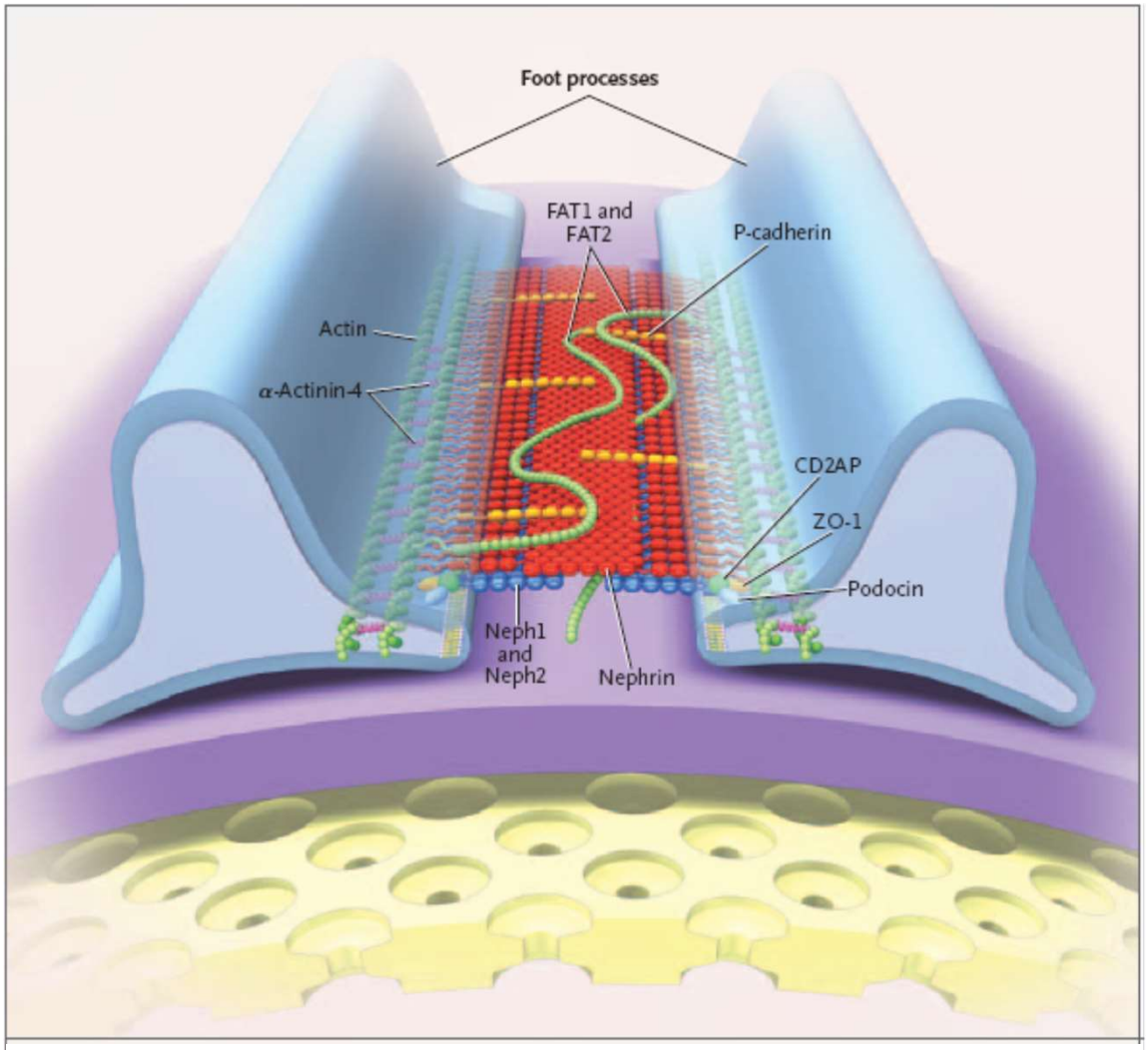
Tryggvason K. NEJM 2006;354:1387-1401.

Eritrociti glomerulari; cosa succede ?



Tryggvason K. NEJM 2006;354:1387-1401.

“ Slit diaphragma”; a zipper like structure



Tryggvason K. NEJM 2006;354:1387-1401.

Marker di ematuria glomerulare - specificità

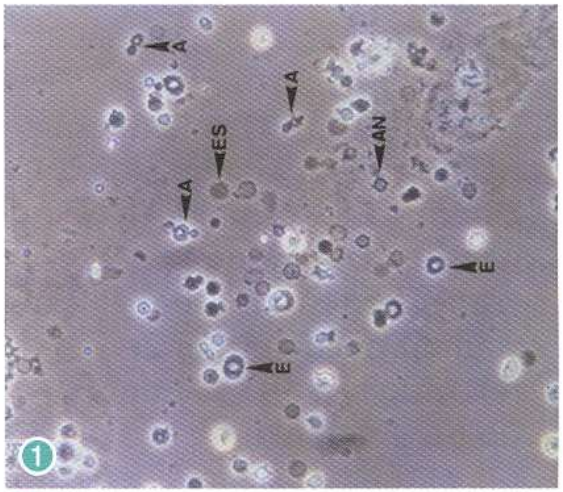
• Acantociti > 5%	88.3%
• Eritrociti dismorfi > 80%	4.7%
• “Pattern” misto	7%
• Cilindri eritrocitari	7%

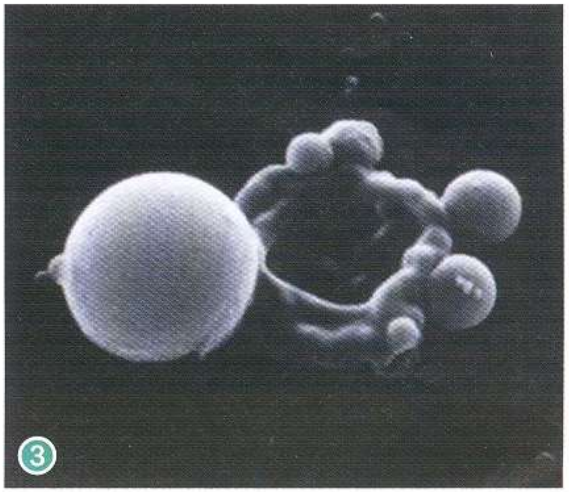
G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org

PERSISTENT ISOLATED MICROSCOPIC HAEMATURIA

?Nephrologist

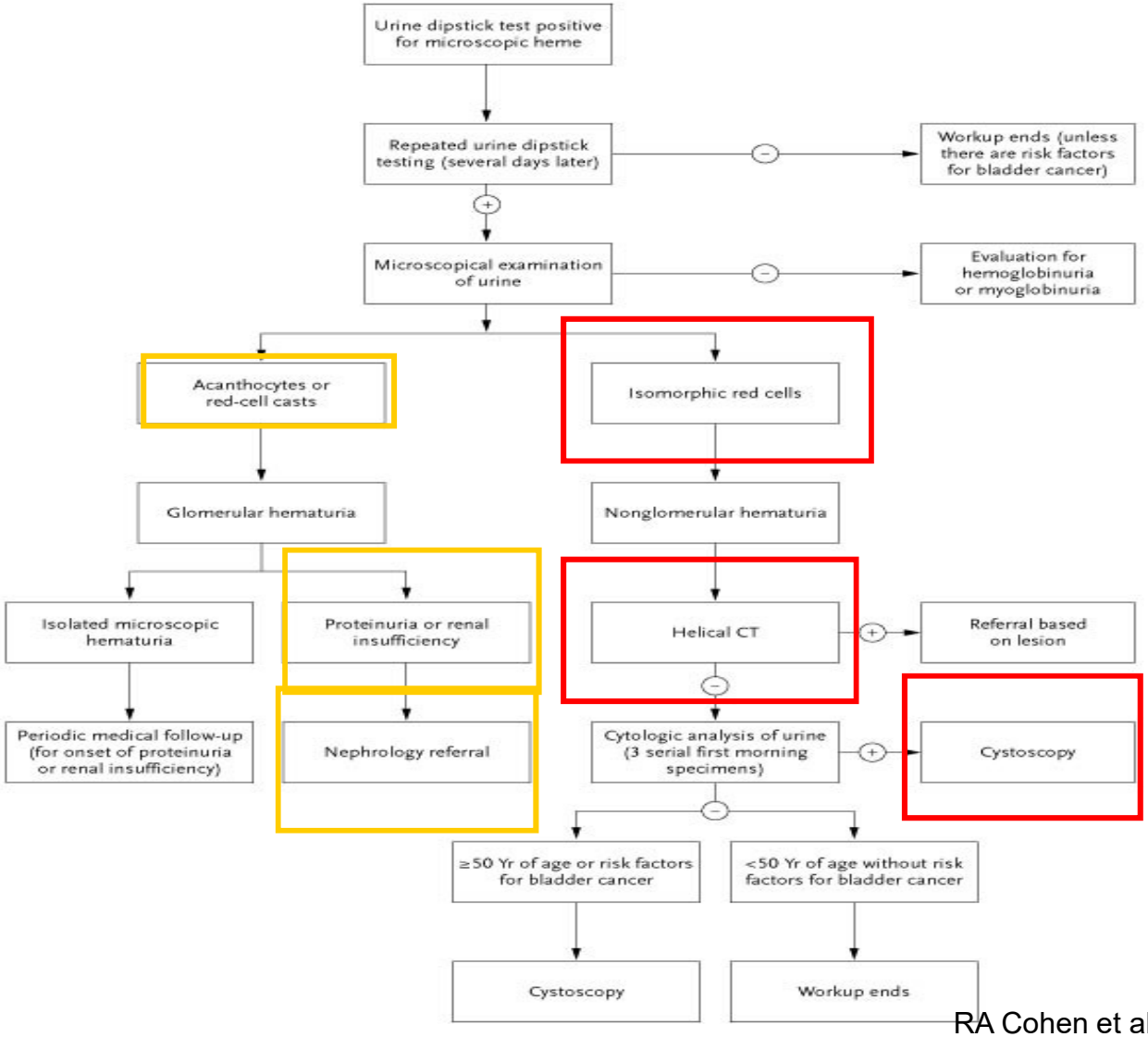
?Urologist



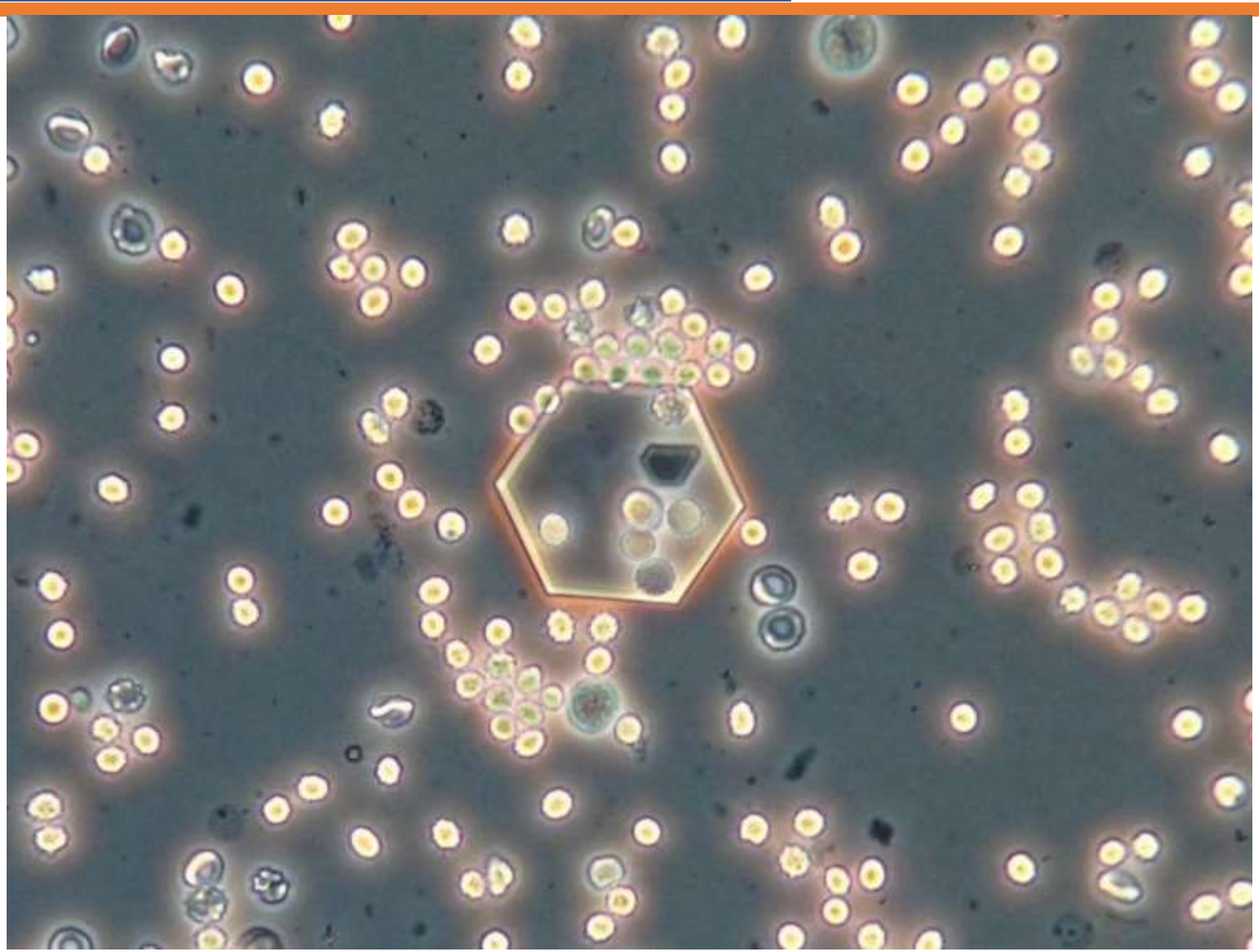



1 Beim Blick durch das Phasenkontrastmikroskop sieht man im Urinsediment Akanthozyten, kleine ringförmige Erythrozyten mit Ausstülpungen. Ein typischer Befund bei glomerulärer Nierenläsion. 2 Akanthozyten in höherer Vergrösserung. 3 Im Rasterelektronenmikroskop erkennt man, wie sich Erys verändern, wenn sie durch die Basalmembran gequetscht werden.

Ematuria; algoritmo decisionale



RA Cohen et al, N Engl J Med 2003



Swissnephro.org (Dr. Florian Buchkremer)

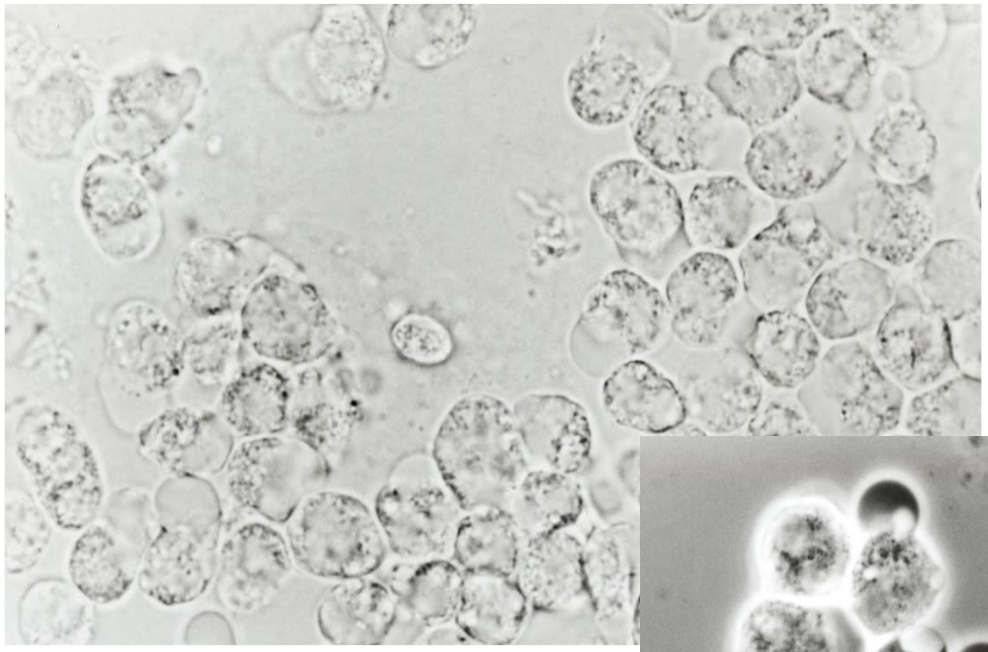
Ematuria glomerulare: cause

- Sindrome delle membrane basali fini
- nefropatia da IgA
- glomerulonefrite postinfeziosa (bambini)
- glomerulosclerosi focale segmentale (secondaria) o membranosa
- glomerulopatia secondaria (o primaria)
- sindrome di Alport (anamnesi famigliare linea maschile e ipoacusia)
- sindrome di Goodpasture (sindrome pulmo-renale)
- Vascolite

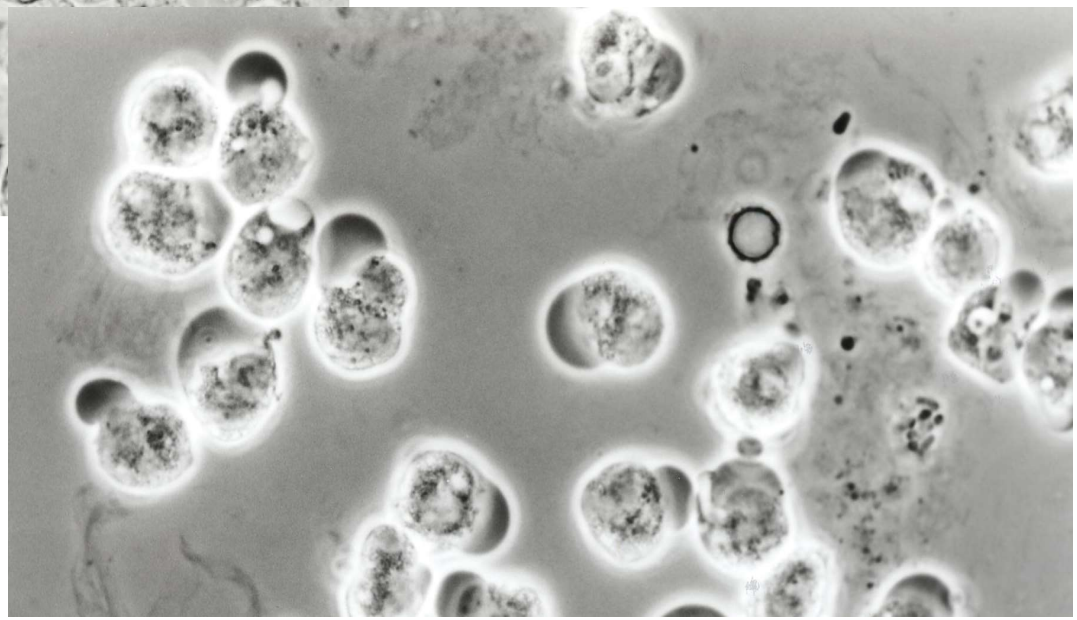
- Biopsia renale necessaria, ad eccezione se status clinico, funzione renale, restante sedimento e pressione arteriosa normali e assenza di proteinuria/albuminuria (sorveglianza regolare!).

Leucociti

Leucociti (100X)

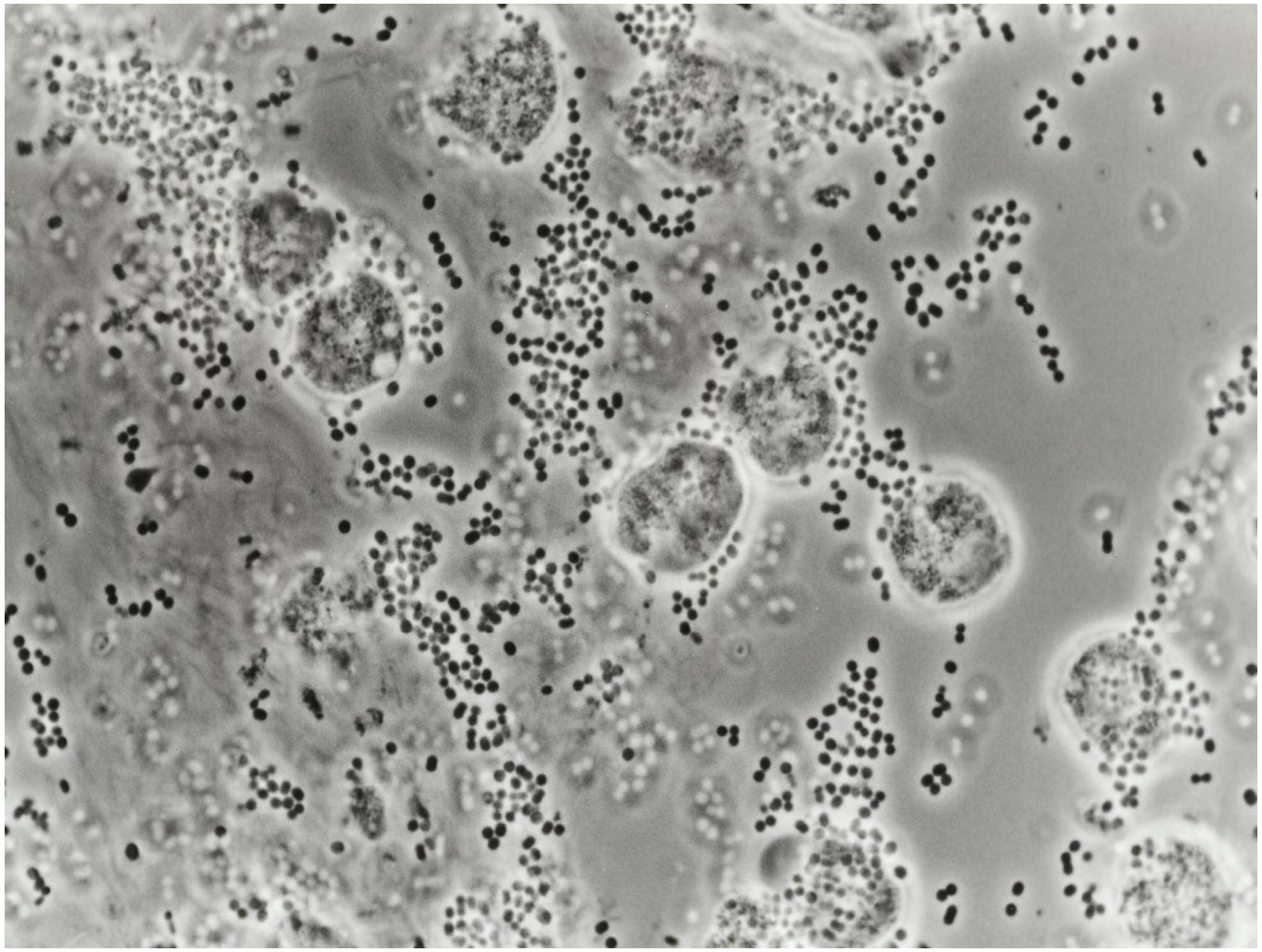


Microscopia ottica



Contrasto fase

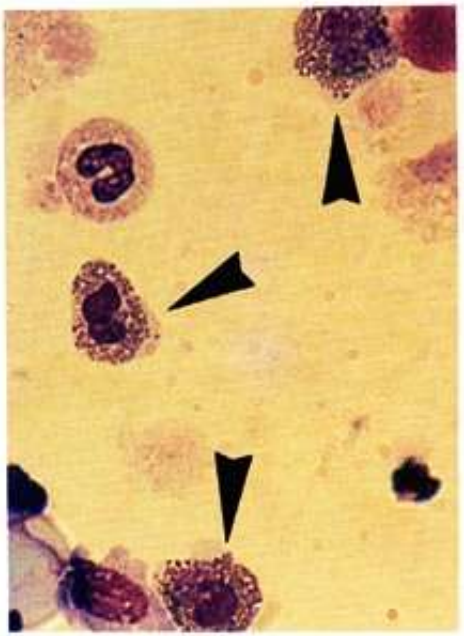
Polimorfonucleati



Leucocituria: cause

- Infezioni
- Nefrite interstiziale acuta
- Glomerulonefrite postinfeziosa

Eosinofili



EOSINOPHILS (BY MGG)

DISEASES ASSOCIATED WITH EOSINOPHILURIA

	URINE STAIN		
	N	HANSEL	WRIGHT
AIN	11	10	2
RPGN	10	4	4
Postinfectious GN	6	1	1
ATN	30	0	0
Acute pyelonephritis	10	0	0
Acute prostatitis	10	6	2

Nolan III RC et al: NEJM 1986;315:1516-19

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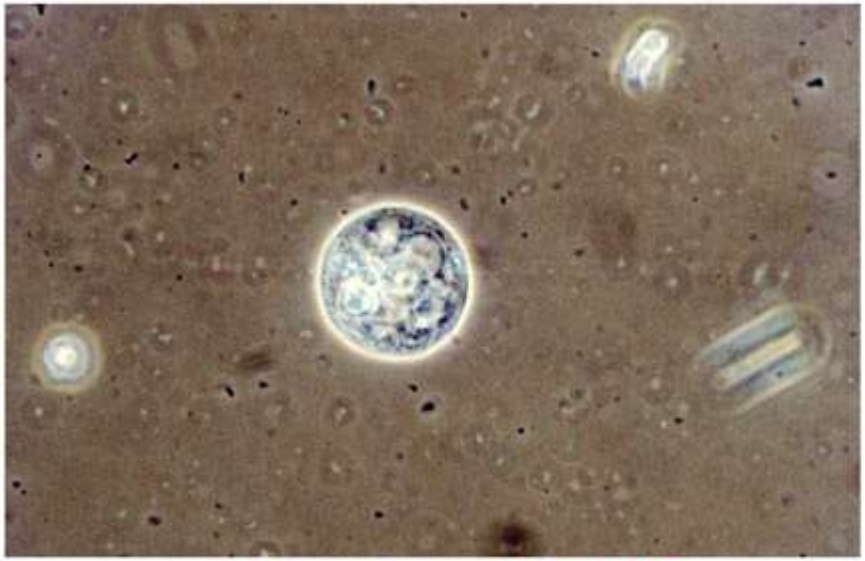
Macrofagi

GRANULAR MACROPHAGE



VACUOLAR MACROPHAGE

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Dm: 30-40 µm

Urosurf, University of Bern

Cilindri

CASTS

Formation	Distal tubules and collecting ducts
Matrix	Tamm-Horsfall glycoprotein
Different types	Different clinical meanings

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CLINICAL MEANING OF CASTS

WHATEVER PARTICLE IS CONTAINED IN A CAST COMES FROM THE KIDNEYS

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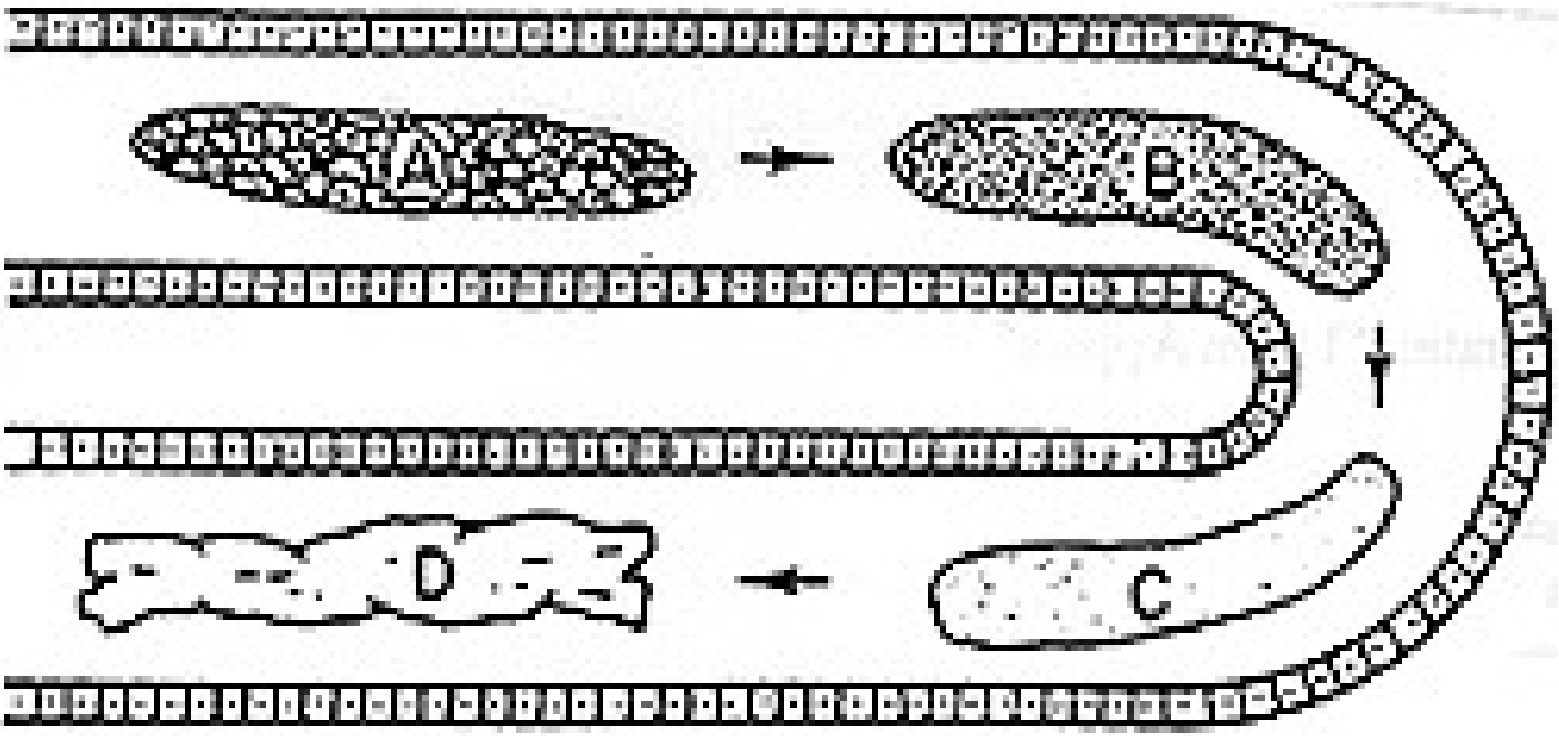
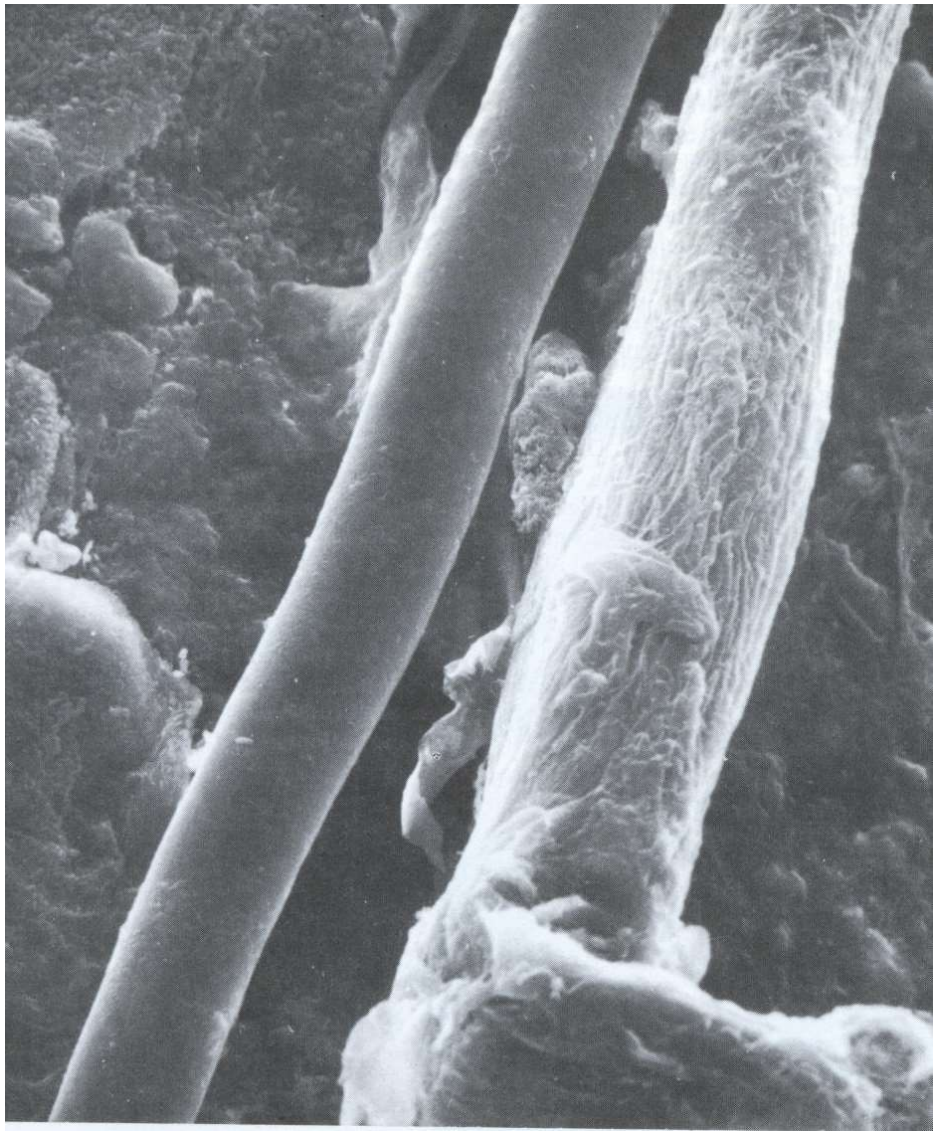


A = Cellular casts
B = Coarsely granular cast
C = Finely granular cast
D = Waxy cast Key:
A = Cellular casts
B = Coarsely granular cast
C = Finely granular cast
D = Waxy cast

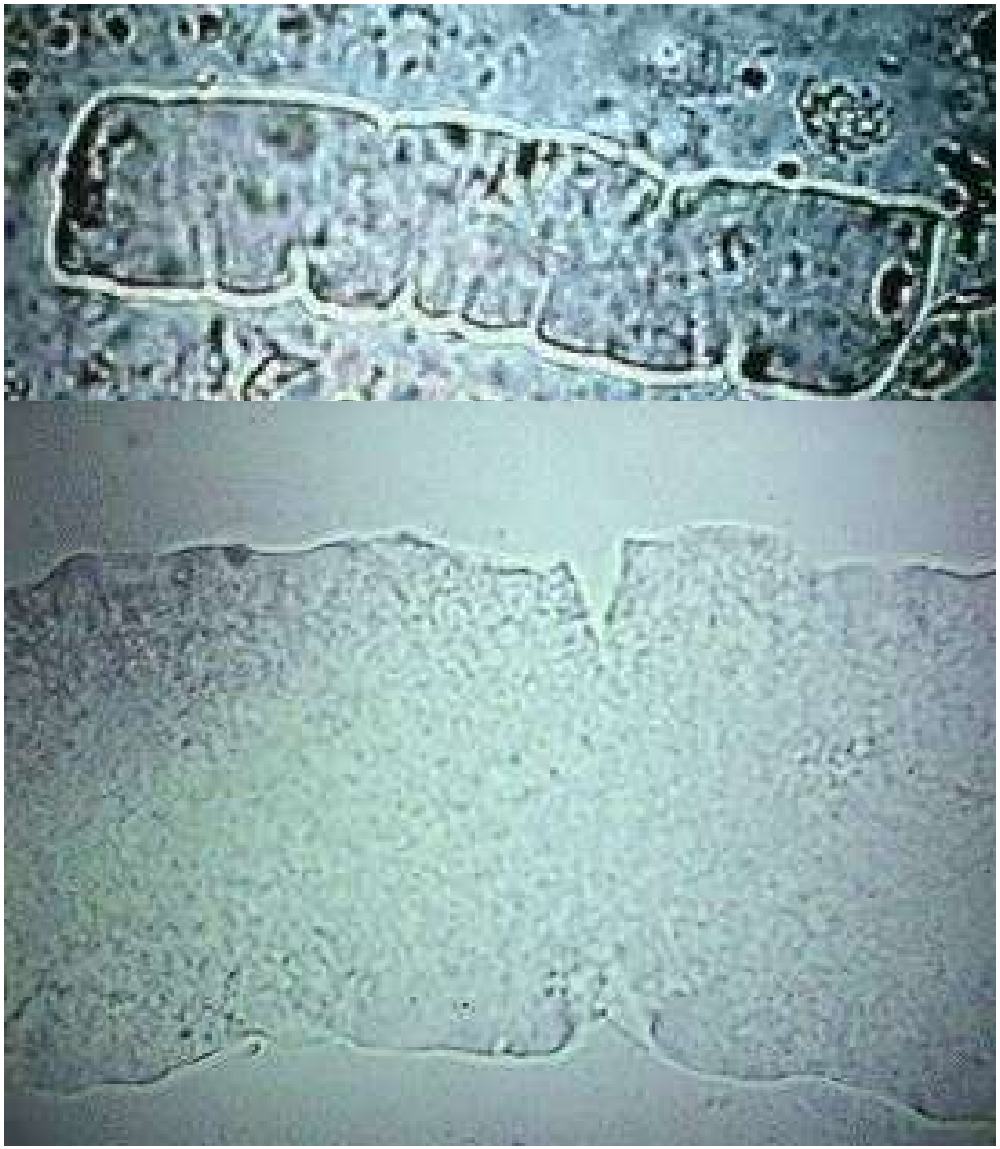
Cilindri ialini = normali



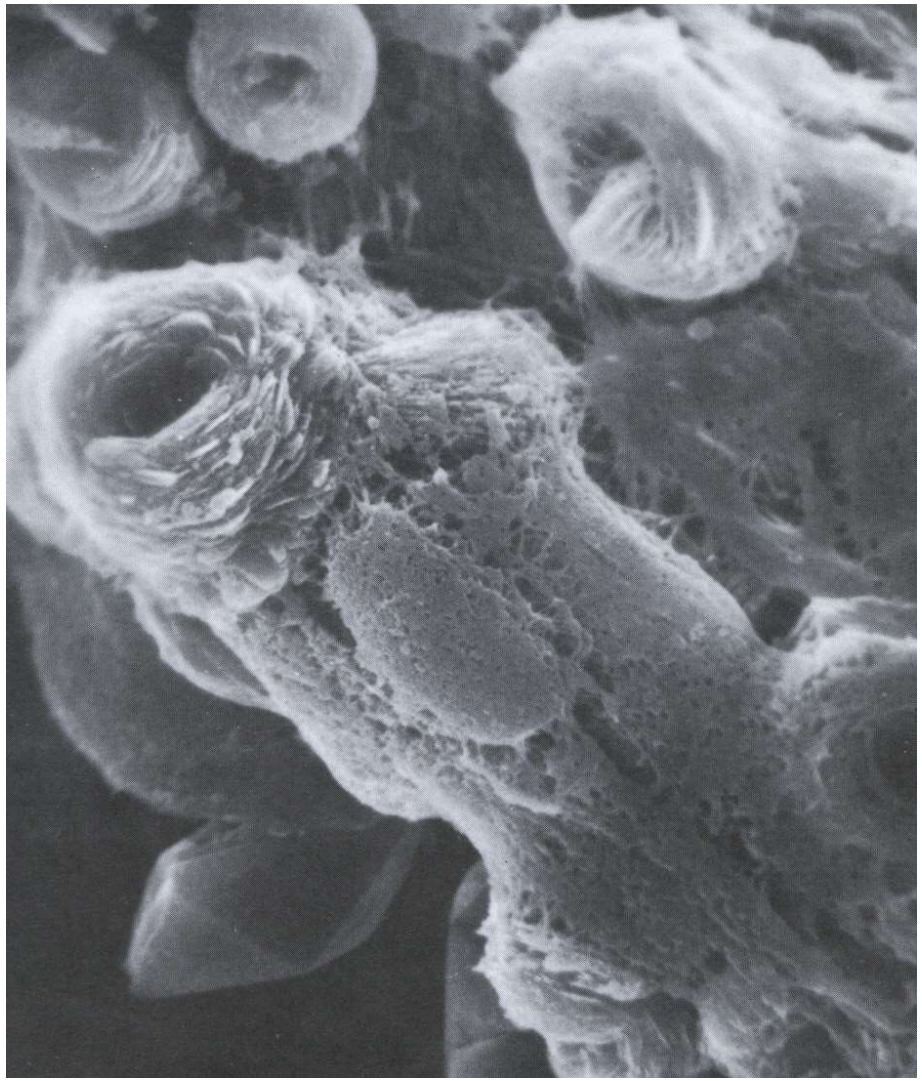
Cilindri ialini

Cilindri di cera ("Wachszylinder")

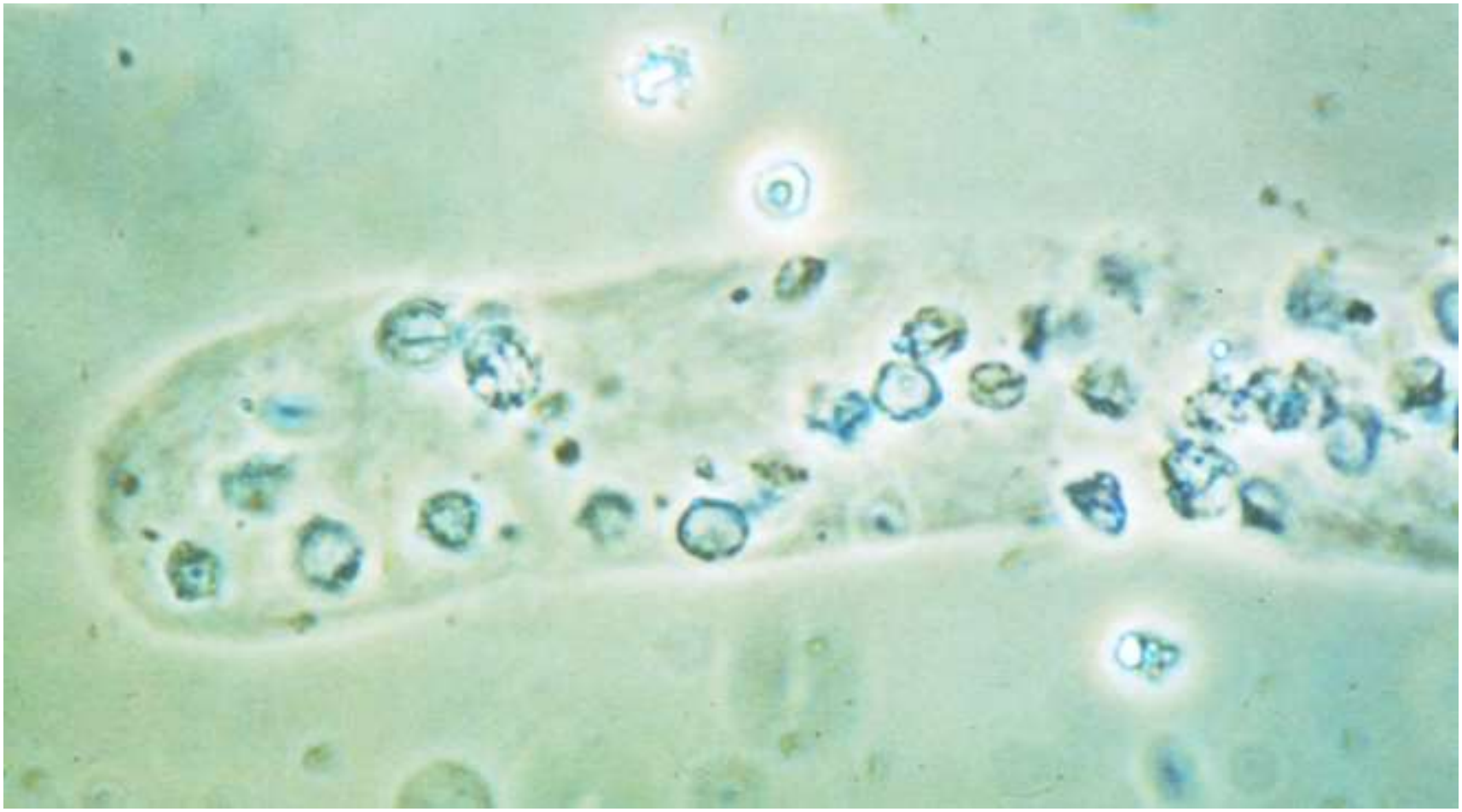
Malattia renale cronica



Cilindri eritrocitari



Cilindri eritrocitari



ERYTHROCYTE CAST

ERYTHROCYTE CASTS

- Rizzoni G. *et al*,1983:
  14/65 pts with various types of GN (22%)
- Rath B. *et al*,1990:
  38/100 samples from 77 pts with various types of GN (38%)
- Köhler H. et al,1991:
  35/143 pts with proven GN (24.5%)
- Van Der Snoek B.E. *et al*, 1994:
  36/42 pts with various types of GN (86%)

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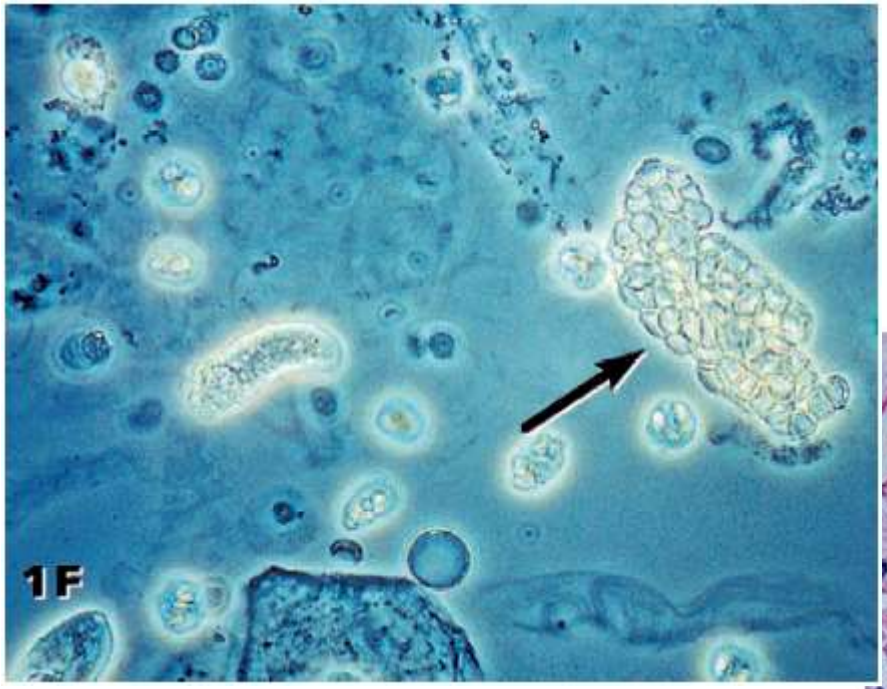
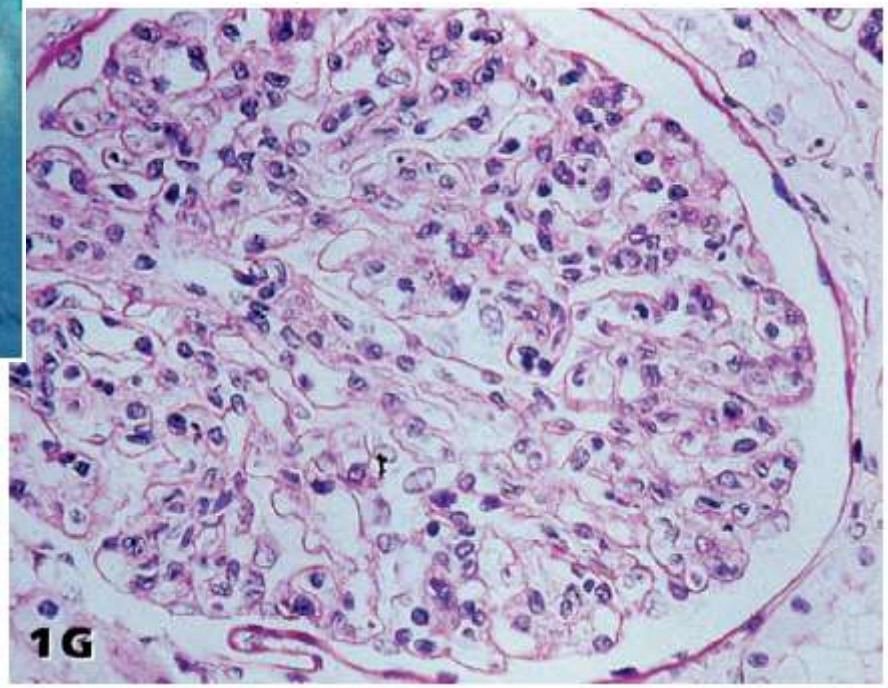
Esempio clinico I





Proliferative Glomerulonephritis nach Streptokokkeninfekt.

RP Wüthrich, Schweiz Med Forum, 2001

Esempio clinico II

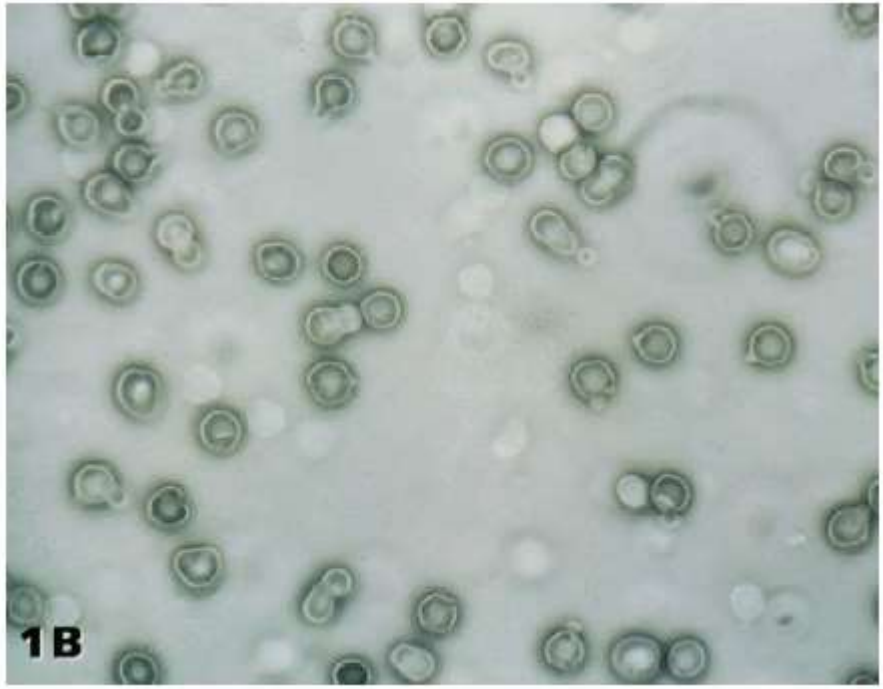


Abbildung 1B.
Zahlreiche dysmorphe Erythrozyten sind in diesem Sediment mit Mikrohämaturie erkennbar.

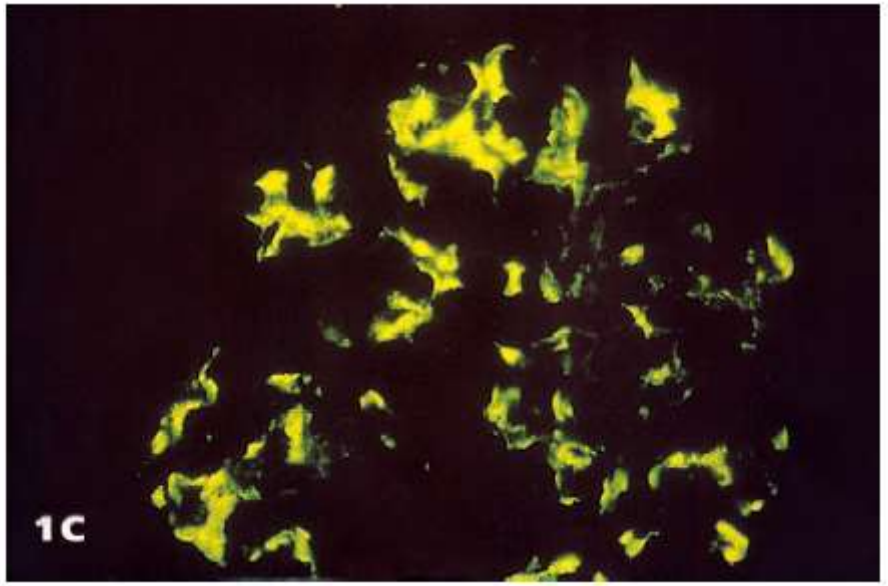
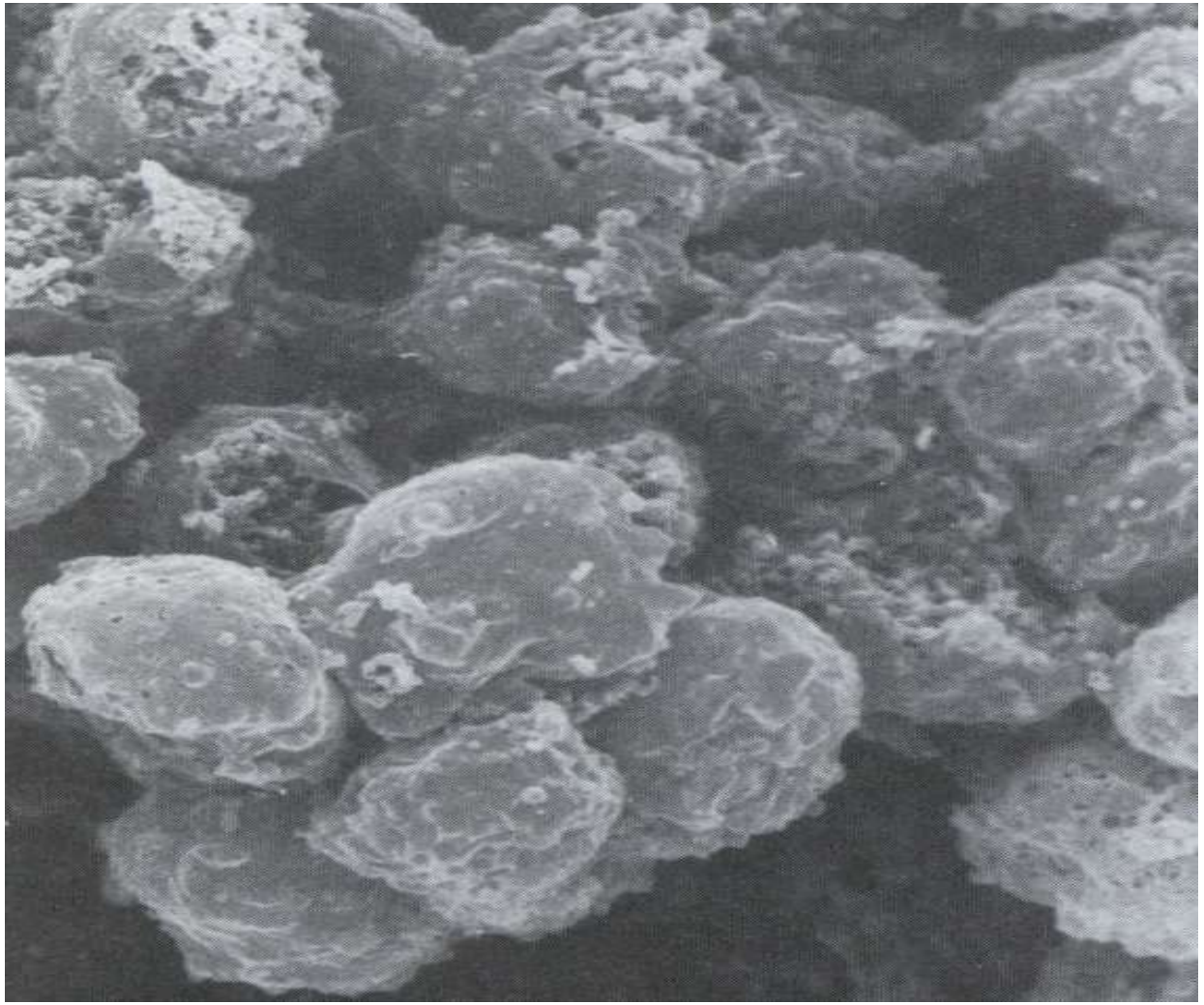


Abbildung 1C.
Immunfluoreszenzfärbung für IgA. Zahlreiche mesangiale Immunkomplexe sind in diesem Glomerulum erkennbar (IgA-Nephritis).

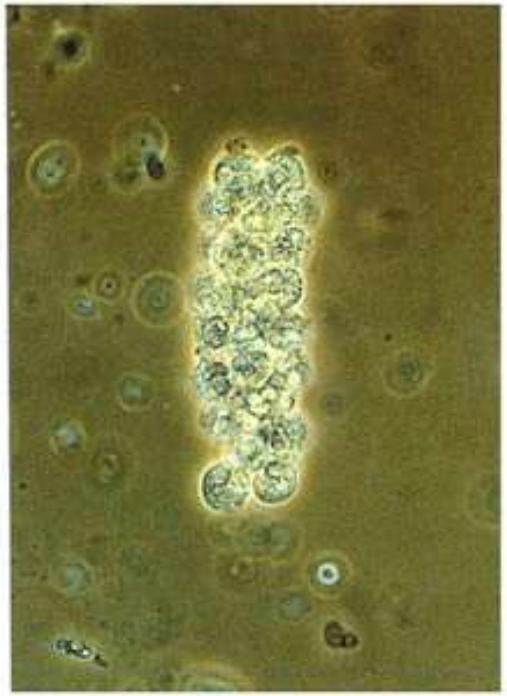
RP Wüthrich, Schweiz Med Forum, 2001

Cilindri leucocitari

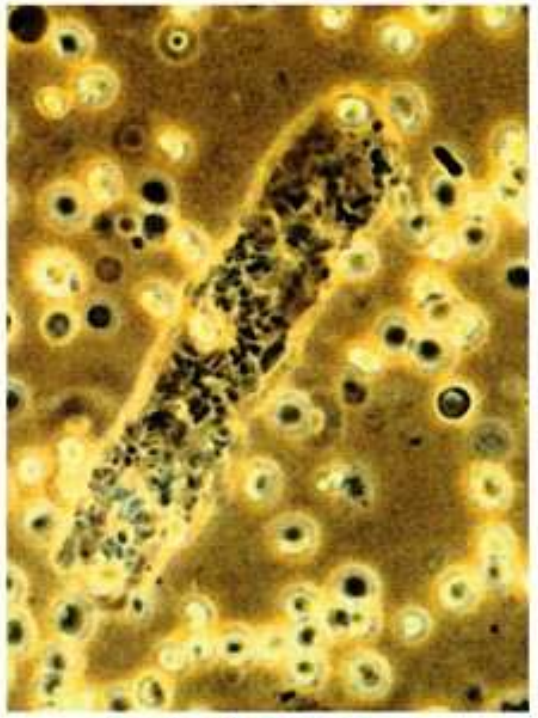


Cilindri leucocitari ?

Cilindri leucocitari ?



LEUKOCYTE CAST



BACTERIAL CAST

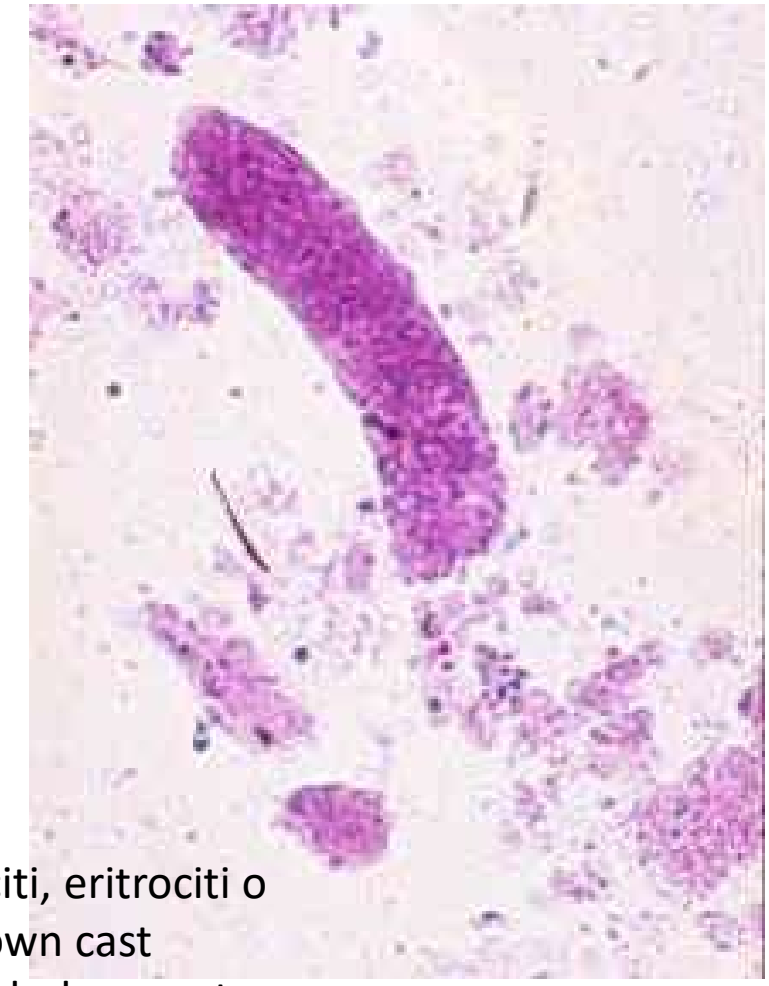
G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org

Cilindri leucocitari ?

Typischer Leukozytenzylinder (Sternheimer-Malbin-Färbung) als Hinweis auf eine in der Niere lokalisierte Infektion (Pyelonephritis).

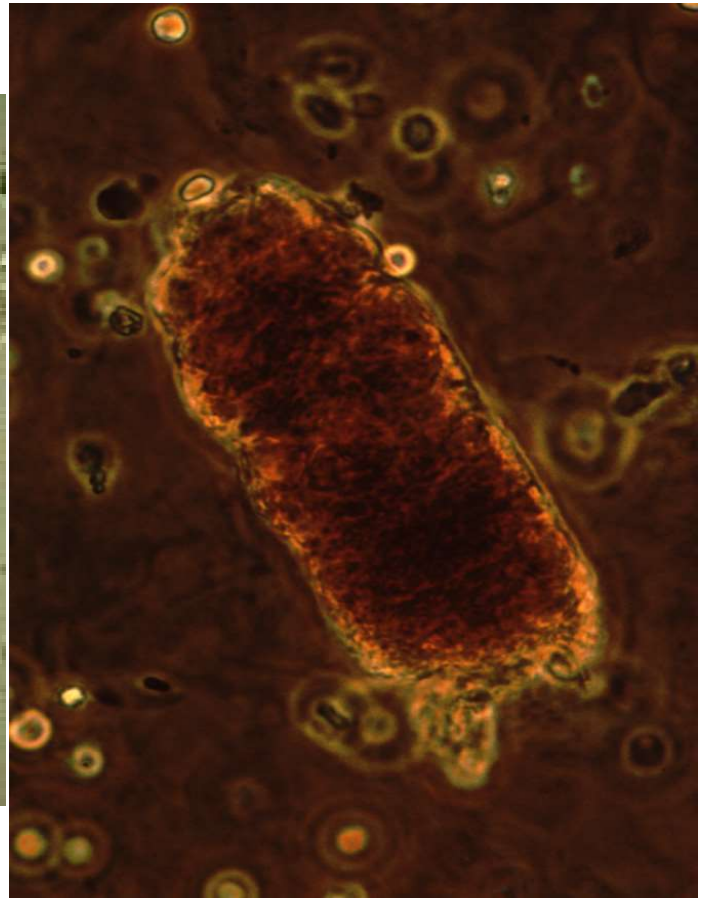
RP Wüthrich, Schweiz Med Forum, 2001

Cilindri granulati



Cilindro degenerato (leucociti, eritrociti o epiteli tubulari); muddy brown cast suggeriscono una necrosi tubulare acuta

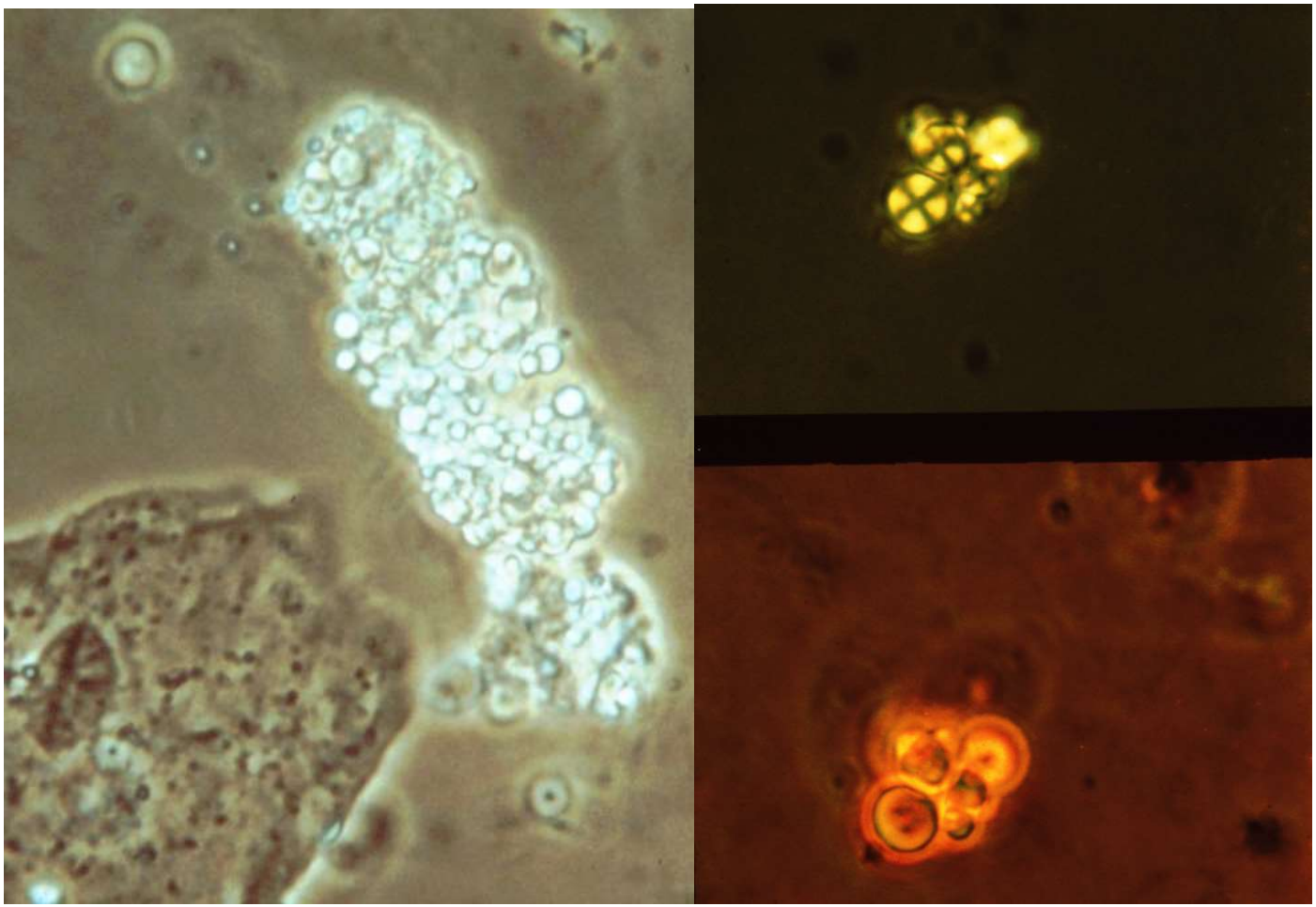
Cilindri pigmentati



Contengono: emoglobina (emolisi intravasale), mioglobina (rabdomiolisi) o bilirubina (insufficienza epatica acuta) o medicamenti

AJKD, Urine Sediment Examination in the Diagnosis and Management of Kidney Disease: Core Curriculum 2019; https://www.ajkd.org/article/S0272-6386(18)30873-4/fulltext

Cilindri di lipidi

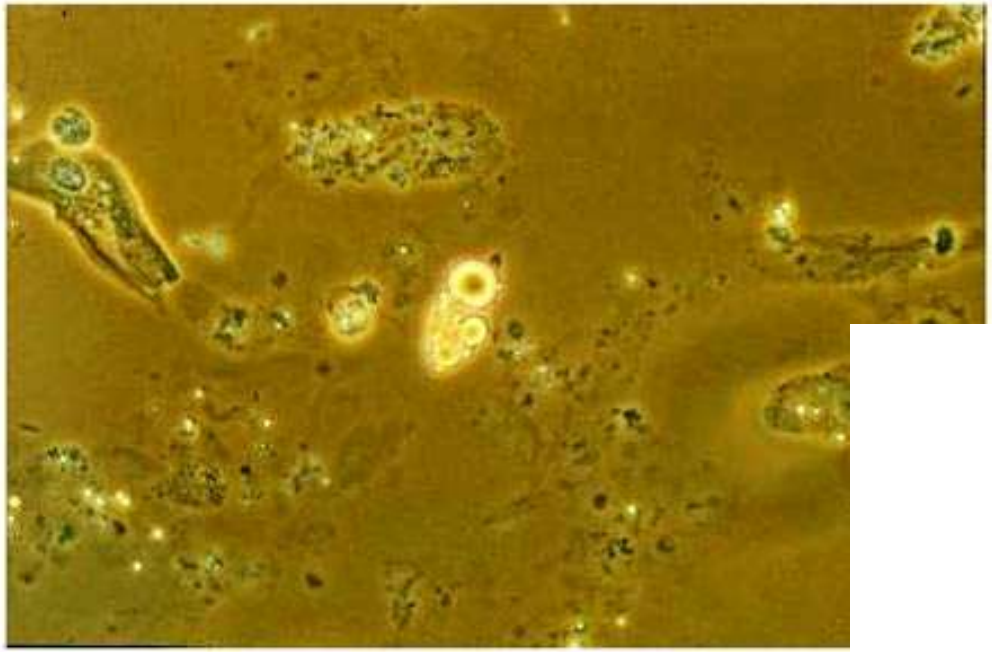


URINARY LIPIDS

Clinical meaning

- Marked proteinuria
- Lipid storage diseases (eg, Fabry disease)

G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org



G.B. Fogazzi. HANDS-ON COURSE BEDSIDE URINARY MICROSCOPY (2007). LECTURES SERIES URINARY SEDIMENT: Part 1-5. http://www.ndt-educational.org

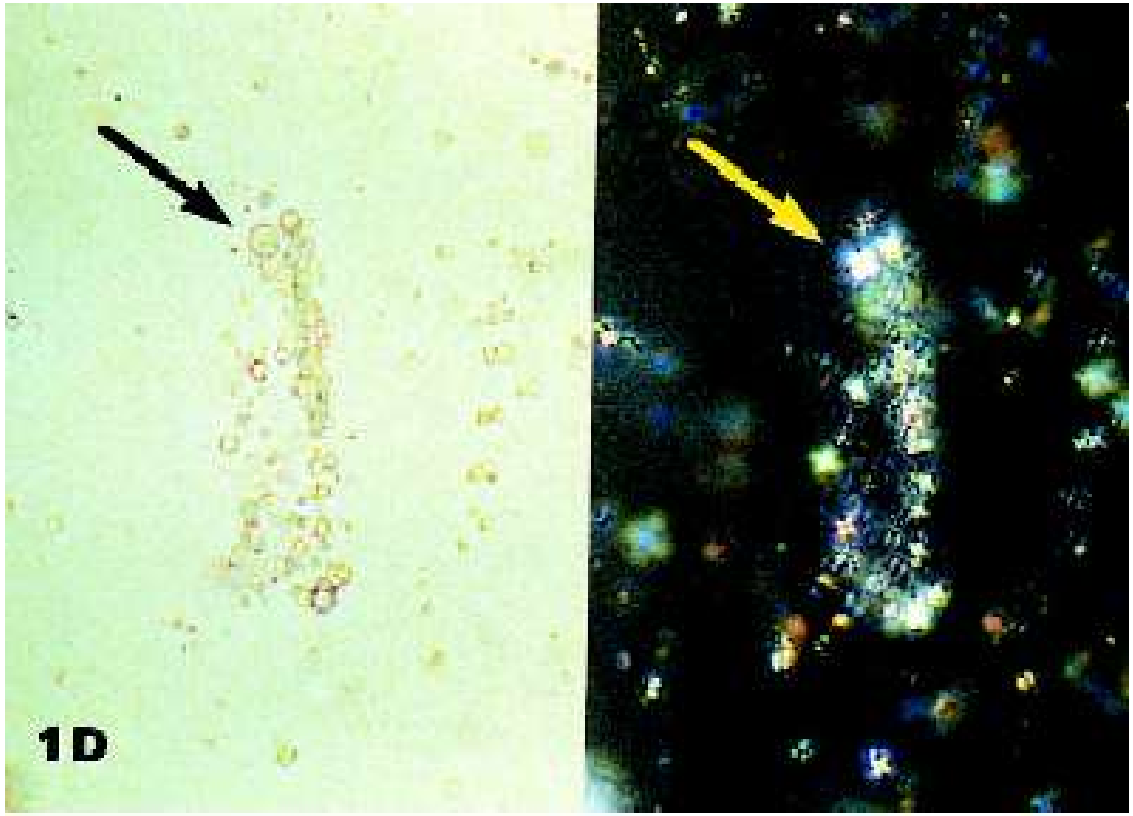


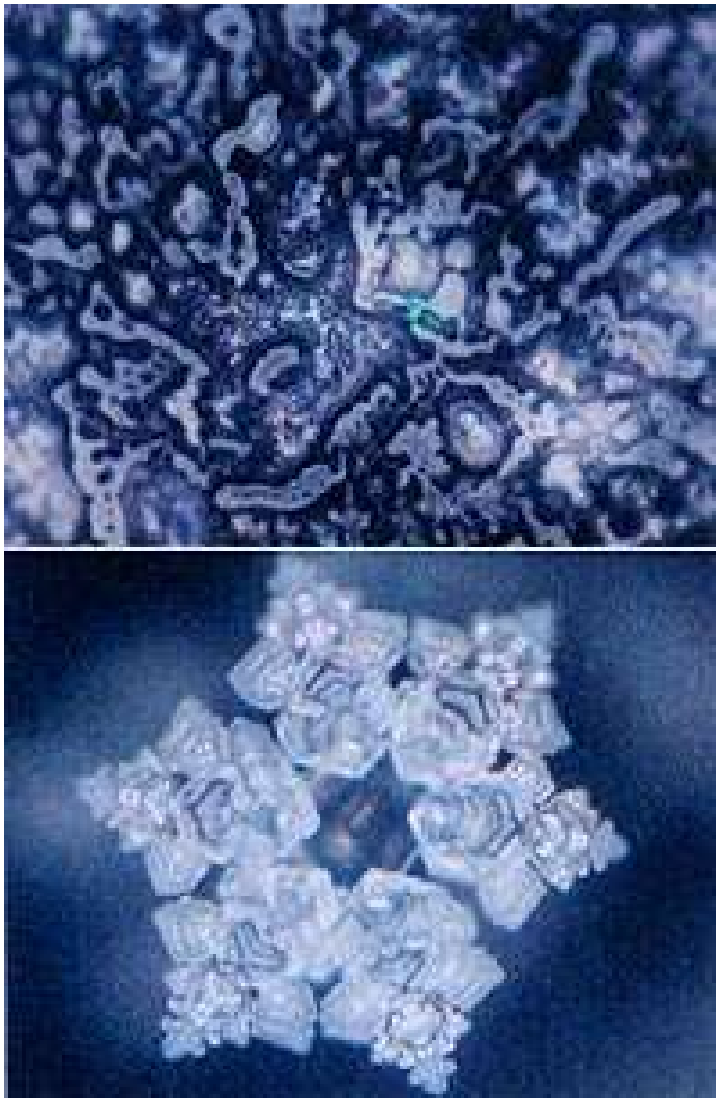
Abbildung 1D.
Nephrotisches Sediment, charakterisiert durch fehlende Erythrozyten und Leukozyten. Zahlreiche Fetttröpfchen und ein hyaliner Zylinder mit Fetttröpfchen sind erkennbar (Pfeil). Im polarisierten Licht (rechts) stellen sich die Fetttröpfchen als Malteserkreuze dar (Pfeil).

RP Wüthrich, Schweiz Med Forum, 2001

Sommario

Site of injury	indicated by
Glomerular	*Signs of glomerular hematuria*
	Dysmorphic red blood cells (RBCs)
	RBC casts
	Hemoglobin casts
	Signs of higher grade proteinuria
	Lipid droplets
	Lipid casts
	Oval fat bodies
	Cholesterol plates
	Waxy casts
Tubulointerstitial	*Signs of tubular cell injury*
	Renal tubular epithelial (RTE) cells
	RTE cell casts
	Granular casts (incl. 'muddy brown')
	Signs of inflammation
	Leucocytes
	Leucocyte casts
	Waxy casts
	Crystals
Urinary tract	RBCs (non-dysmorphic)
	Leucocytes
	Bacteria
	Fungi
	Urothelial cells

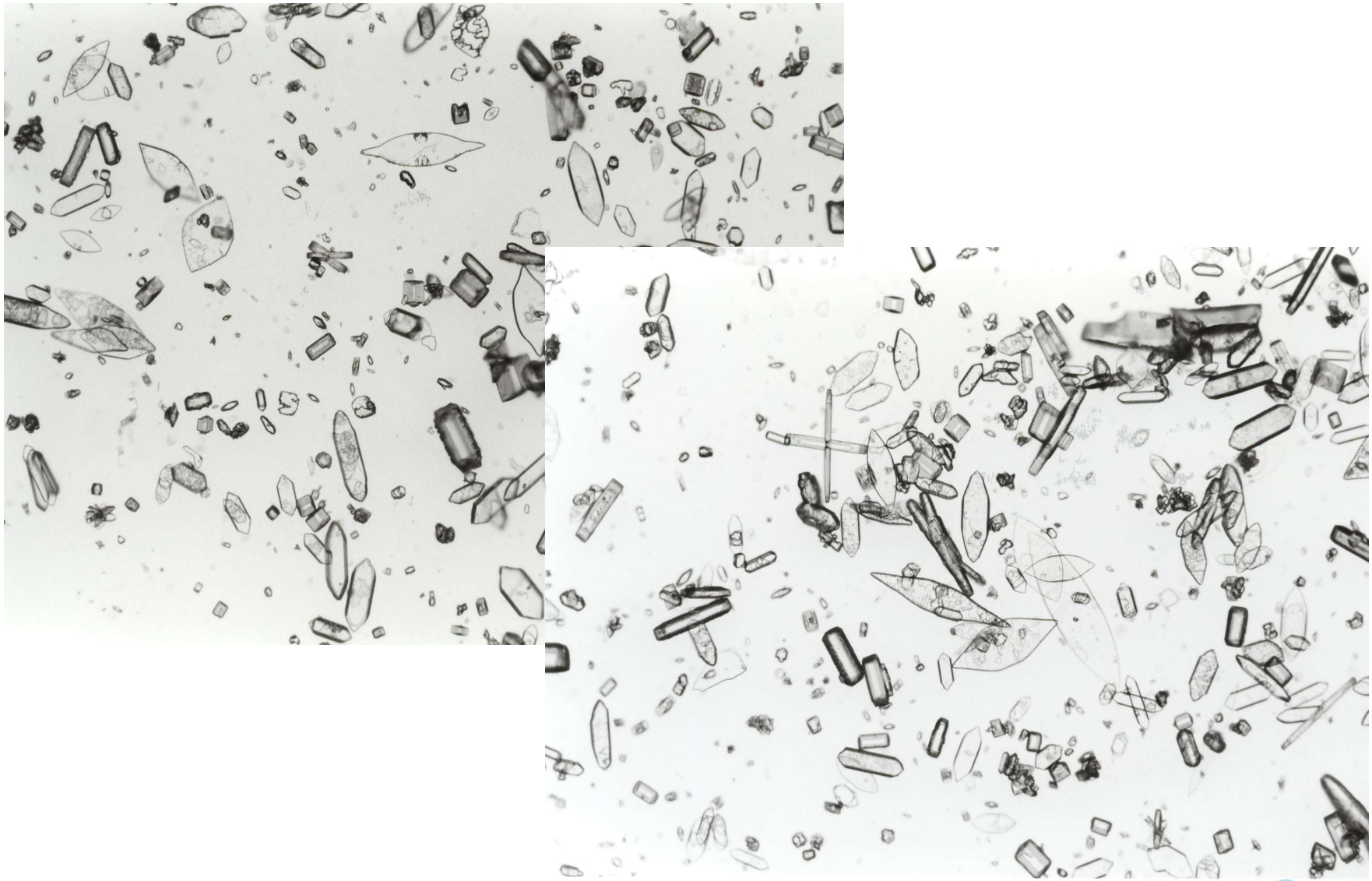
Cristalli

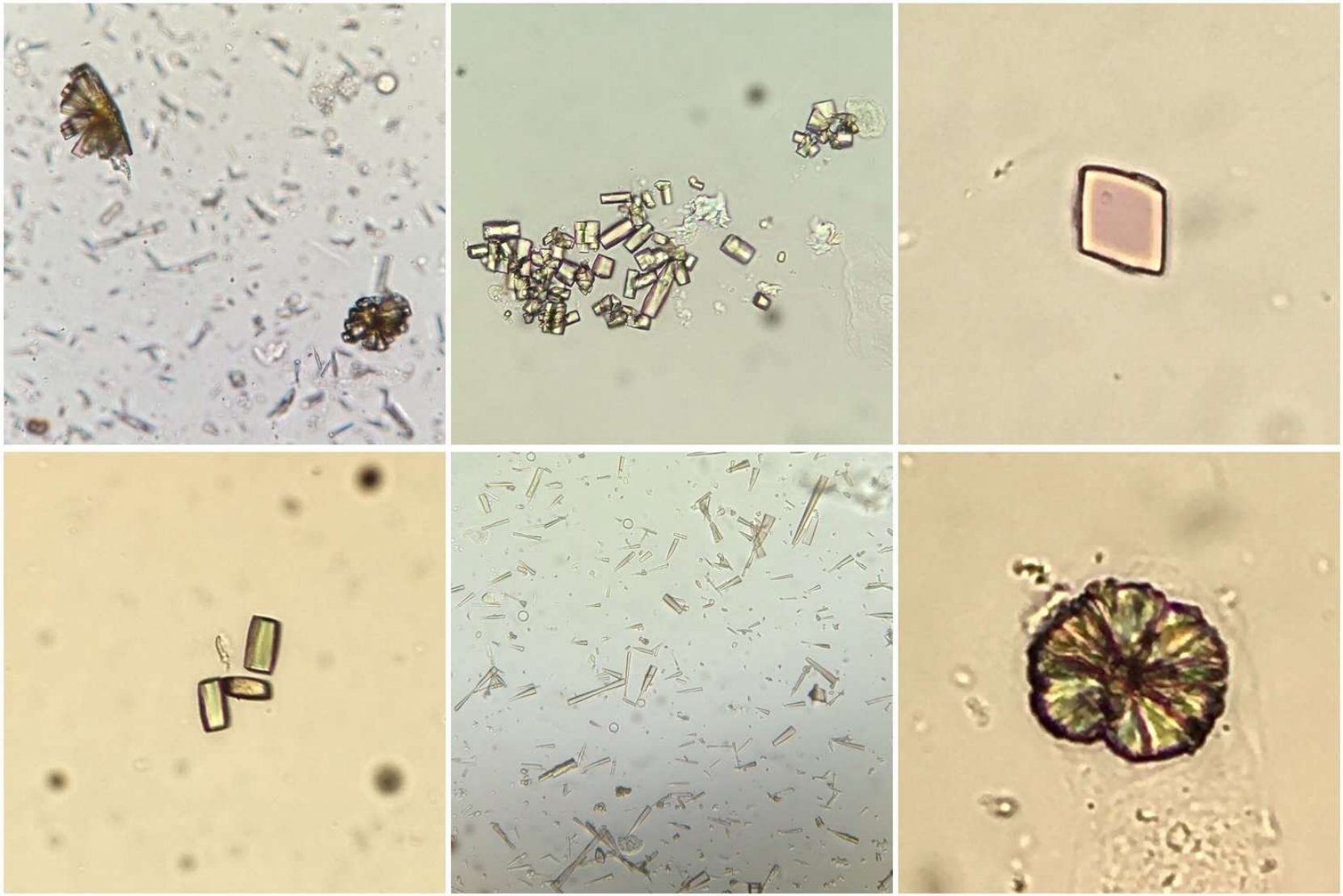


Ognuno di noi produrrà nelle prossime 24 ore
10 mio di cristalli urinari

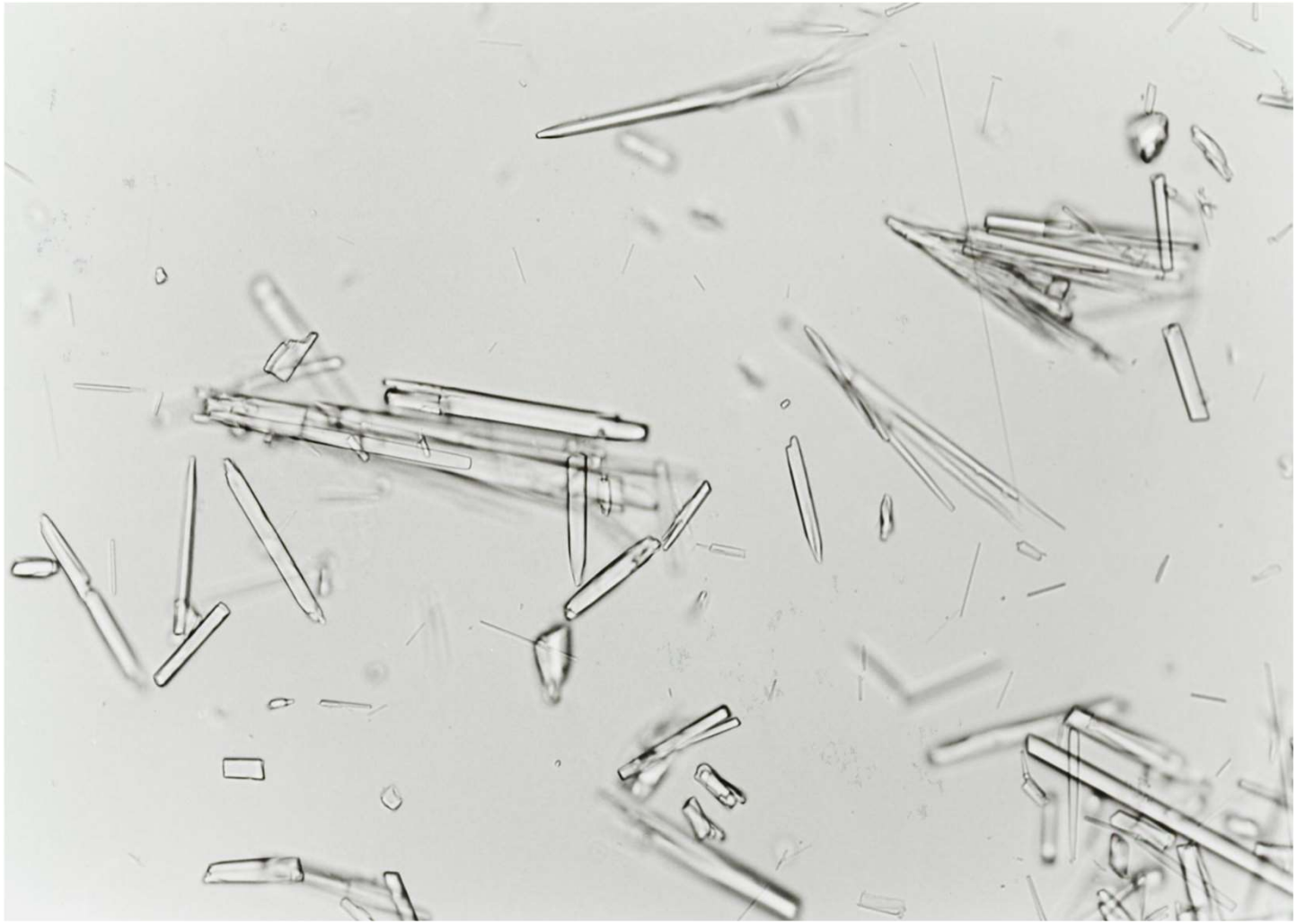
Cristalli

- Cristalli “comuni”
- Cristalli “patologici”
- Cristalli “medicamentosi”



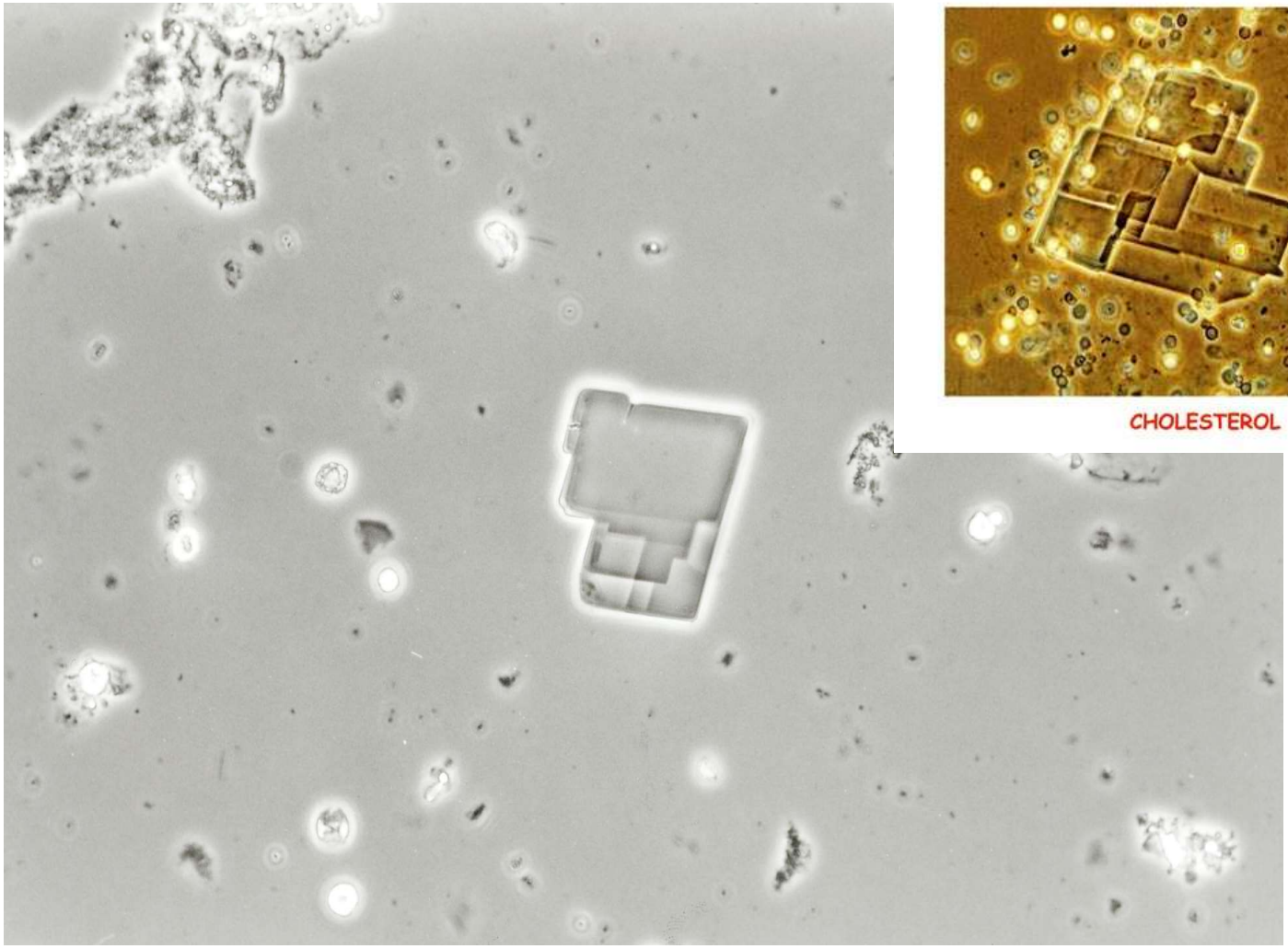


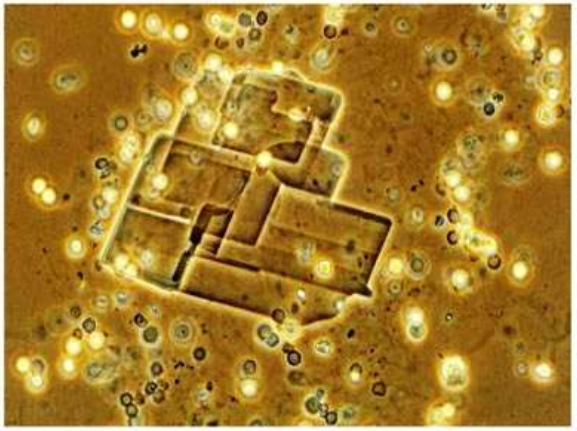
Swissnephro.org (Dr. Florian Buchkremer)

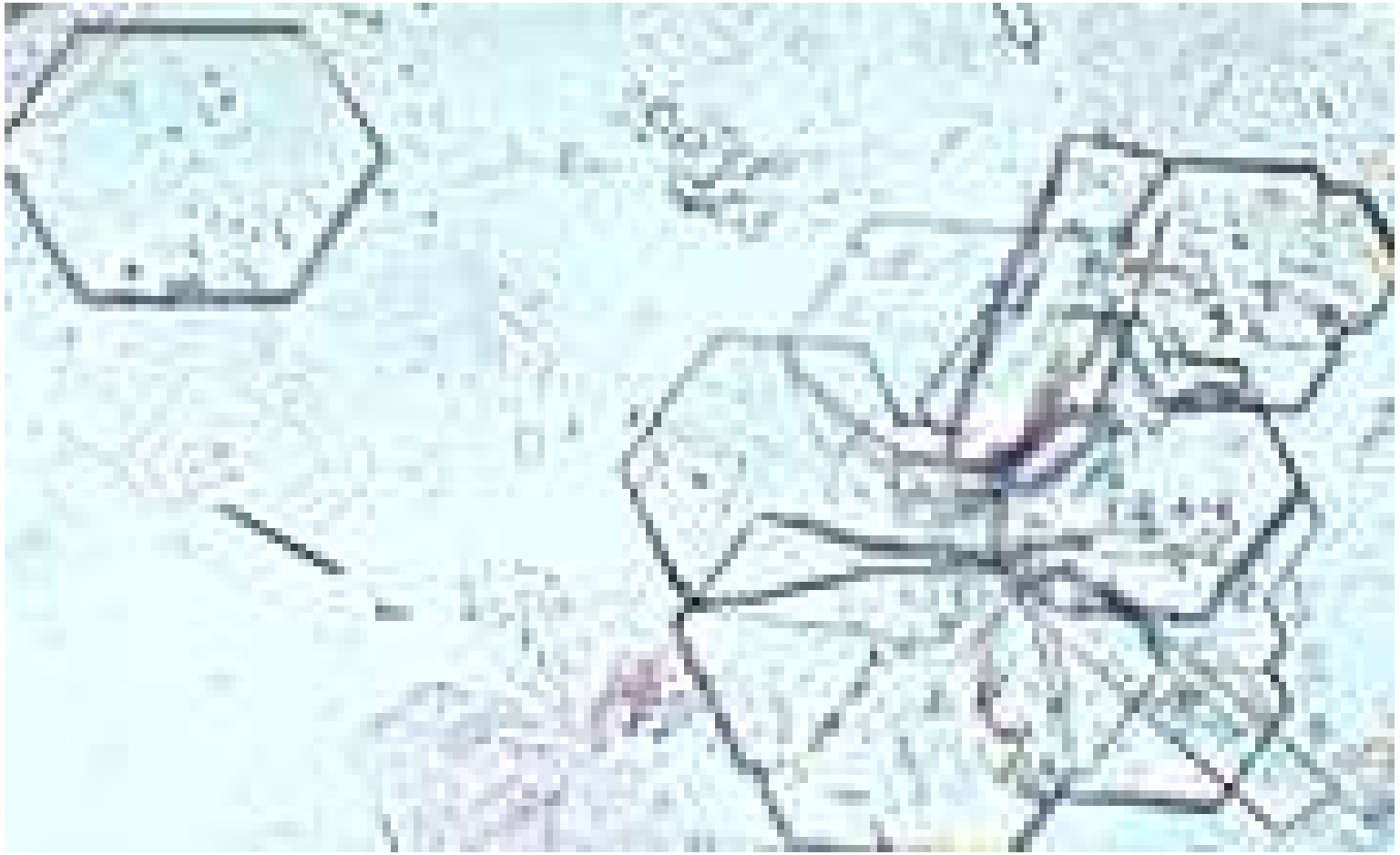


Infezione con batteri che produco ioni ammonio grazie ad ureasi (proteus, pseudomonas, klebsiella, stafilococco)

Cristalli “patologici”: Colesterolo







Cristalli “medicamentosi”

- Fattori predisponenti
  - Disidratazione
  - Ipoalbuminemia
  - Dosaggio tossico
  - pH urinario

Crystalluria ? : “Think of a drug”

G.B. Fogazzi, S.Verdesca. AN ALBUM OF URINARY MICROSCOPY IMAGES IN A CLINICAL CONTEXT(2008): Part I-VI http://www.ndt-educational.org

- Sulfadiazine
- Amoxycillin
- Cephalexin
- Ciprofloxacin
- Acyclovir
- Indinavir
- Triamterene
- Piridoxylate
- Primidone
- Naftidrofuryl oxalate*
- I.v. Vitamin C*
- Orlistat*
- Felbamate

*Calcium oxalate crystals

Nephrol Dial Transplant (2003) 18: 212–214

Nephrology Dialysis Transplantation

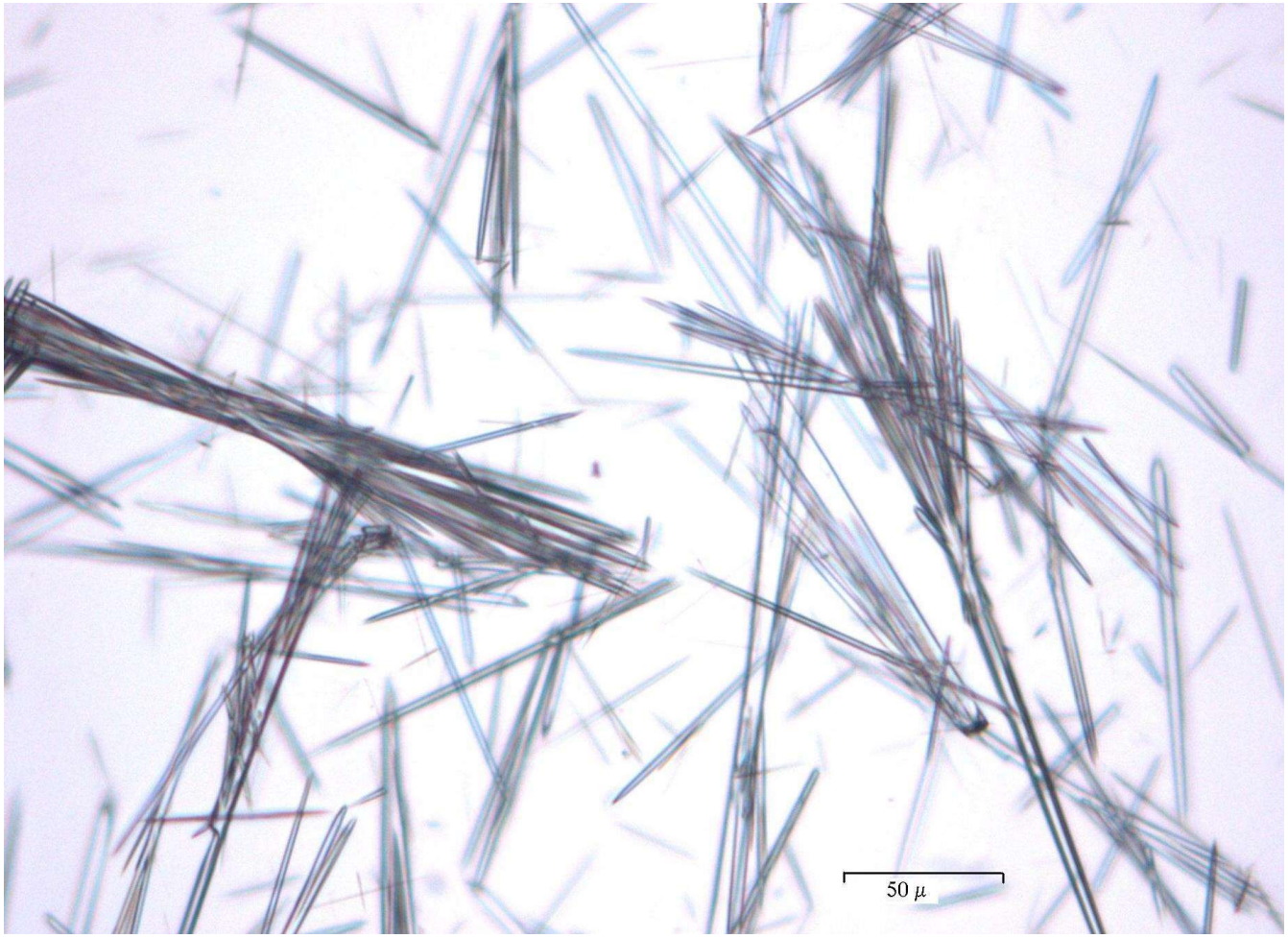
Images in Nephrology
(Section Editor: G. H. Nield)

Amoxycillin, a rare but possible cause of crystalluria

Giovanni B. Fogazzi[1], Mariadele Cantù[1], Lucia Saglimbeni[1] and Michel Daudon[2]

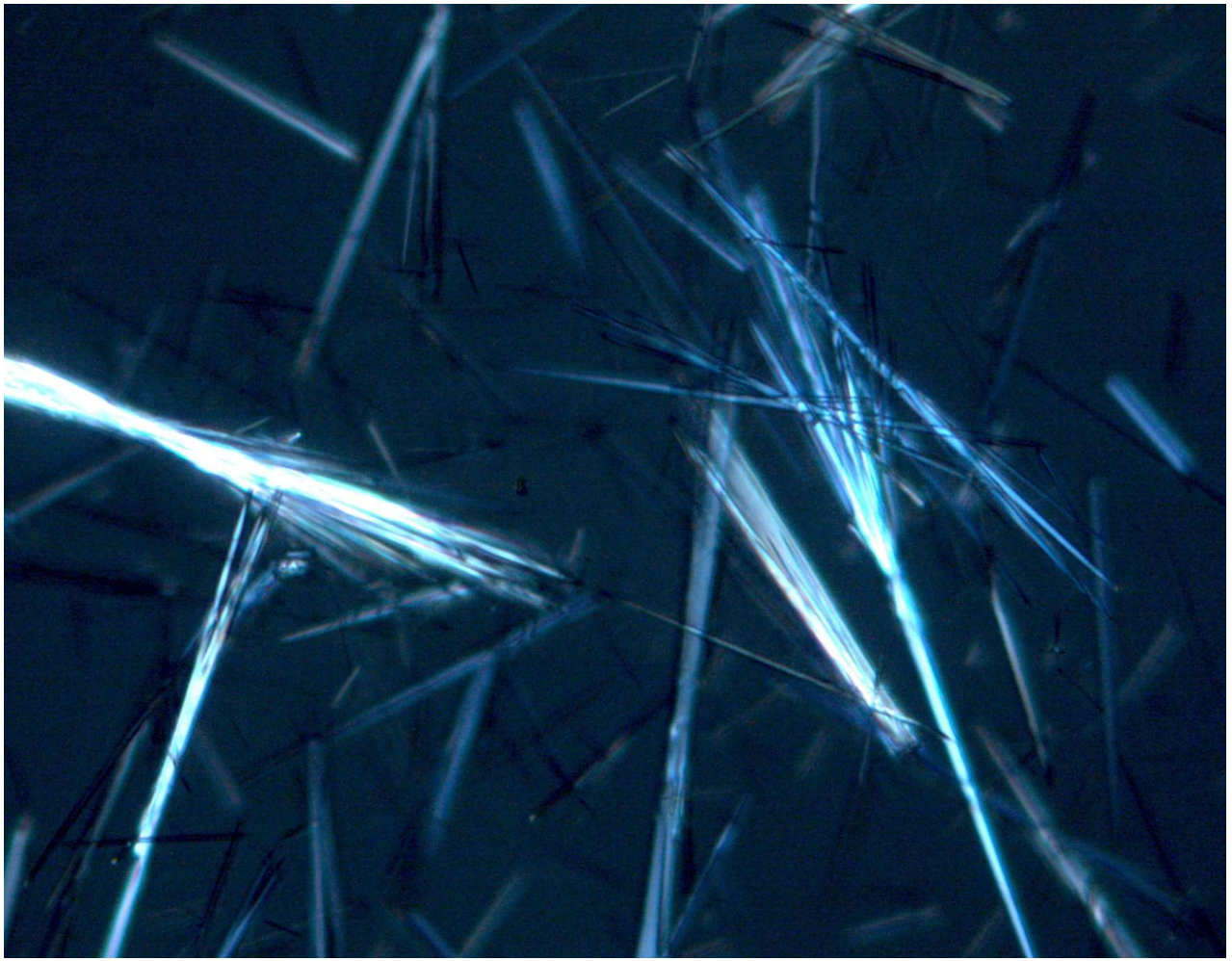
[1]Research laboratory on urine of Divisione di Nefrologia, Ospedale Maggiore, IRCCS, Milano, Italy and [2]Laboratoire de Biochimie A, Groupe Hospitalier Necker-Enfants Malades, Paris, France

Cristalli di Amoxicillina



Gentilmente concesse da Dr.med. L.Berwert, ORBV

Cristalli di Amoxicillina



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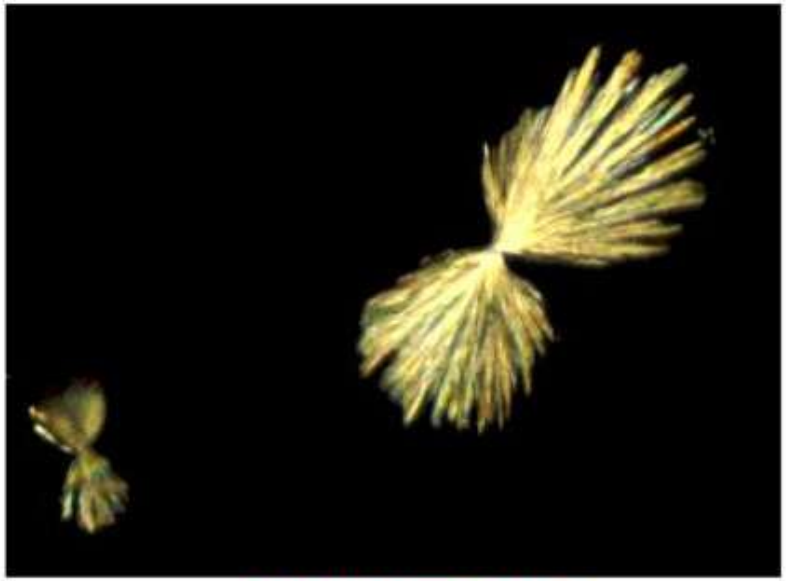
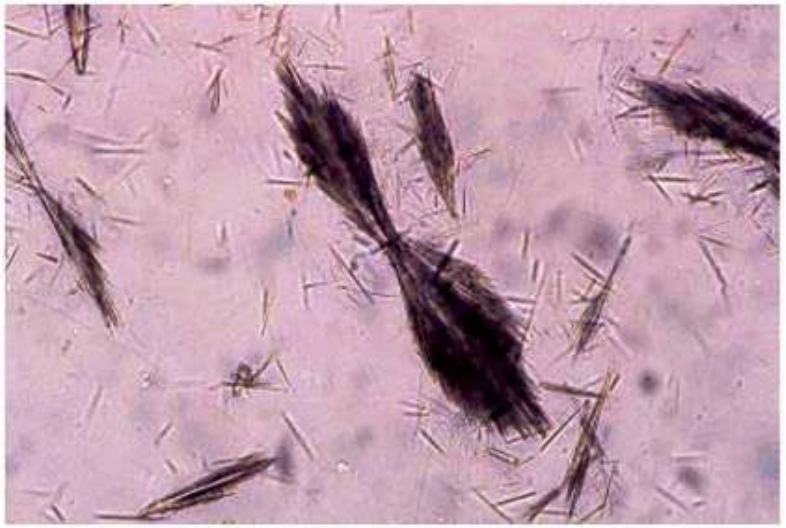
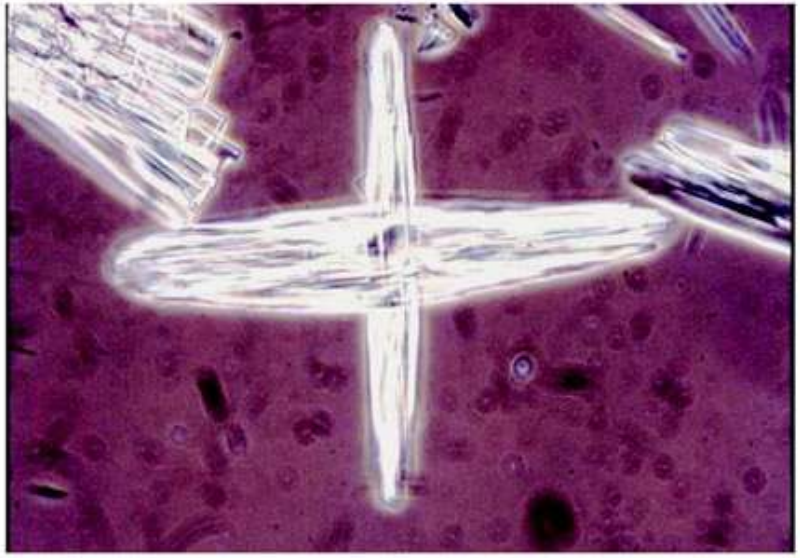


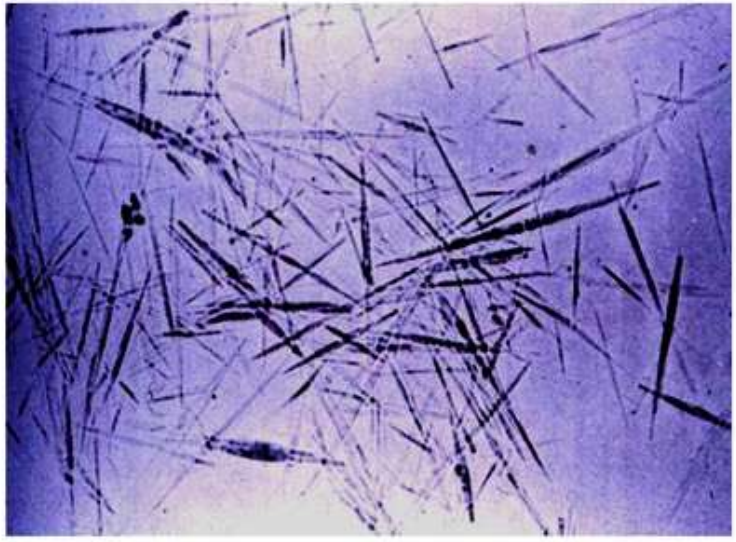
SULPHADIAZINE (POL)



AMOXYCILLIN (BF)

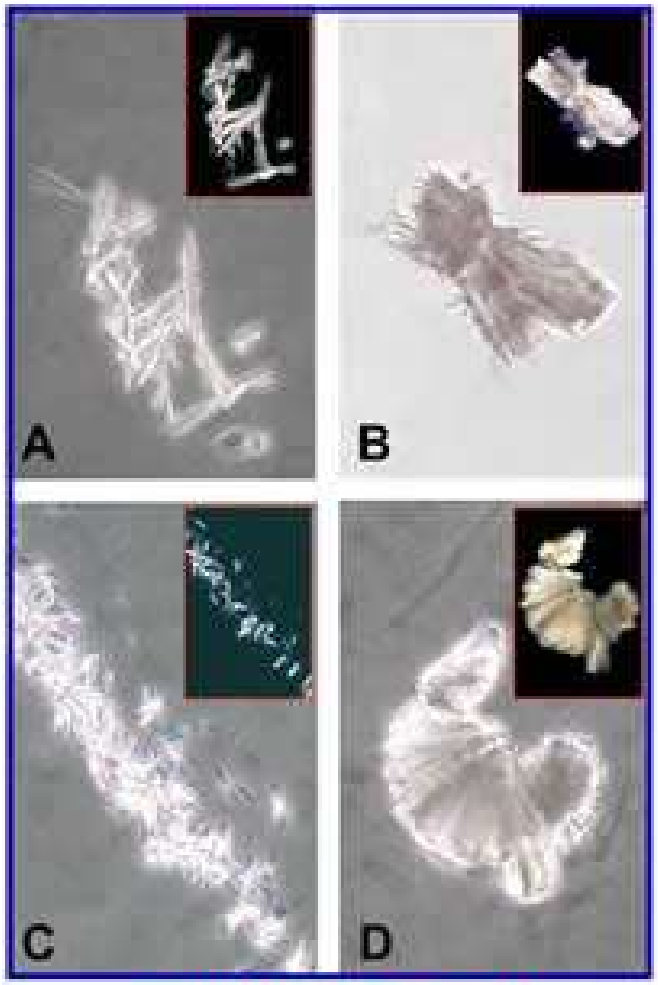


INDINAVIR



ACYCLOVIR

Cristalli di Ciprofloxacina



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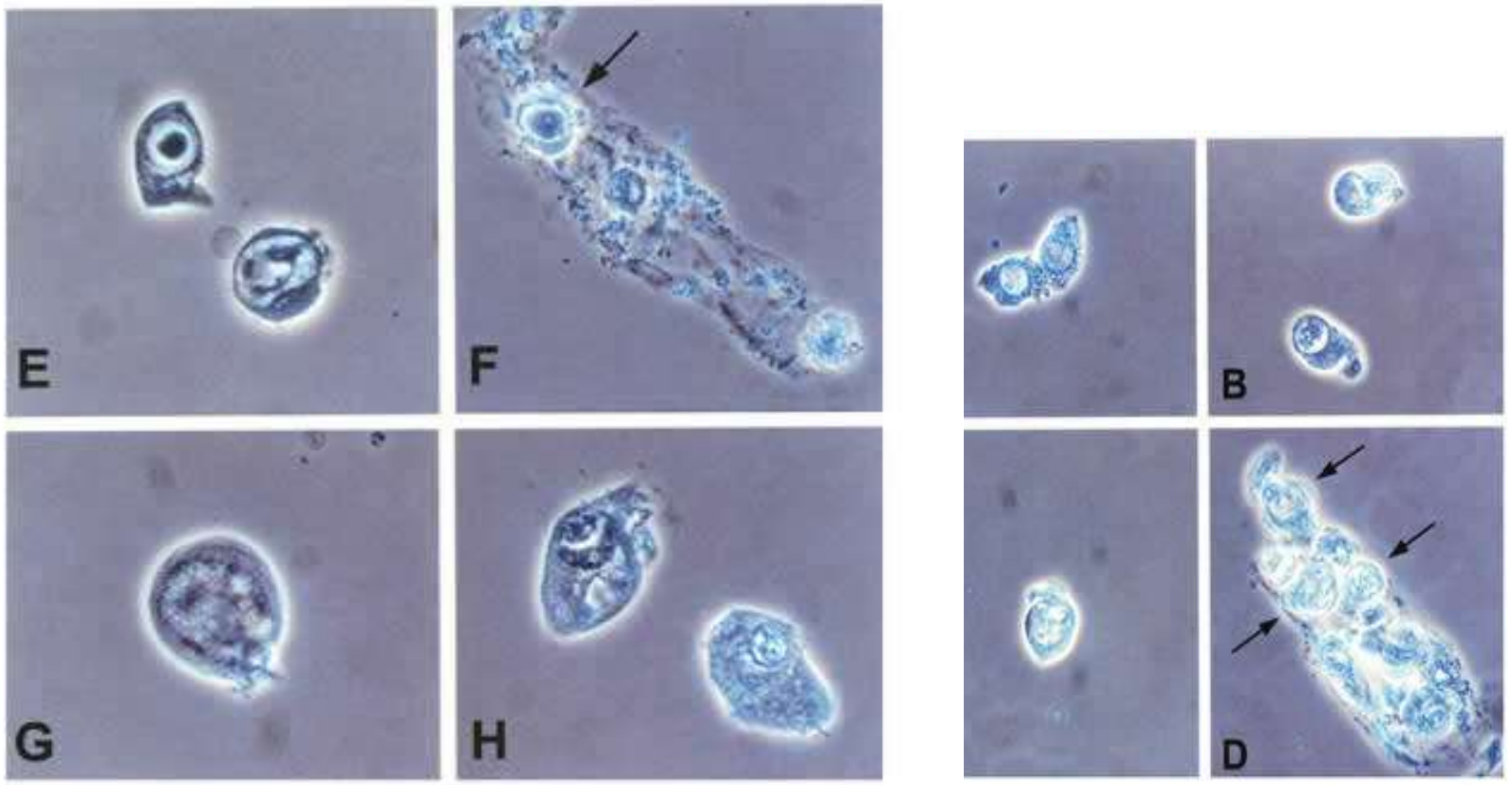
Sedimento e trapianto renale



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Sedimento e trapianto renale

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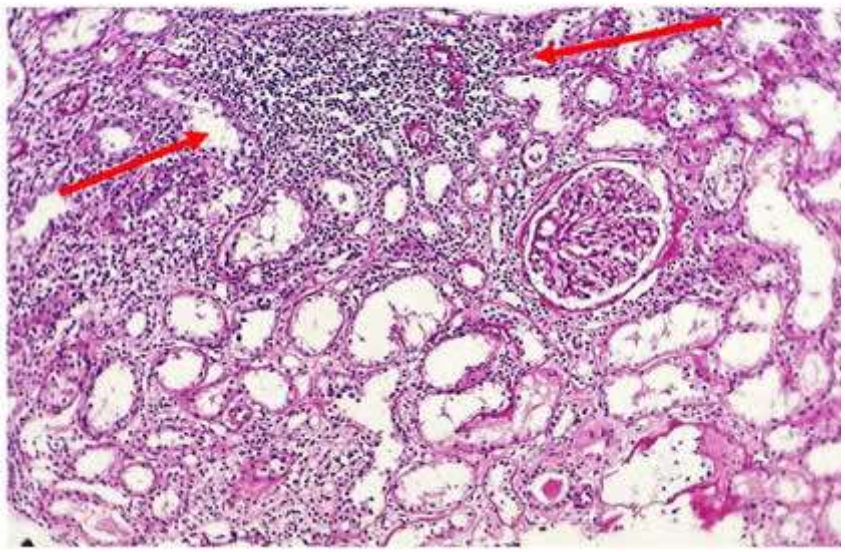
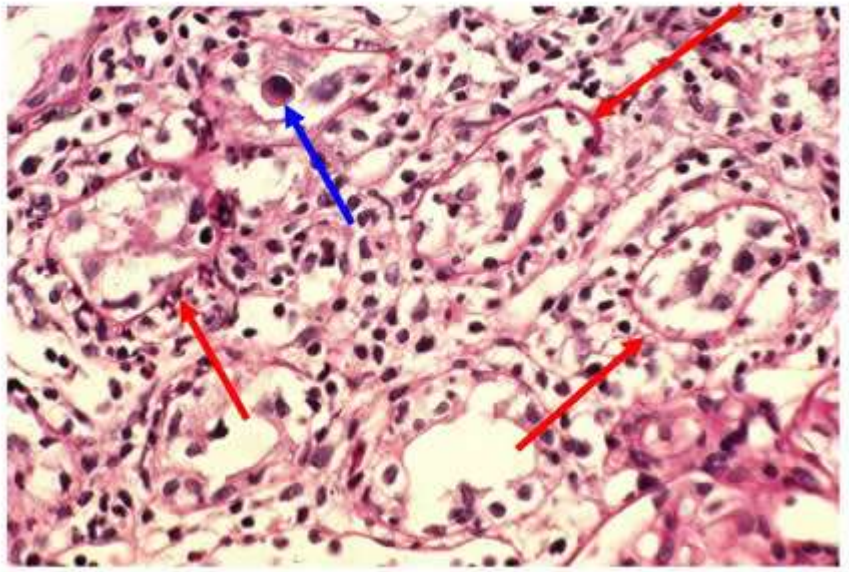
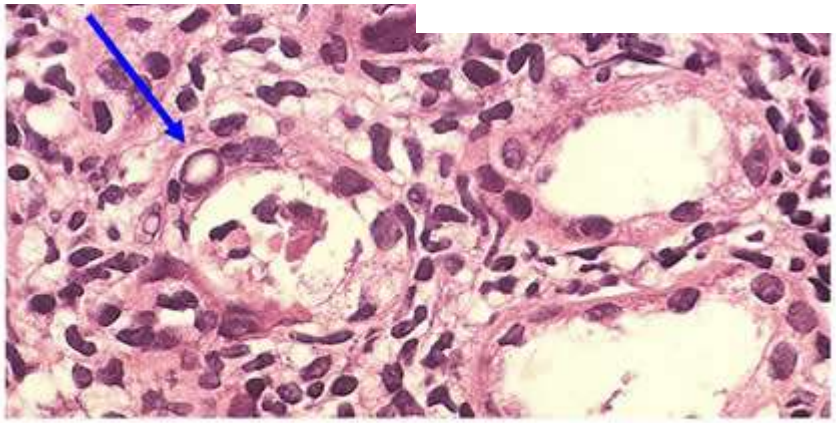
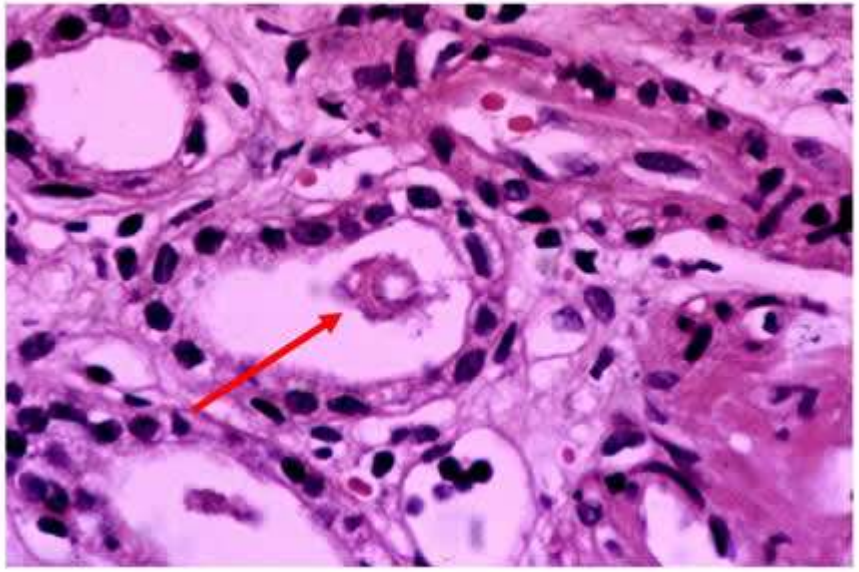
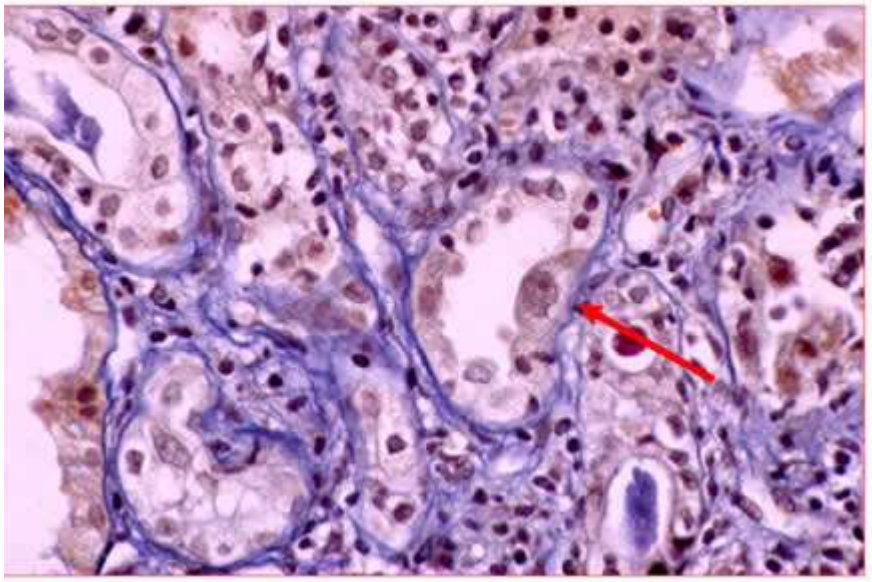


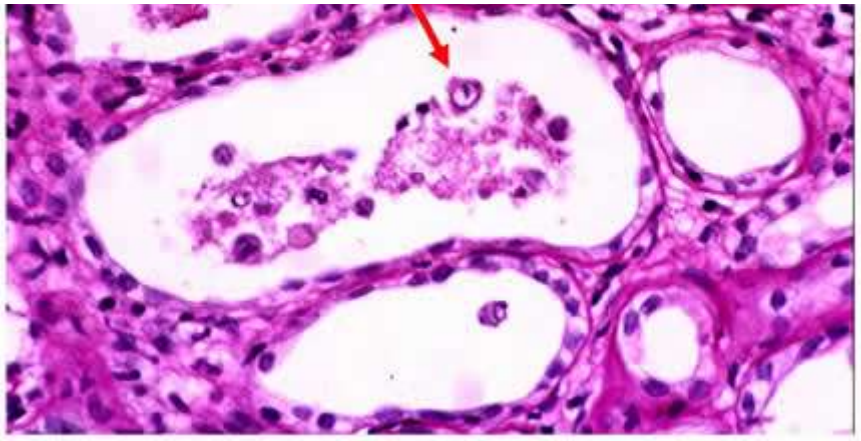




Sedimento e trapianto renale







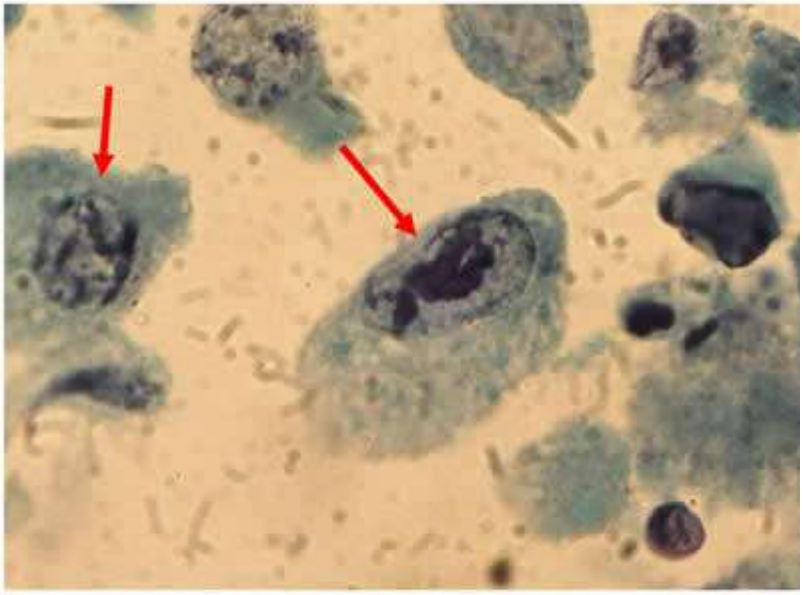
“Decoy Cells”

Cellule tubulari con tipiche alterazioni nucleari

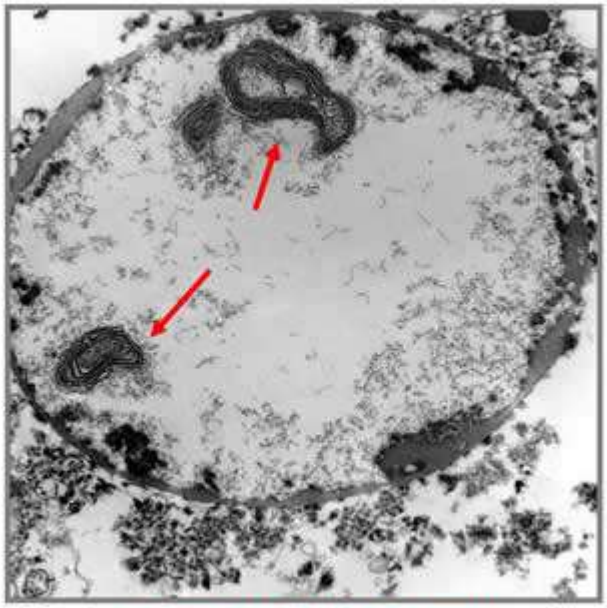
- Nucleo allargato (“ground glass” con inclusioni di varia forma e dimensione
- Inclusione nucleare unica (“bird eye”)
- “Marginazione” della cromatina
- Vacuoli intracitoplasmatici
- Vacuoli intranucleari (rari)

G.B. Fogazzi, S.Verdesca. AN ALBUM OF URINARY MICROSCOPY IMAGES IN A CLINICAL CONTEXT(2008): Part I-VI http://www.ndt-educational.org

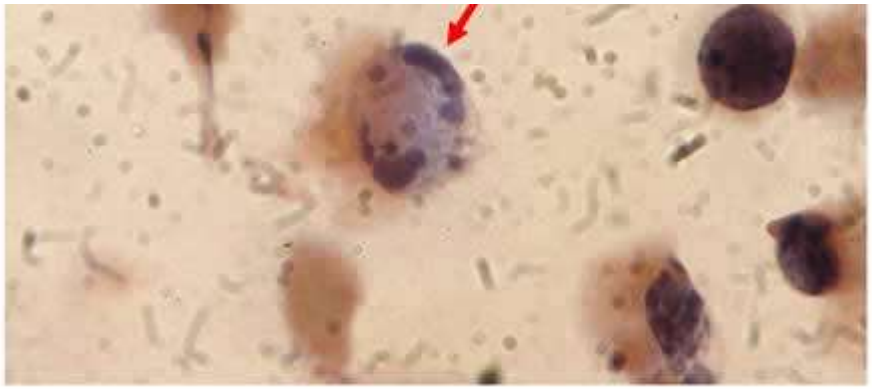
Decoy Cells

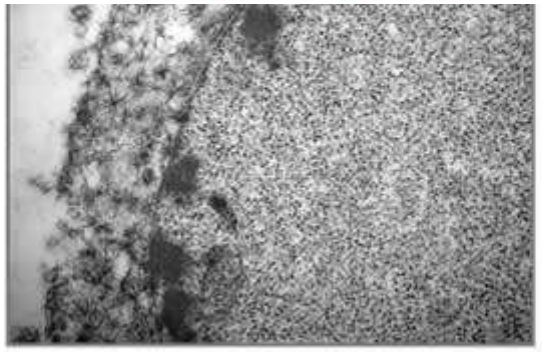


PAPANICOLAOU STAIN



ELECTRON MICROSCOPY





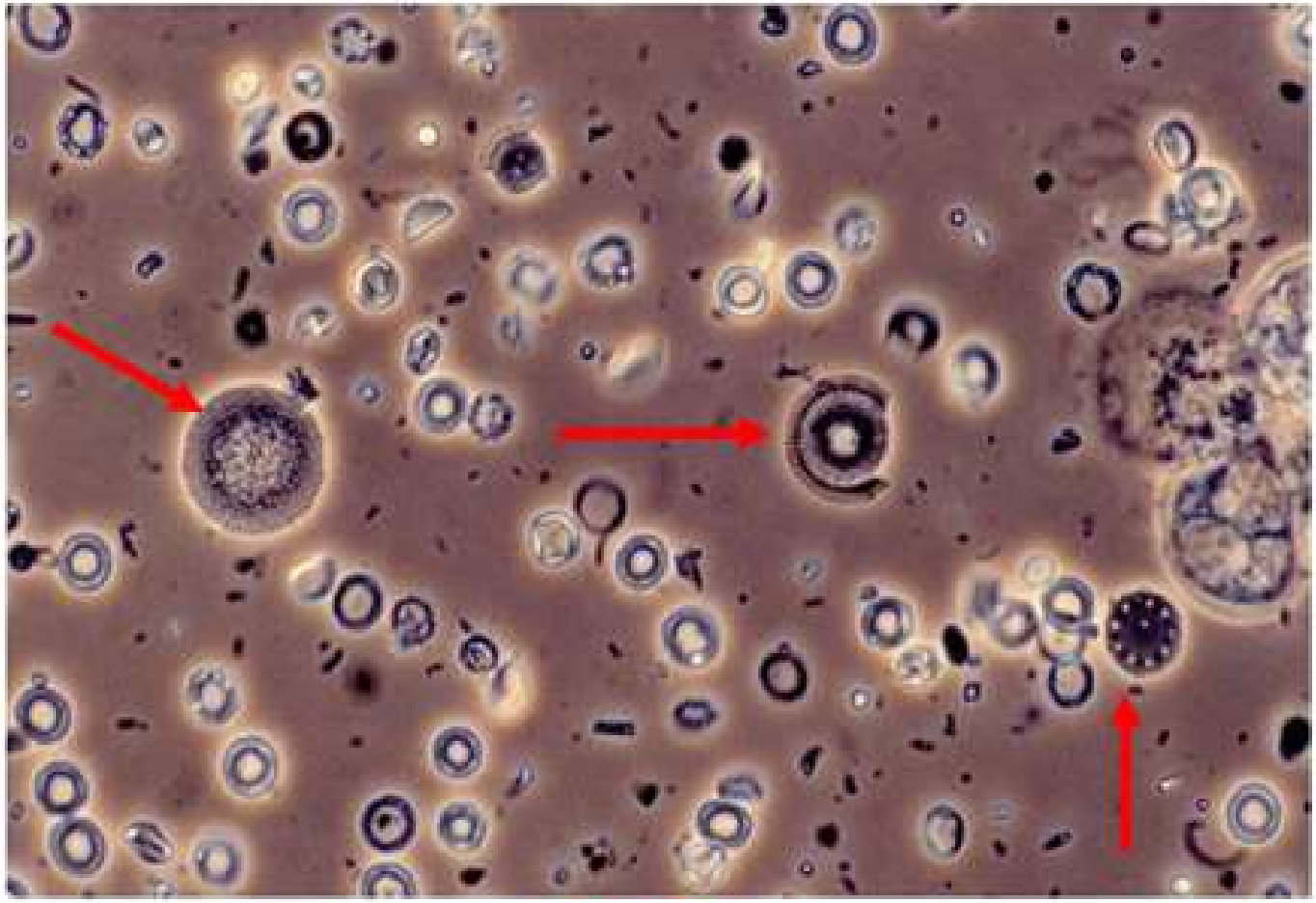
ELECTRON MICROSCOPY

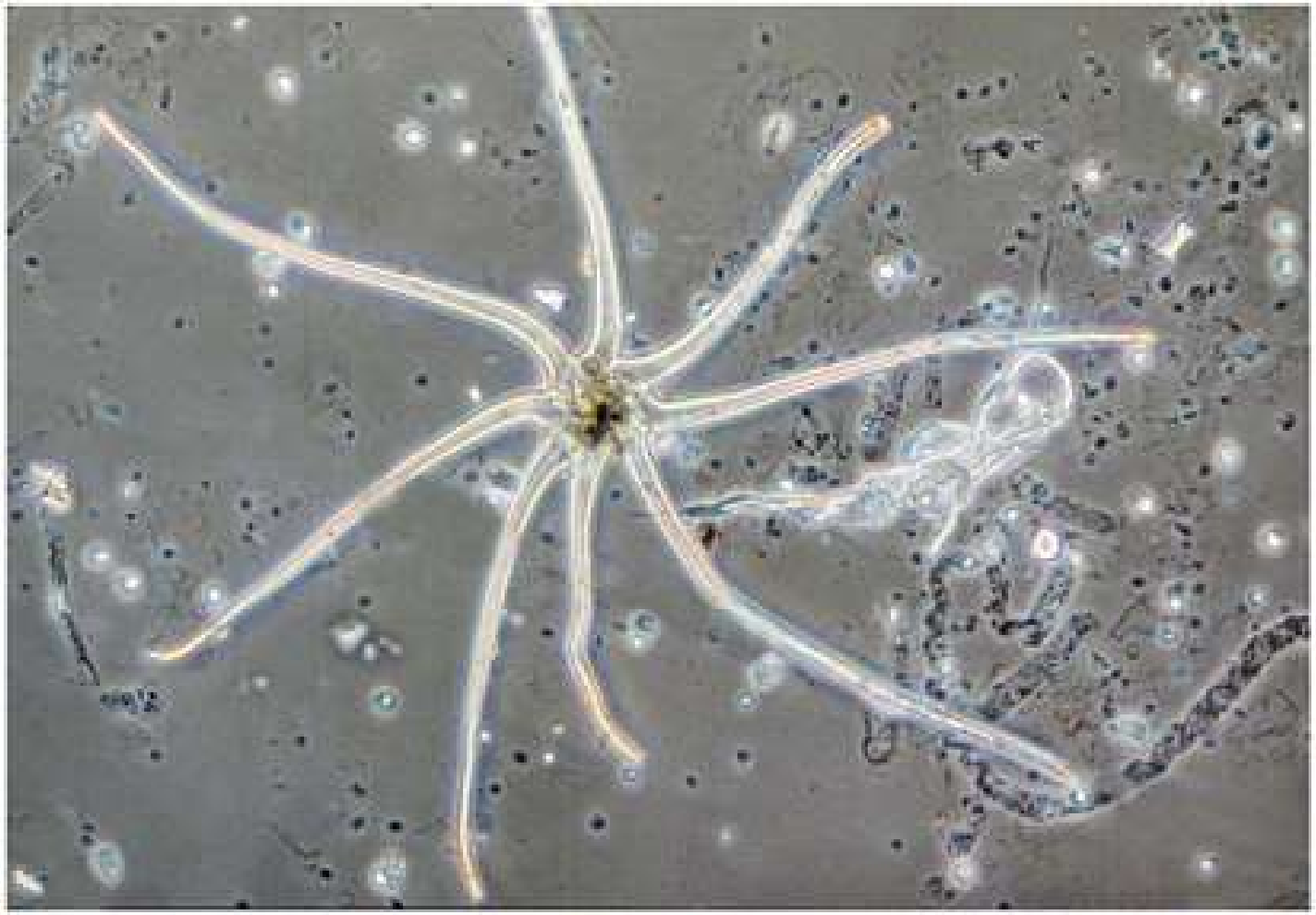
Nefropatia da BK

- In immunocompetent individuals, BKV:
  - is acquired early in life and establishes a persistent subclinical infection (~ 80% of general population)
  - remains latent in the uroepithelium of the urinary tract
- In immunocompromised individuals, BKV:
  - may reactivate from latency and cause a renal disease (BKVN)
  - BKVN affects 1% to 5% of renal allograft recipients, especially when treated with tacrolimus and/or MMF and leads to graft loss in about one-half of cases

G.B. Fogazzi, S.Verdesca. AN ALBUM OF URINARY MICROSCOPY IMAGES IN A CLINICAL CONTEXT(2008): Part I-VI http://www.ndt-educational.org

Sedimento: curiosità





STARS....

Trichomanes reniforme

- Rangitoto Island (NZ) 2000 -

"So great it is the potentiality of the examination of the urine sediment that it should be carried out by the physician himself…

The two to five minutes of additional time consumed often will richly be rewarded"

G.E. Schreiner 1961

Nephrol Dial Transplant (2007) 22: 1778–1781
doi:10.1093/ndt/gfm142
Advance Access publication 1 April 2007

Teaching Point
(Section Editor: A. Neyrier)

NDT
Nephrology Dialysis Transplantation

How a skilful and motivated urinary sediment examination can save the kidneys

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[1]Research laboratory on urine, U.O. di Nefrologia, Fondazione IRCCS, Ospedale Maggiore Policlinico, Mangiagalli e Regina Elena and [2]Cattedra di Nefrologia, Ospedale S. Paolo, Milan, Italy

Fine