

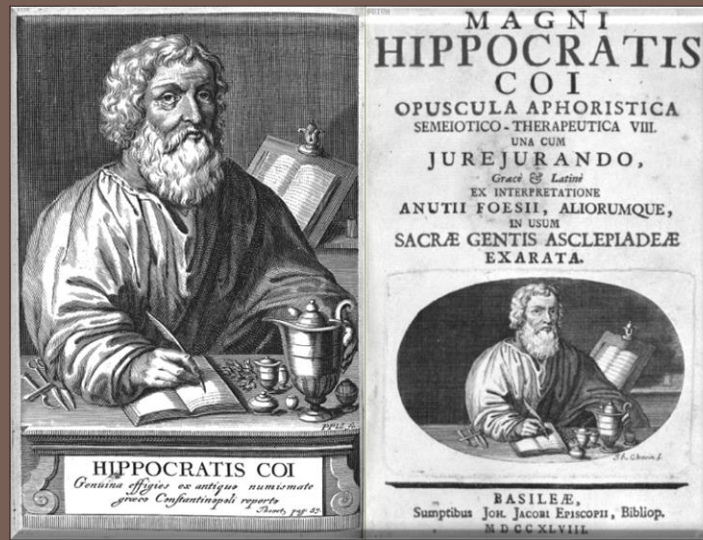


# SEMEIOTICA NEFROLOGICA



Carmelo  
Libetta

Capitolo 2°



Il fondamento dell'arte  
medica è l'essere padrone  
del metodo di indagine



Carmelo  
Libetta

Semeiotica

- Anamnesi
- Esame obiettivo
  
- Esame urine
- Funzione renale
- Esami strumentali
- Biopsia renale



Carmelo  
Libetta

Semeiotica nefrologica

# Sintomi

- Macroematuria
- Edemi
- Dolori lombari
- Colica renale
- Alterazioni della minzione

# Alterazioni esami

- Creatininemia
- Azotemia
- Elettroliti
- Esame urine
- **Ipertensione arteriosa**



Carmelo  
Libetta

Perché il paziente va dal nefrologo?



# Familiare

- Ipertensione
- Diabete mellito
- Malattie congenite
- Malattia renale cronica



# Fisiologica

- Attività lavorativa (contatti con sostanze tossiche)
- Abuso di farmaci
- Alterazioni della minzione
- Abitudine dietetiche



Carmelo  
Libetta

ANAMNESI

## IRRITATIVI

- Disuria
- Stranguria
- Pollachiuria
- Nicturia

## OSTRUTTIVI

- Mitto ipovalido
- Tenesmo
- Iscuria paradossa



Carmelo  
Libetta

Disturbi minzionali

Dolore da colica

Dolore da flogosi



Carmelo  
Libetta

Dolore del tratto genito-urinario



Carmelo  
Libetta

ESAME OBIETTIVO







Carmelo  
Libetta

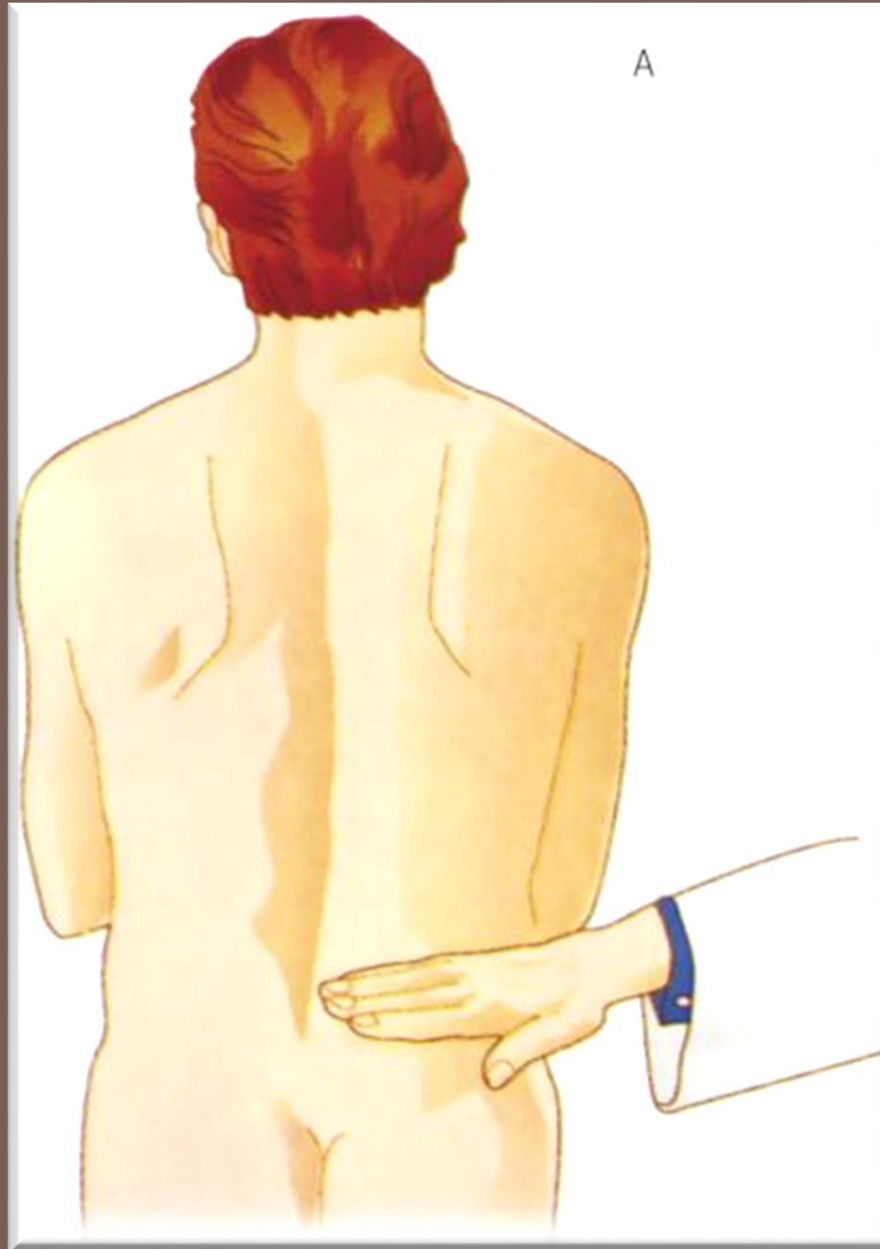
ISPEZIONE: PETECCHIE



Carmelo  
Libetta

## Posizione dei reni





Carmelo  
Libetta

Manovra di Giordano

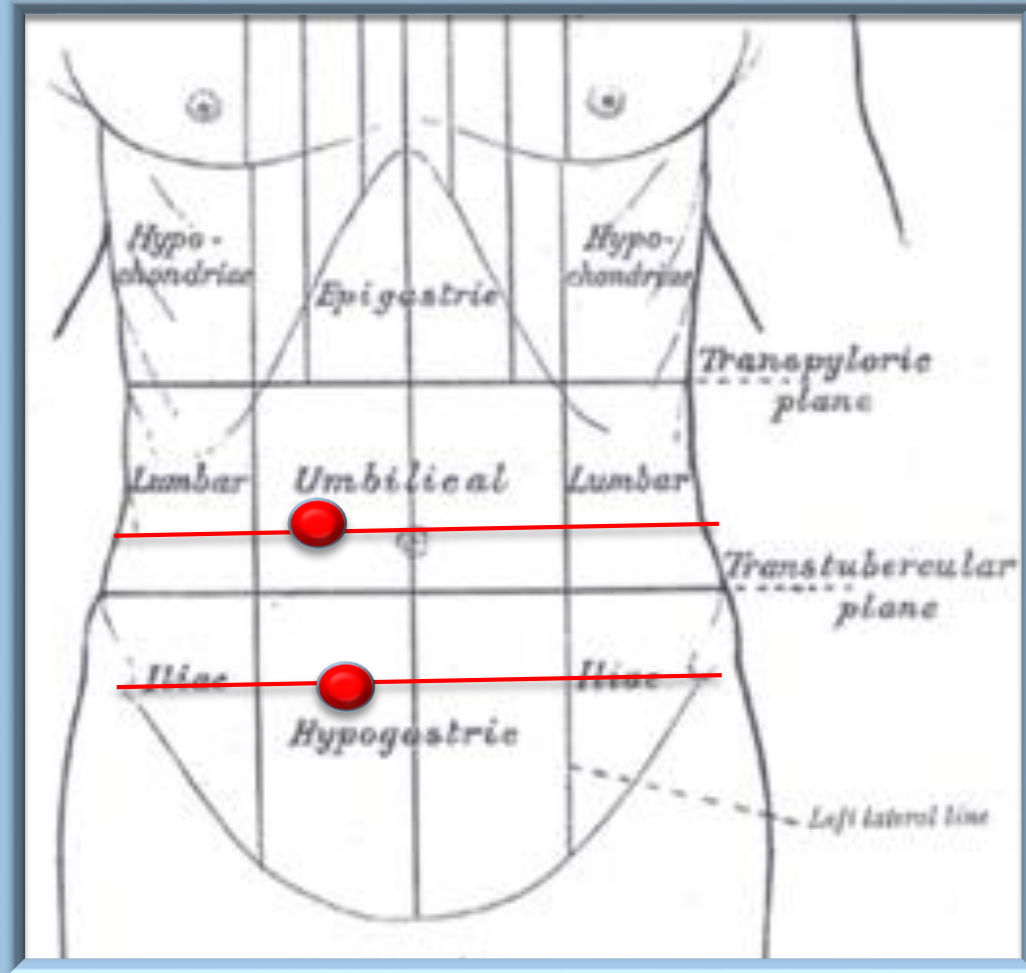


**Carmelo  
Libetta**

Palpazione bimanuale del rene



Bazin  
Tourneux

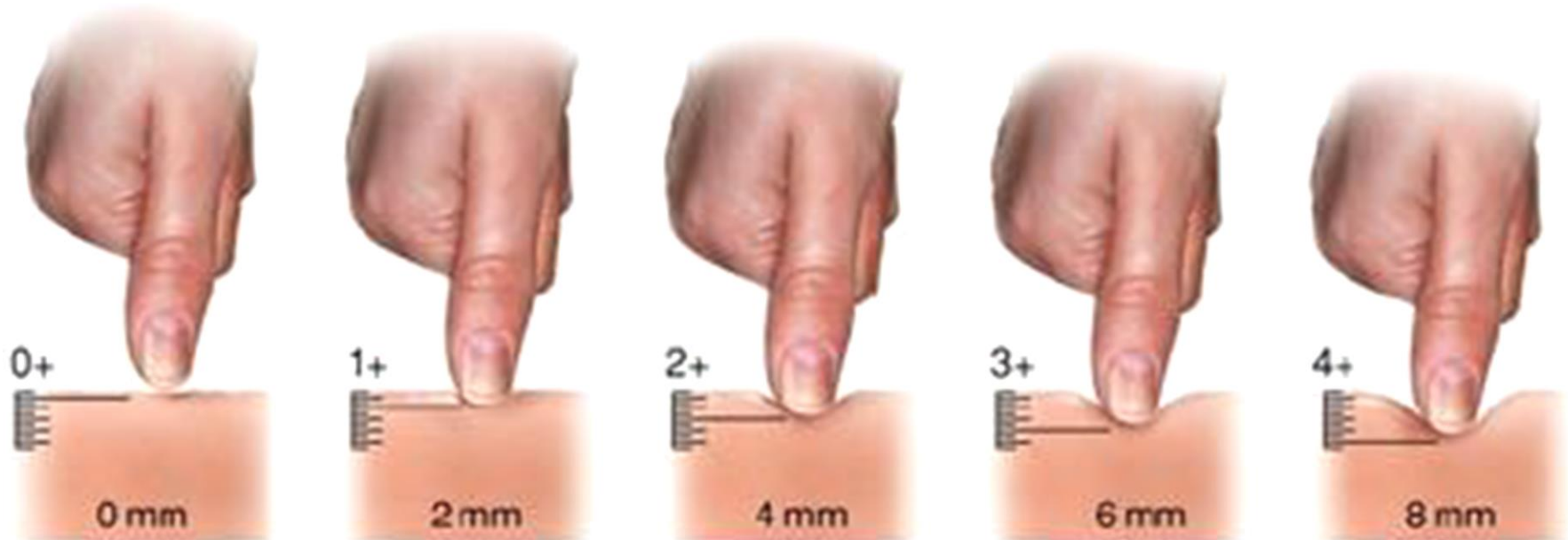


Carmelo  
Libetta

Punti ureterali



# Grading Pitting Edema



Carmelo  
Libetta

EDEMI





Edema (swelling) of the ankles and feet

Edema simmetrico



©2011 NORTH WAPITI

Edema localizzato



Carmelo  
Libetta

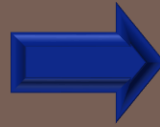
Edema

- ✧ **Insufficienza cardiaca**
- ✧ **Sindrome nefrosica**
- ✧ **Glomerulonefrite acuta**
- ✧ **Cirrosi**
- ✧ **Malnutrizione (ipoprotidemia)**
- ✧ **Ipotiroidismo**
- ✧ **Ipercorticosurrenalismo**
- ✧ **Gravidanza**
- ✧ **Farmaci (estrogeni, vasodilatatori)**





Trombosi venose  
Insufficienza venosa



Ostacolo del ritorno venoso

Asportazione linfonodi  
Metastasi linfonodi  
Linfomi  
Filariasi



Ridotto drenaggio linfatico



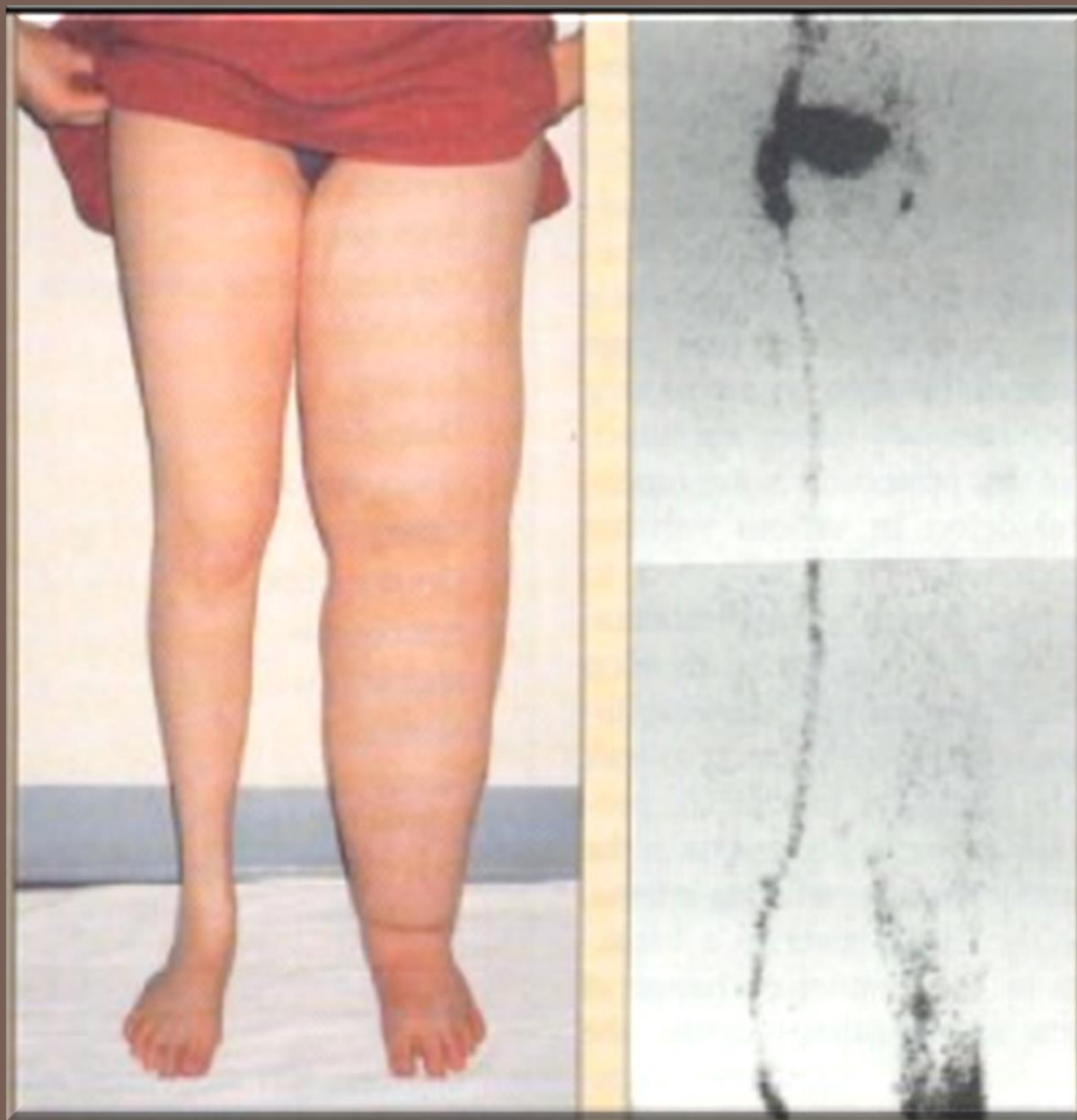
Carmelo  
Libetta

Edema localizzato



**Carmelo  
Libetta**

**Edema localizzato**



Carmelo  
Libetta

LINFEDEMA



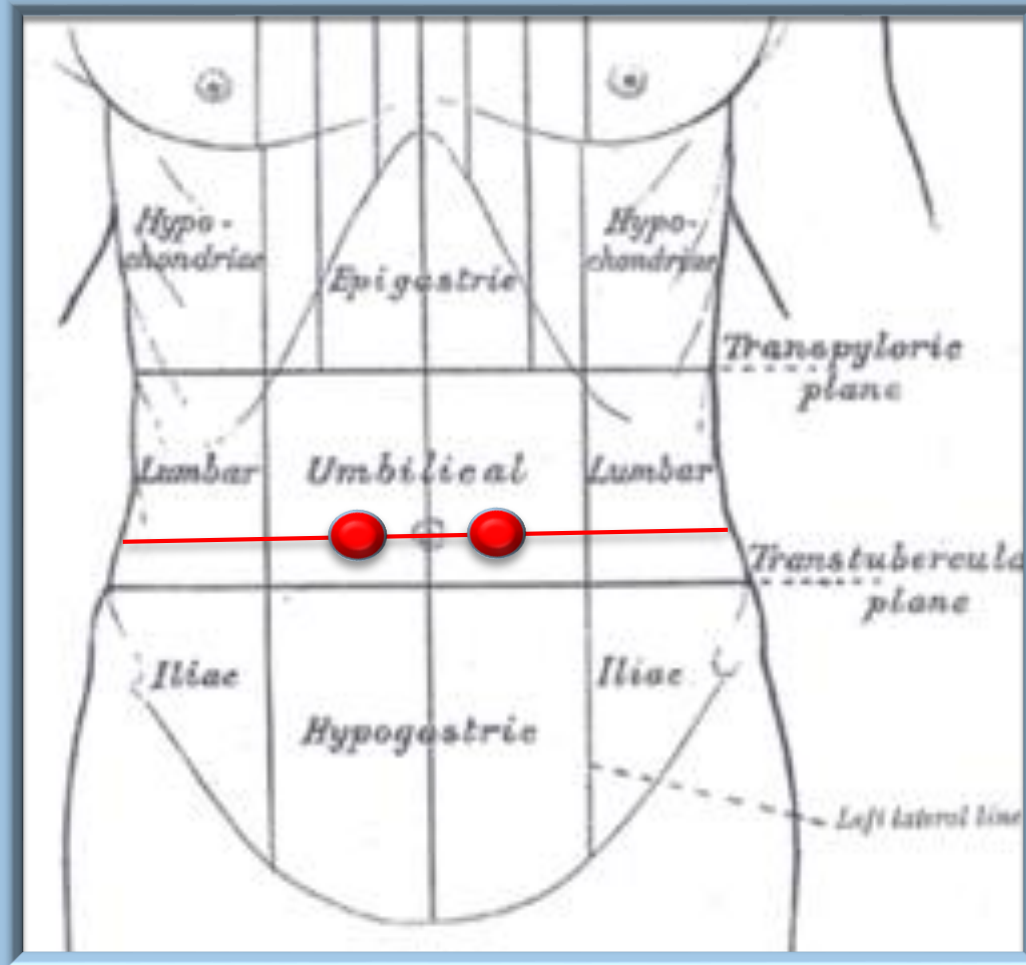
**Carmelo  
Libetta**

**Edema periorbitale**



Carmelo  
Libetta

Edema polmonare



Carmelo  
Libetta

Ascultazione addominale





**"I'll have that diagnosis for you in a jiffy."**



**Carmelo  
Libetta**

**DIAGNOSTICA**



Carmelo  
Libetta

Esame delle urine





- ✧ **Esame Fisico**
- ✧ **Esame Chimico**
- ✧ **Esame Sedimento**



**Carmelo  
Libetta**

**ESAME URINE**



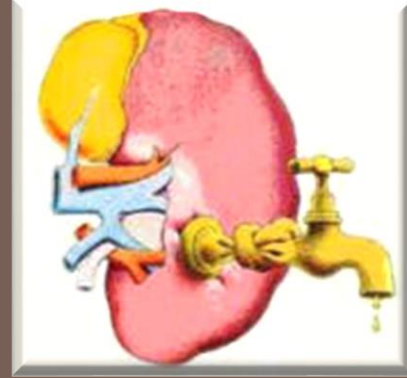
Carmelo  
Libetta

Esame Fisico

- **Volume**
- **Aspetto**
- **Colore**
- **Peso Specifico**



# Volume



- ◆ Poliuria  $> 2500$  ml/24 h
- ◆ Oliguria  $< 500$  ml/24 h
- ◆ **Oligo-anuria**  $< 200$  ml/24 h
- ◆ Anuria  $< 50$  ml/24 h



**LIMPIDO**

---

normale

**TORBIDO**

---

infezioni vie urinarie

**LATTESCENTE**

---

-Infezioni vie urinarie  
-lipuria



**Carmelo  
Libetta**

**Aspetto**

**Fizzy:**

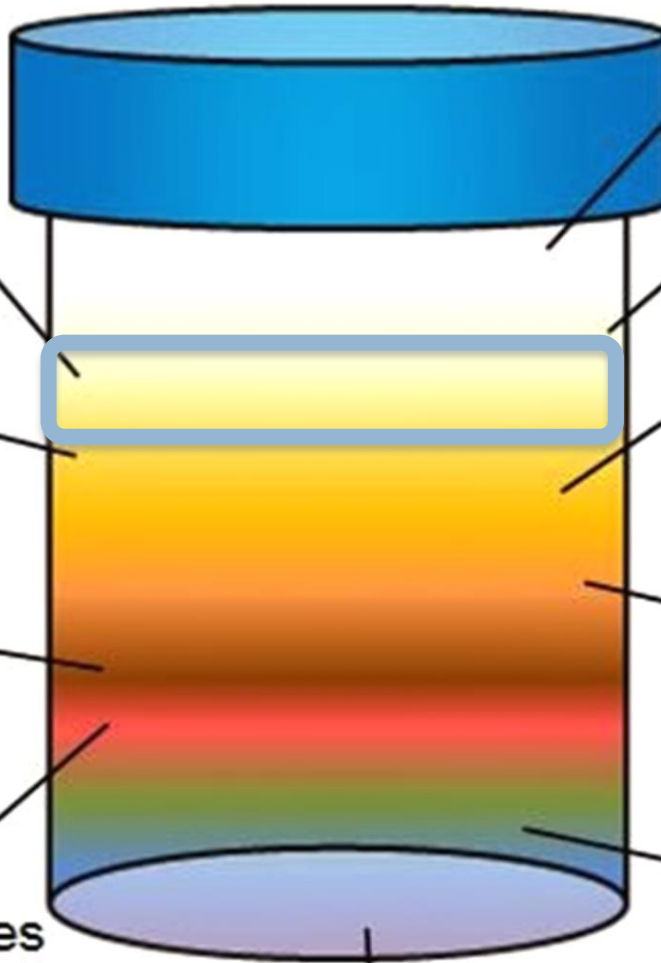
Normal, excess protein, kidney problem

**Transparent Yellow:**  
normal

**Dark Yellow:**  
normal, but in need of water soon

**Brown:**  
severely dehydrated, liver disease

**Pink / Red:**  
Eaten beets / blueberries  
rhubarb, blood in urine



**Clear:**  
excess water

**Pale Straw Yellow:**  
healthy

**Honey/Amber:**  
dehydrated

**Orange:**  
dehydrated, liver/ bile duct condition, food dye

**Blue / Green:**  
rare genetic disease, bacteria or medication, food dye

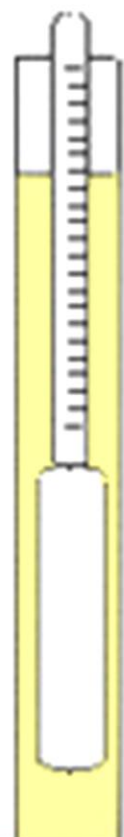
**Purple:**  
does not exist

Carmelo  
Libetta

Colore



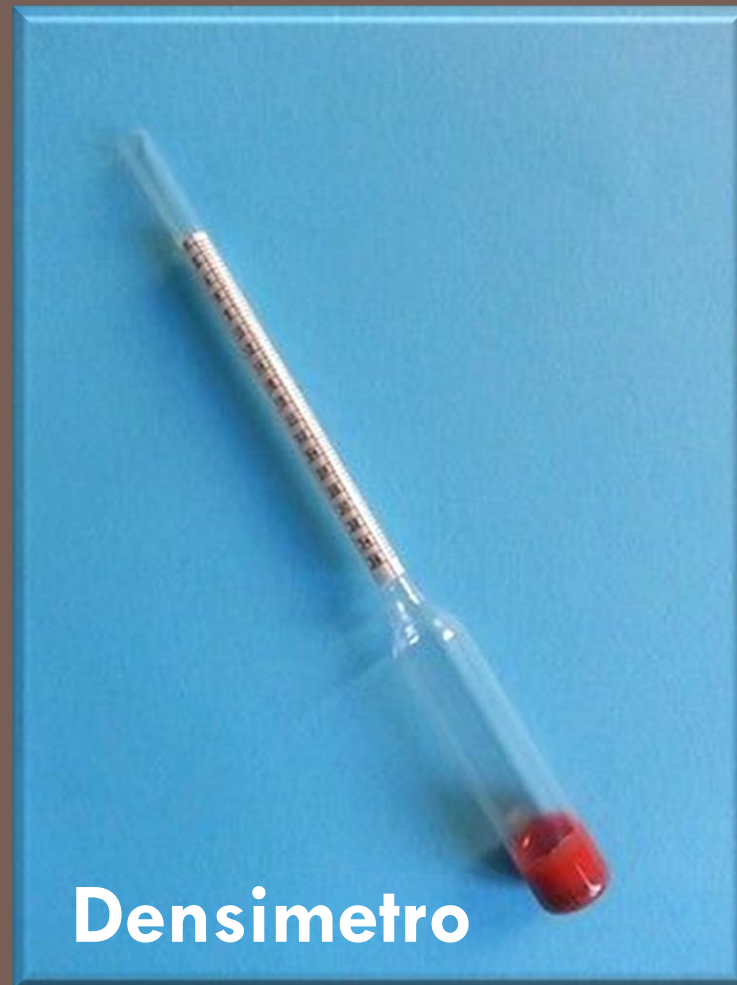
- Ipotoniche 1,001 - 1,004
- Isotoniche 1,009 - 1,011
- Ipertoniche 1,025 - 1,040



Ipotoniche



Ipertoniche



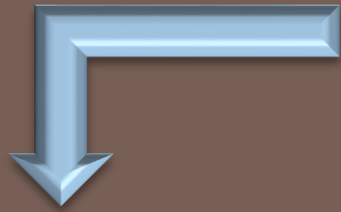
Densimetro



Carmelo  
Libetta

Peso specifico

# Soluti



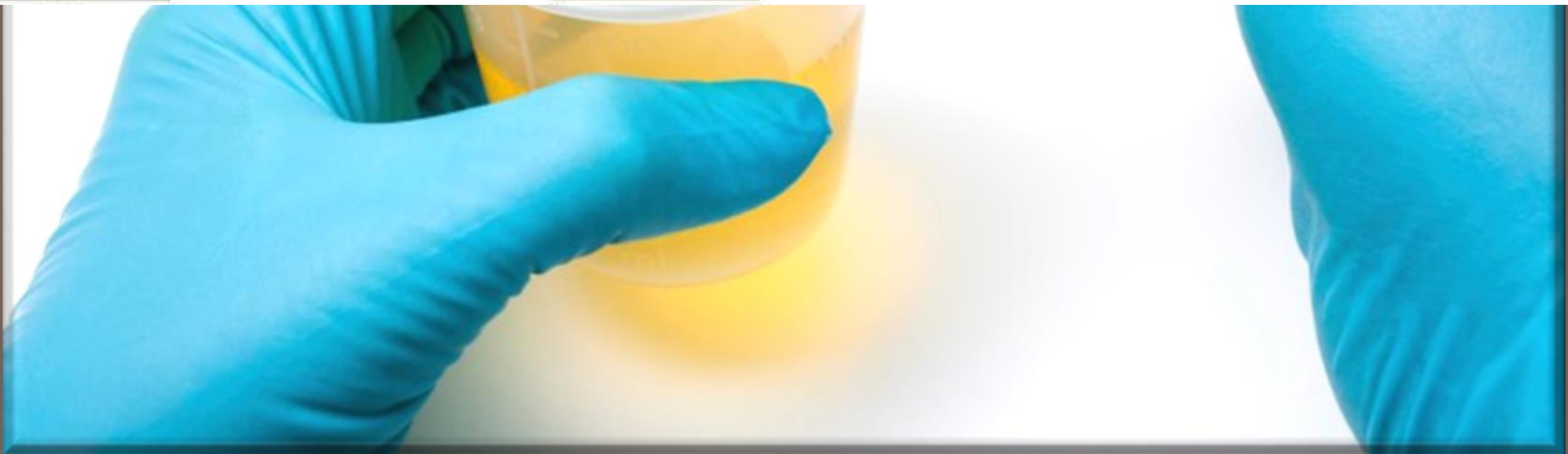
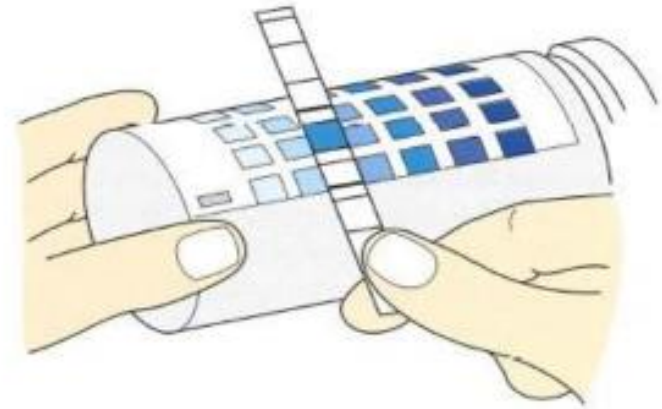
P.S.



Osmolalità





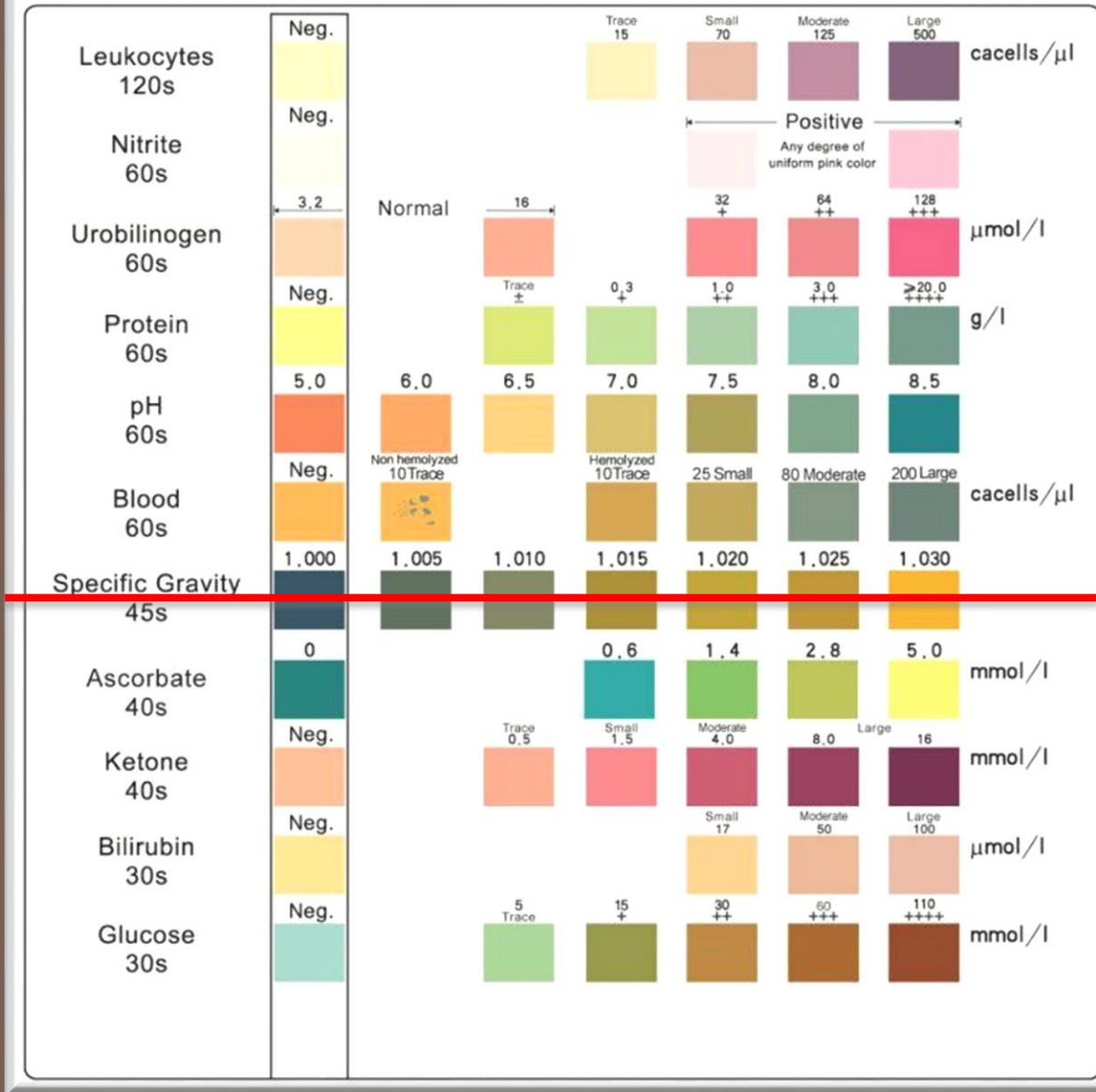


Carmelo  
Libetta

ESAME CHIMICO

# TESTING AND READING TIME

Rev.08/2010



Strisce reattive (dipstick)



Carmelo  
Libetta

ESAME CHIMICO



**IPOTONICHE**

**IPERTONICHE**



**Carmelo  
Libetta**

**Peso Specifico**



Carmelo  
Libetta

Ph



Carmelo  
Libetta

# Glucosio

- **Diabete mellito**
- **Gravidanza (diabete mellito latente)**
- **Da farmaci (corticosteroidi, ACTH, diuretici tiazidici)**
- **Riassorbimento tubulare insufficiente**  
*Sindrome di Fanconi*





Carmelo  
Libetta

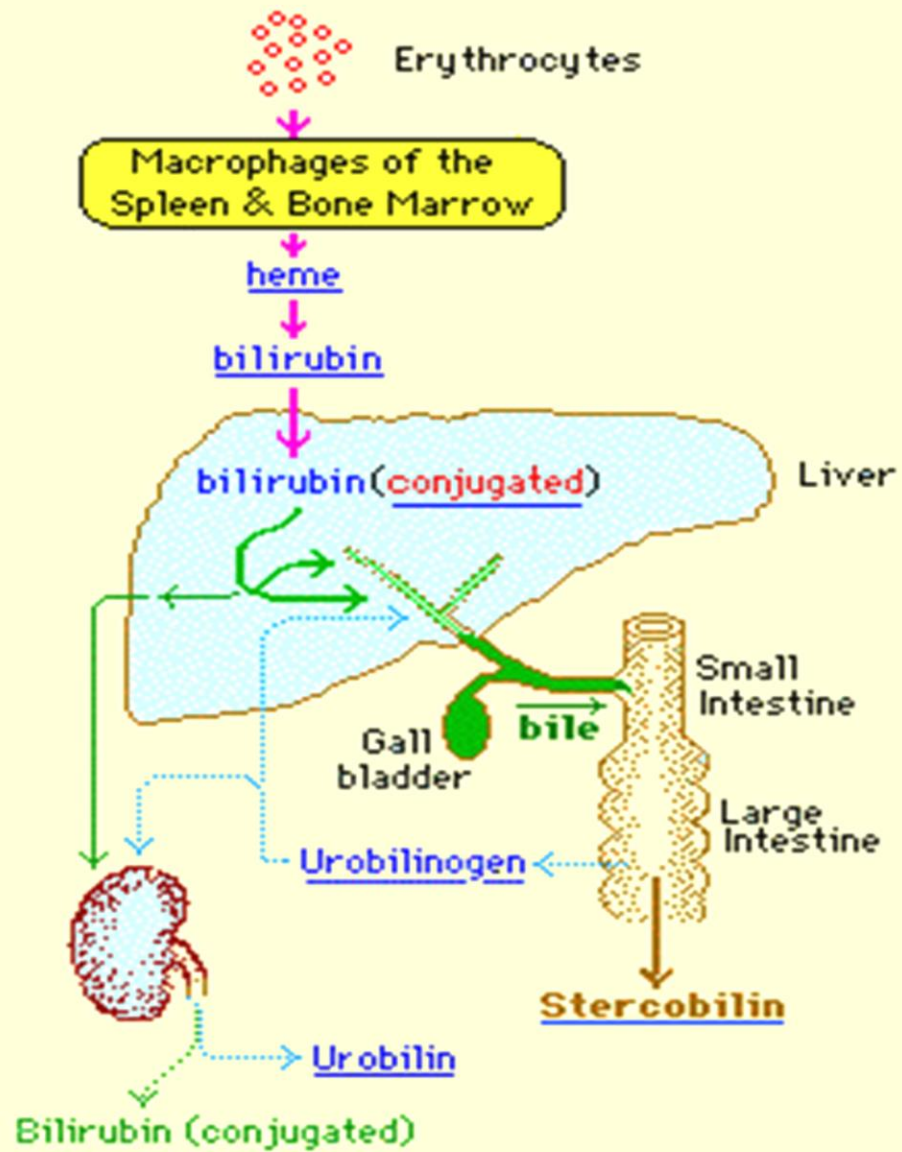
# Bilirubina



Carmelo  
Libetta

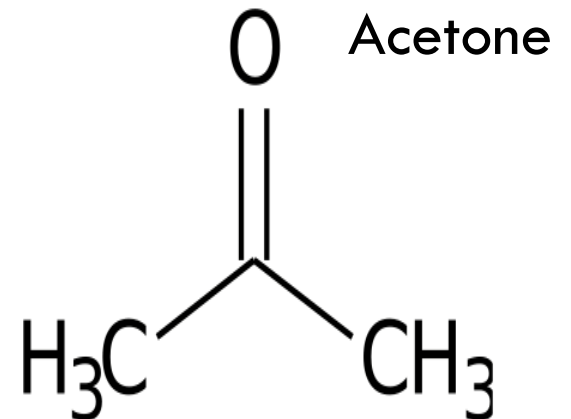
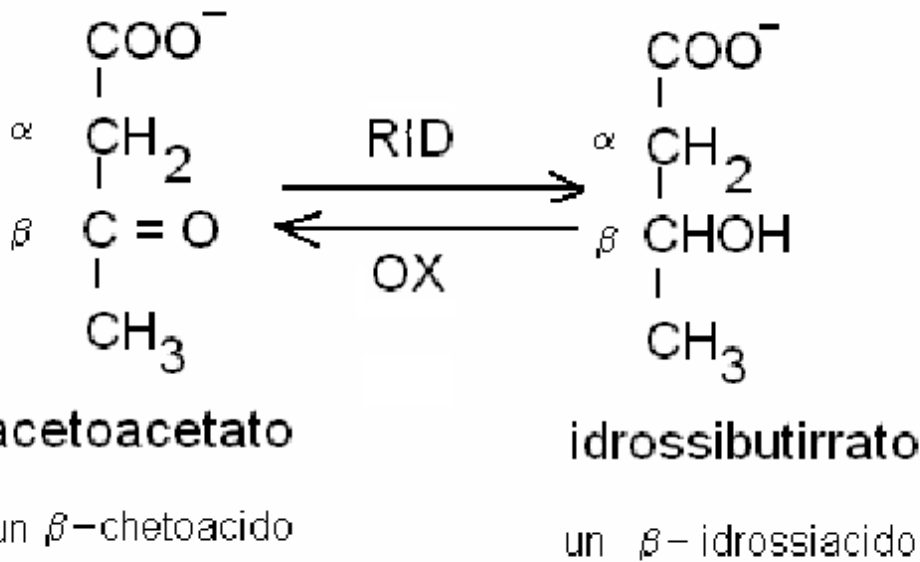
Urobilinogeno





Carmelo  
Libetta

LA BILE



Carmelo  
Libetta

Corpi chetonici





- 1) Verde di bromoresolo
- 2) Blu di bromofenolo



Carmelo  
Libetta

Proteinuria

Domenica Mattina



Intera giornata



Lunedì Mattina

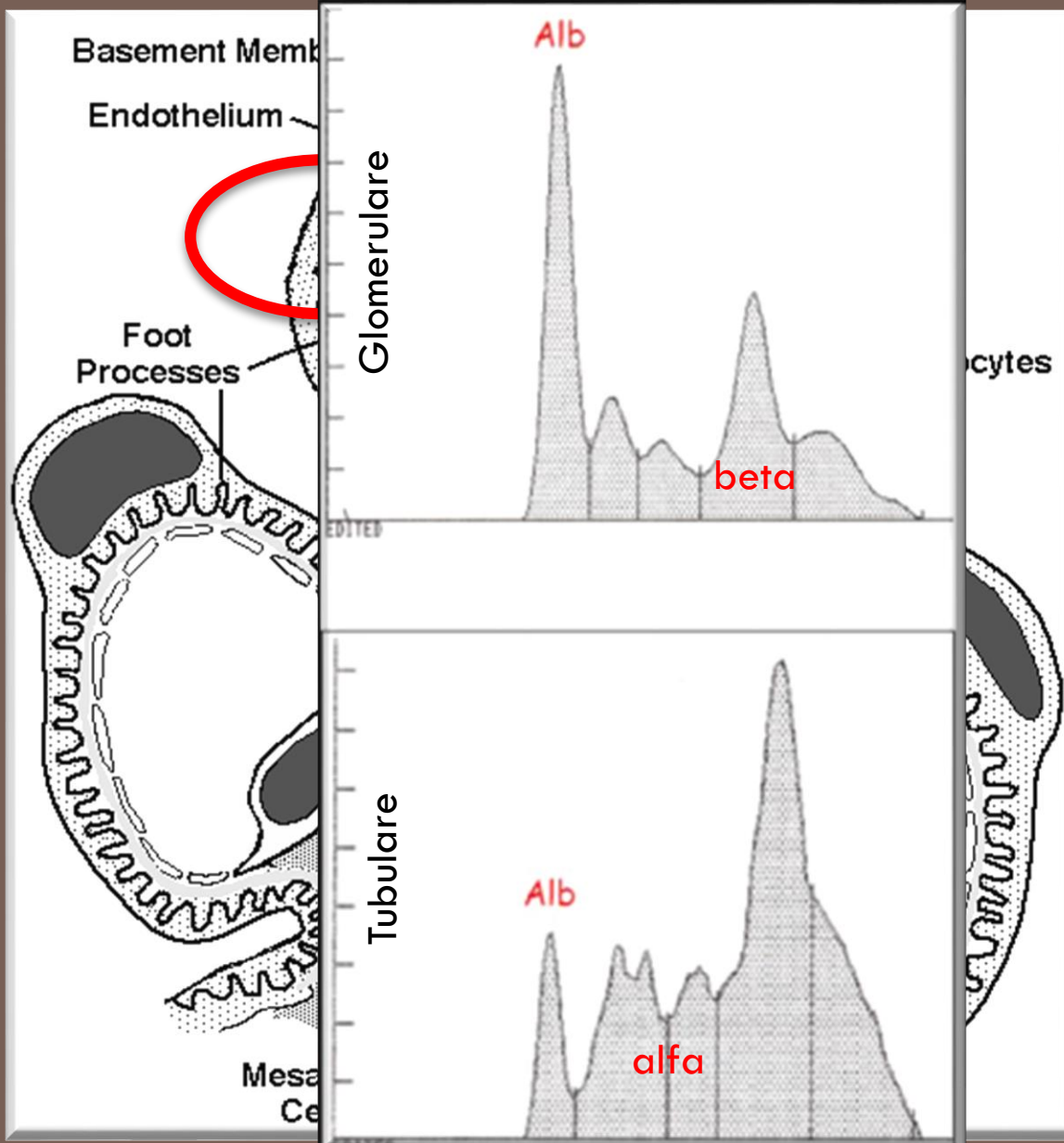


v.n.  $< 150$  mg/24h

Nefrosica  $> 3000$  mg/24h

Carmelo  
Libetta

Proteinuria 24/h (quantitativa)



Carmelo  
Libetta

Proteinuria 24/h (quantitativa)





❖ IPERTENSIONE ARTERIOSA

❖ DIABETE MELLITO



Carmelo  
Libetta

Microalbuminuria

	24-Hour Urine: Urinary Albumin Excretion, mg/24 hours	Urinary Albumin Concentration, mg/L	First Morning Void		
			Albumin:Creatinine Ratio		
			Sex	mg/mmol	mg/g
Normoalbuminuria	<30	<20	Male	<2.5	<20
			Female	<3.5	<30
Microalbuminuria	30–300	20–200	Male	2.5–25	20–200
			Female	3.5–35	30–300
Macroalbuminuria	>300	>200	Male	>25	>200
			Female	>35	>300



**Carmelo Libetta**

**Microalbuminuria**



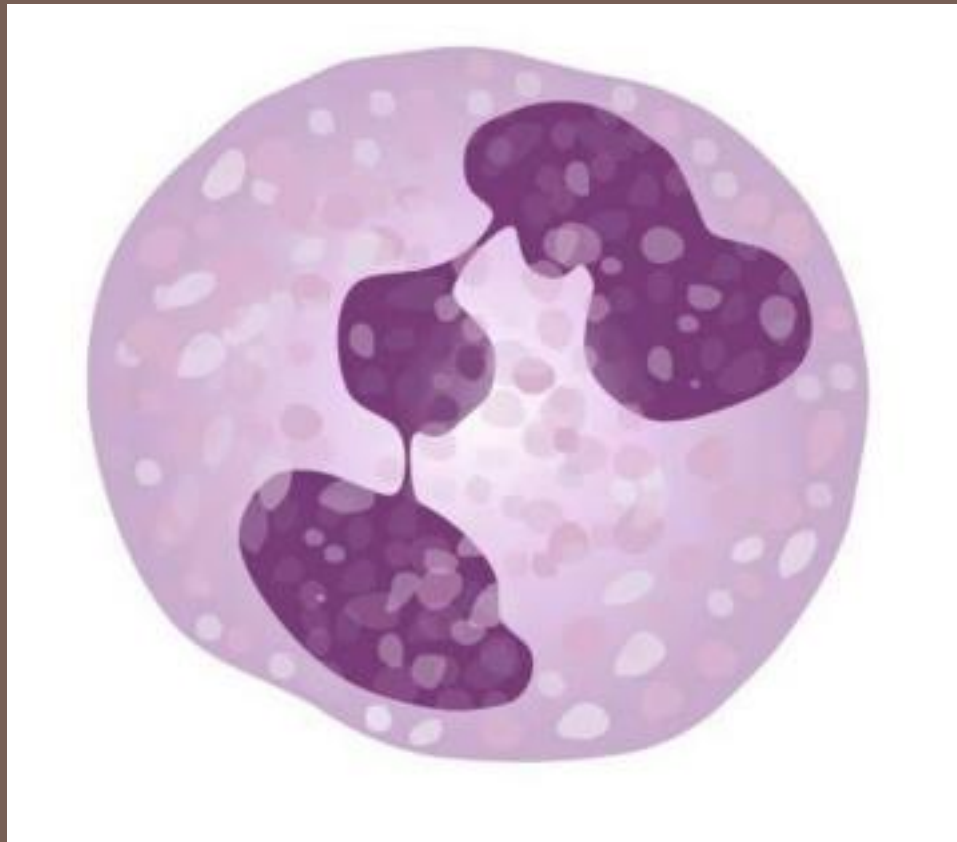
## ATTIVITA' ESTERASICA



Carmelo  
Libetta

# LEUCOCITI





Carmelo  
Libetta

# LEUCOCITI



Carmelo  
Libetta

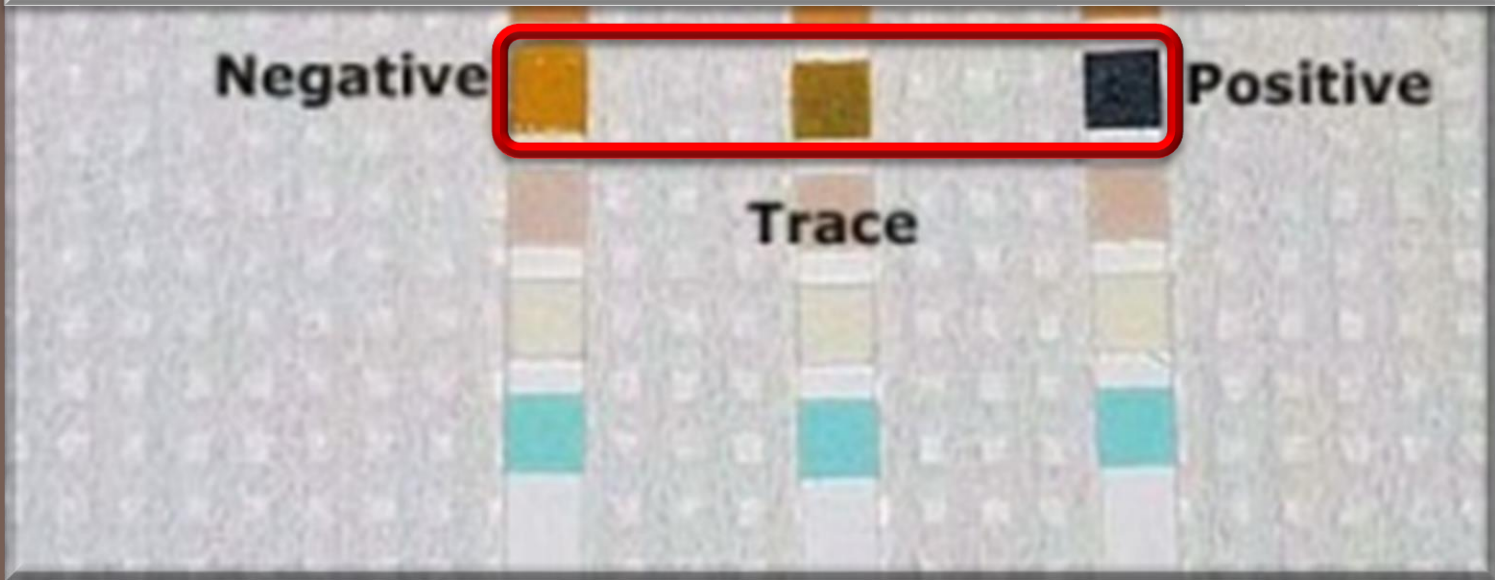
**NITRITI**

- Gram-negativi come *E. coli* formano nitriti
- Gli enterococchi non formano nitriti
- Il comportamento dello stafilococco *Albus* è variabile



Carmelo  
Libetta

NITRITI



Carmelo  
Libetta

SANGUE



Carmelo  
Libetta

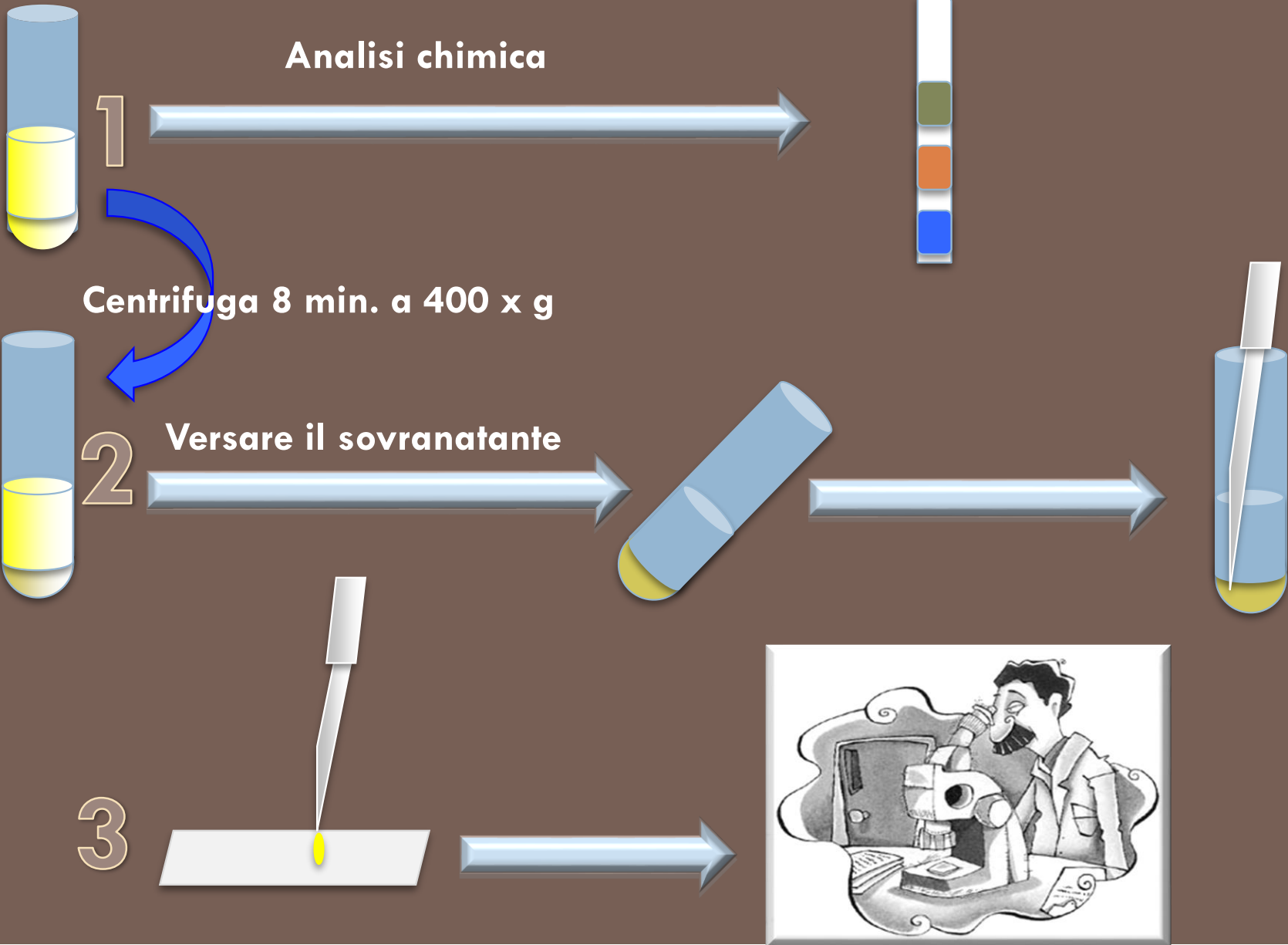
# SEDIMENTO

**1) Urine del mattino più concentrate ed acide:  
gli elementi cellulari e i cilindri si  
conservano meglio.**

**2) Condizioni per non alterare il campione:  
esame microscopico entro un'ora dal  
prelievo o tenuto a 4° C.**



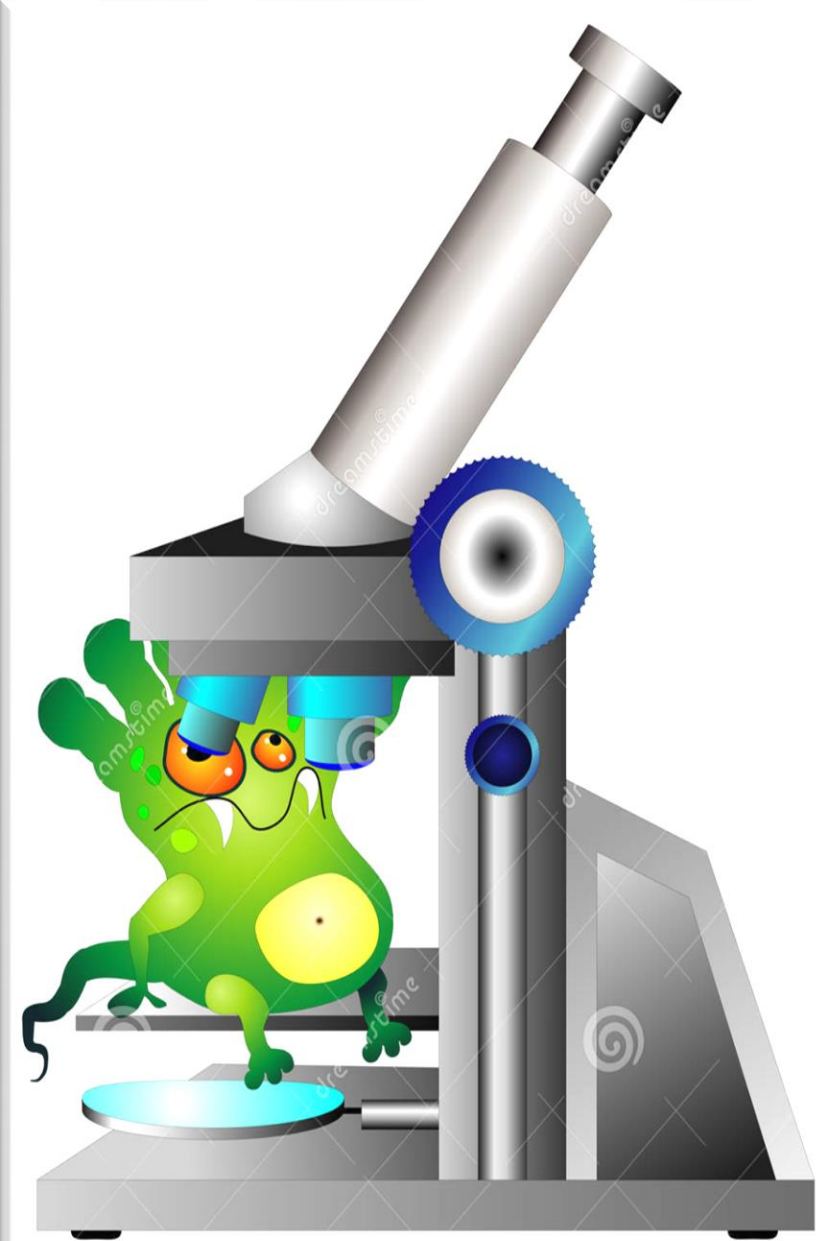
# Analisi chimica



Carmelo  
Libetta

Esame delle urine





**ERITROCITI**

- regolari

- alterati

**LEUCOCITI**

- granulociti

- linfociti

**C. EPITELIALI**

- uroteliali

- tubulari

**CILINDRI**

- ialini

- granulosi

- cerei

- ematici

- cellulari

**CRISTALLI**

**BATTERI**

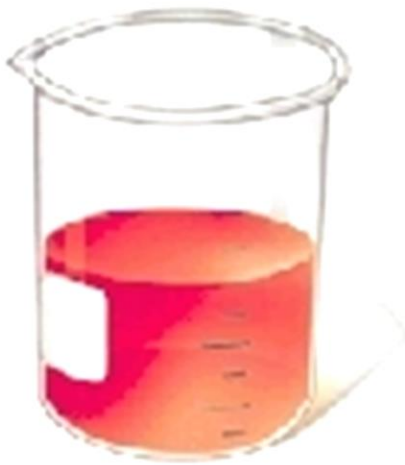
**MICETI**



**Carmelo  
Libetta**

**SEDIMENTO URINARIO**

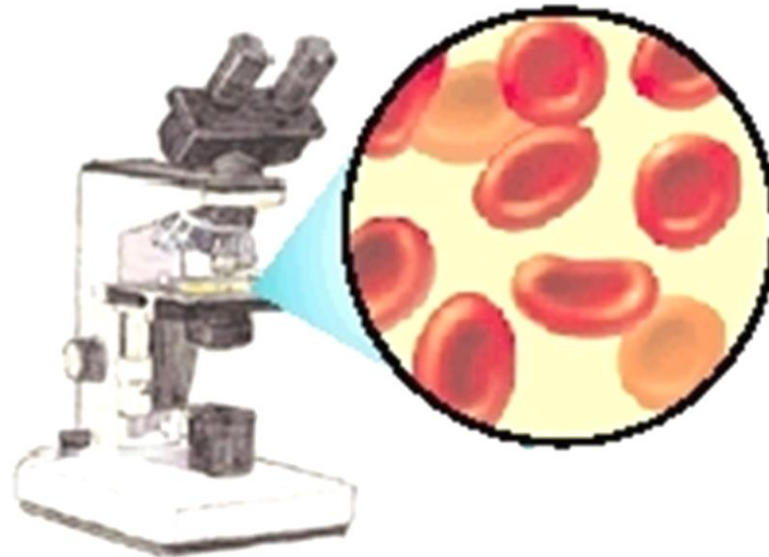




**MACROEMATURIA**



**MICROEMATURIA**

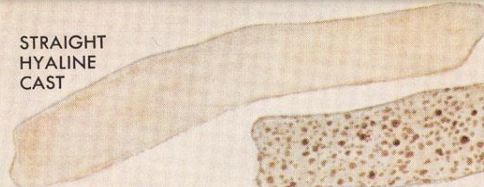


**Carmelo  
Libetta**

**EMATURIA**



STRAIGHT  
HYALINE  
CAST



FINELY GRANULAR CAST



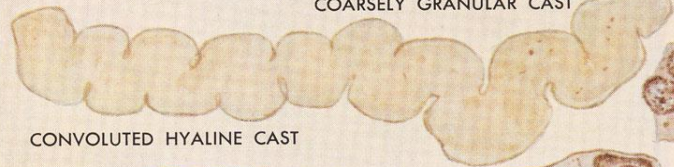
COARSELY GRANULAR CAST



WAXY  
CAST



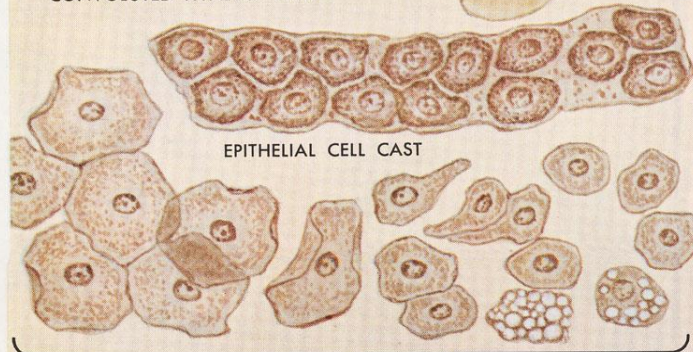
CONVOLUTED HYALINE CAST



WHITE BLOOD CELL CAST

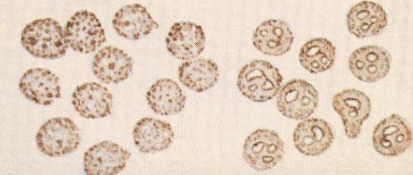


EPITHELIAL CELL CAST



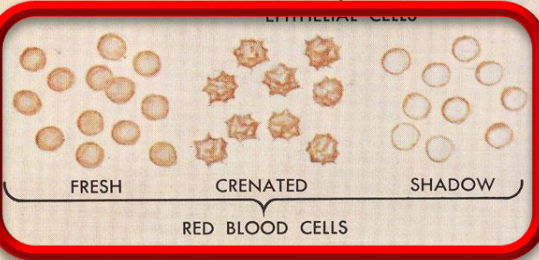
ORDINARY  
APPEARANCE

TREATED WITH  
ACETIC ACID



LEUKOCYTES

EPITHELIAL CELLS



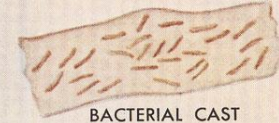
FRESH

CRENATED

SHADOW

RED BLOOD CELLS

BACTERIAL CAST



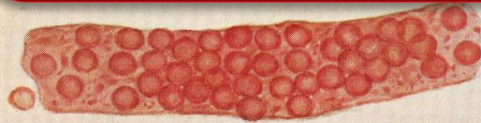
BACTERIA



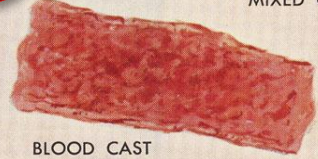
MIXED CELL CAST



RED BLOOD CELL CAST

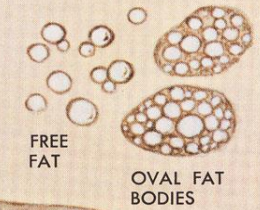


BLOOD CAST

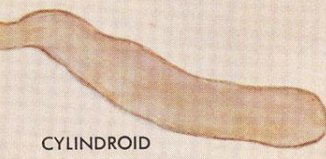


FREE  
FAT

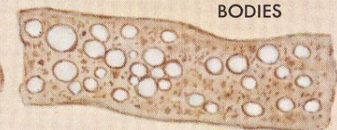
OVAL FAT  
BODIES



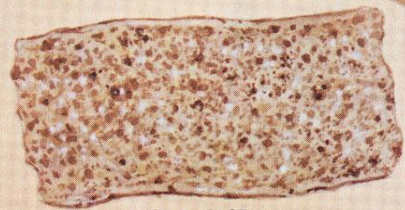
CYLINDROID



FATTY CAST



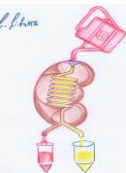
BROAD CAST



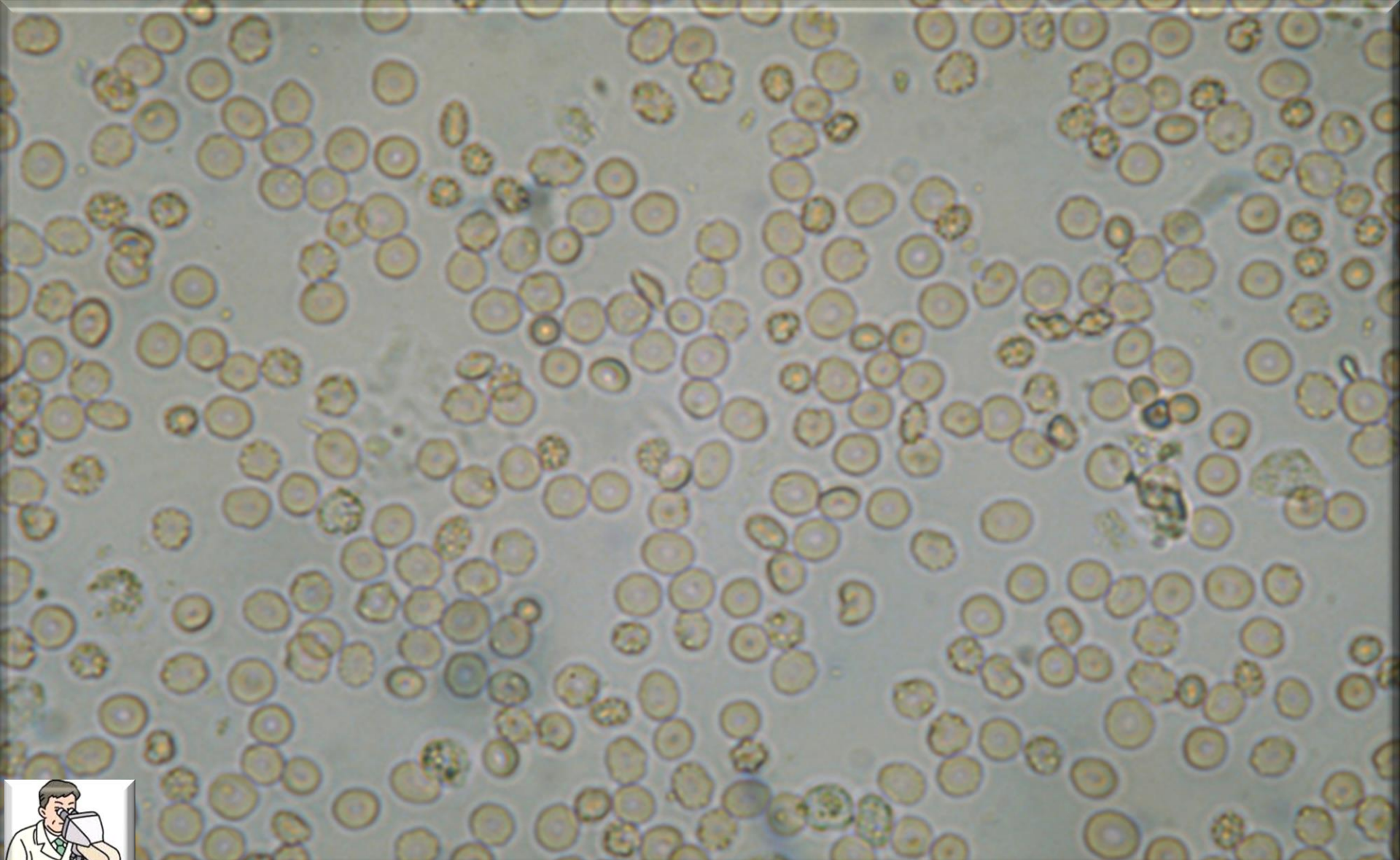
MUCOUS THREADS



*Netter*  
M.D.  
© CIBA

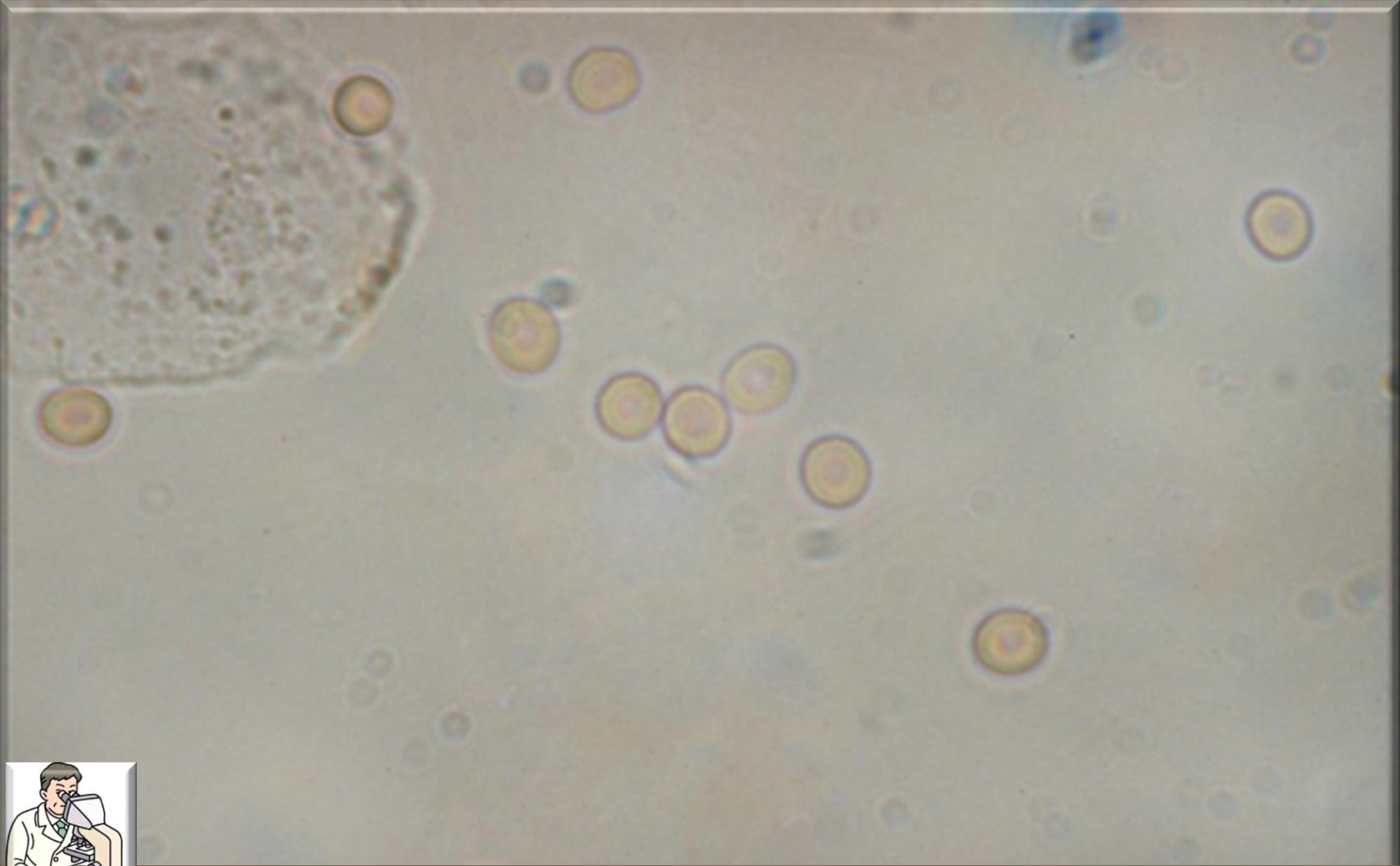


Carmelo  
Libetta



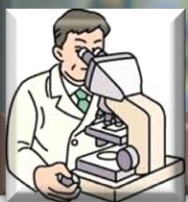
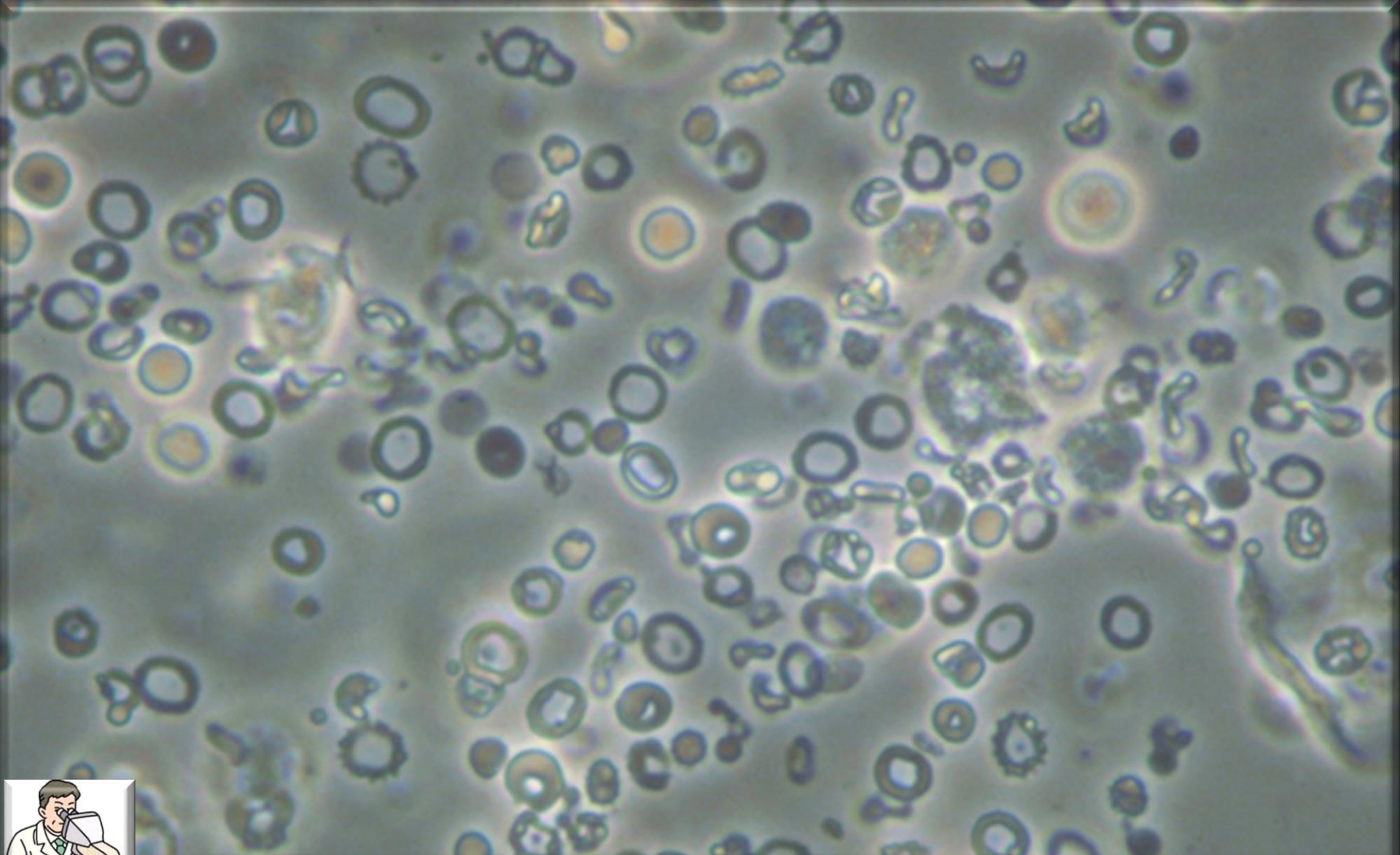
Carmelo  
Libetta

Ematuria



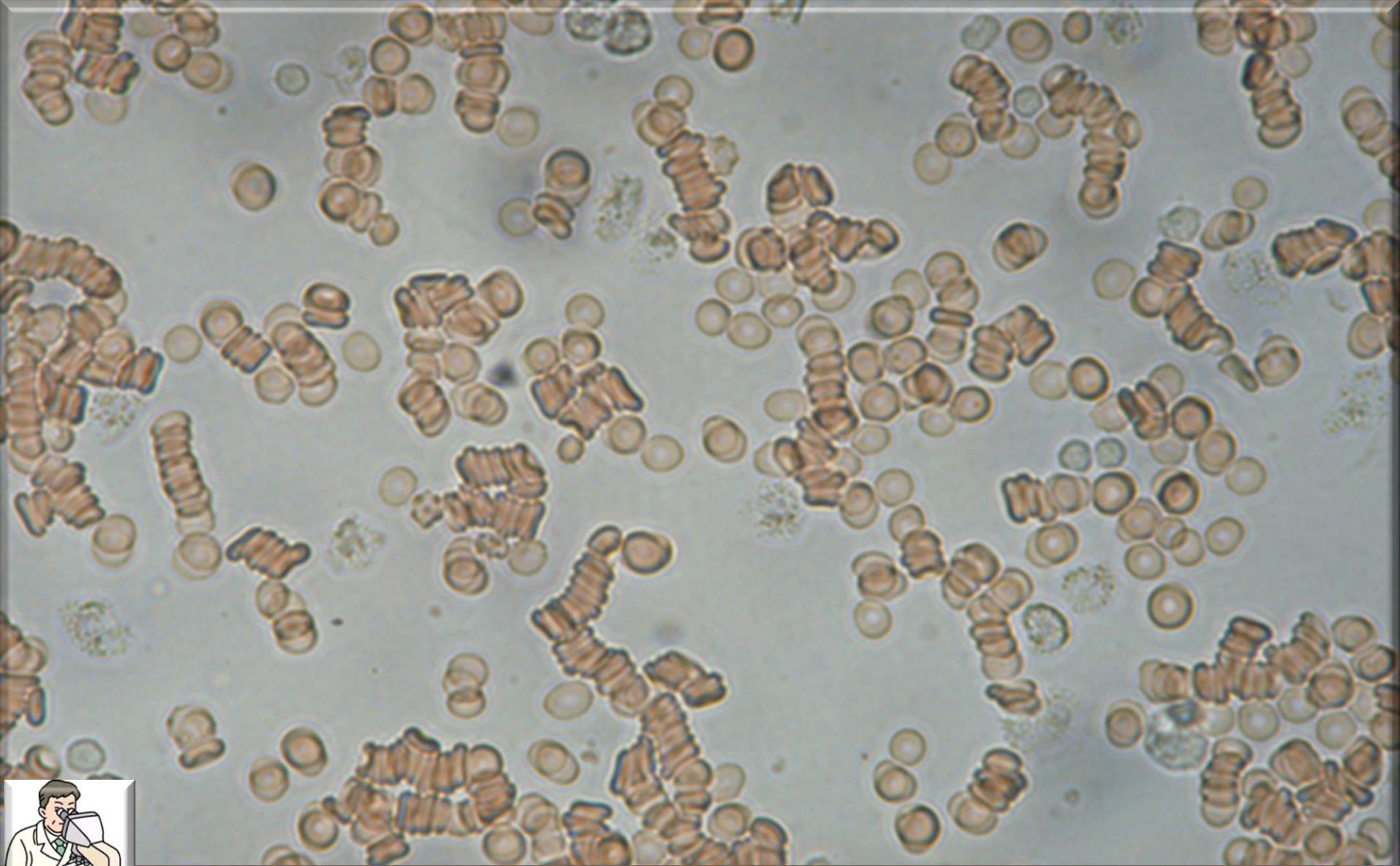
Carmelo  
Libetta

# Emazie monomorfe



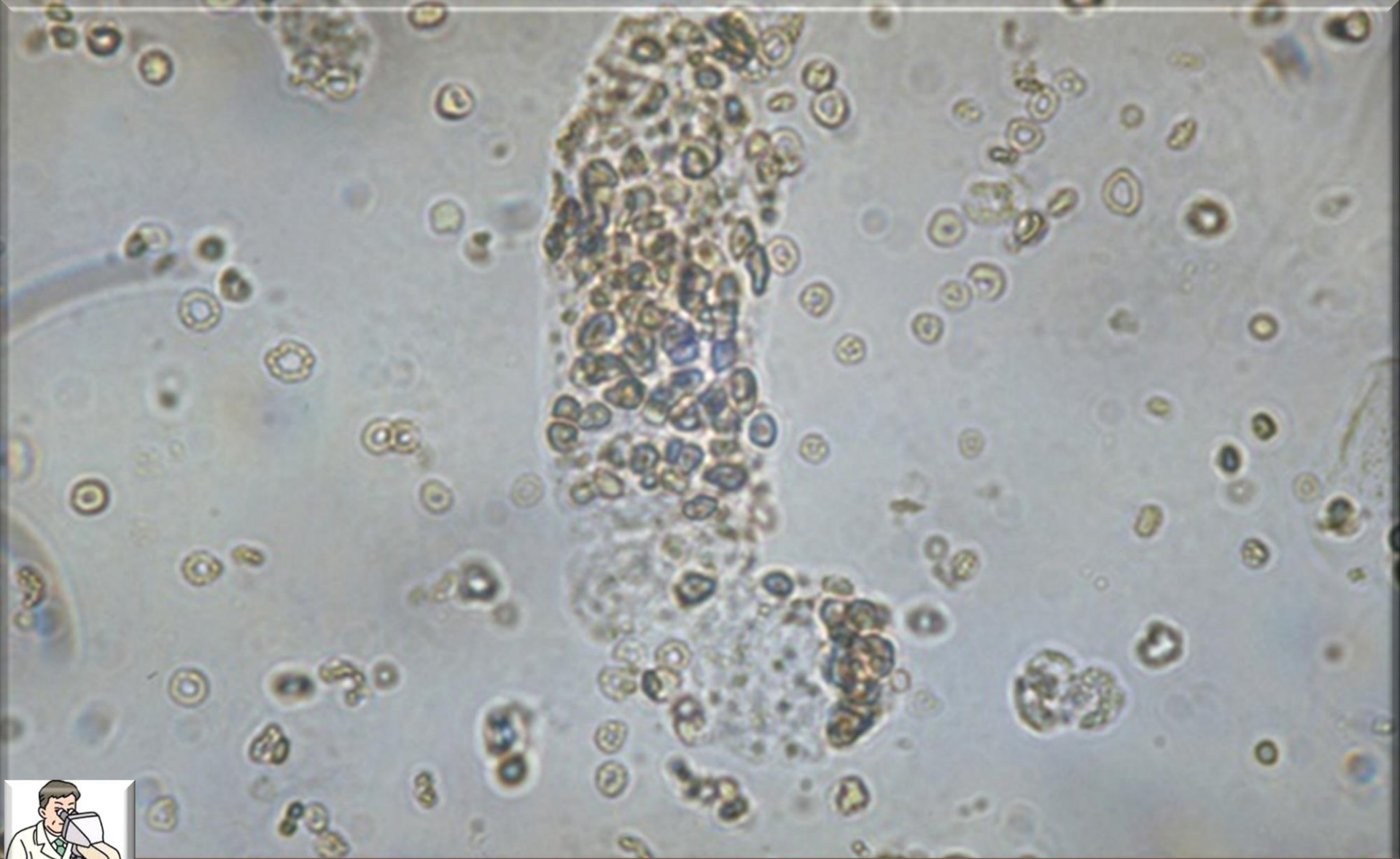
Carmelo  
Libetta

Emazie polimorfe



Carmelo  
Libetta

Emazie impilate



**Carmelo  
Libetta**

**Emazie dismorfiche e cilindro eritrocitario**

## Prova dei tre bicchieri

(criterio orientativo per la diagnosi di sede di origine di un'ematuria)



**Ematuria totale = probabilmente renale**



**Ematuria terminale = probabilmente vescicale**



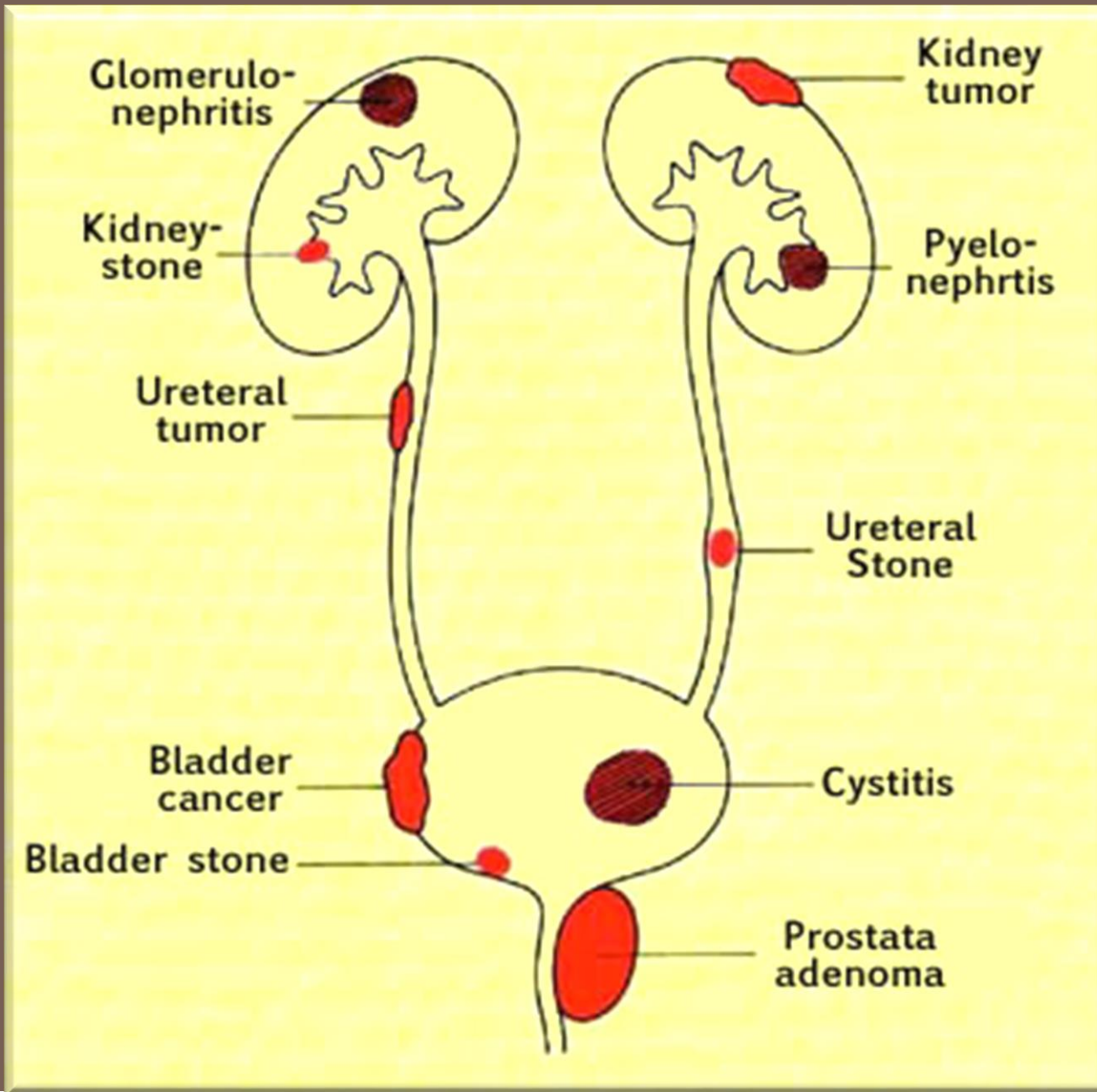
**Ematuria iniziale = probabilmente uretrale**



Carmelo  
Libetta

# EMATURIA



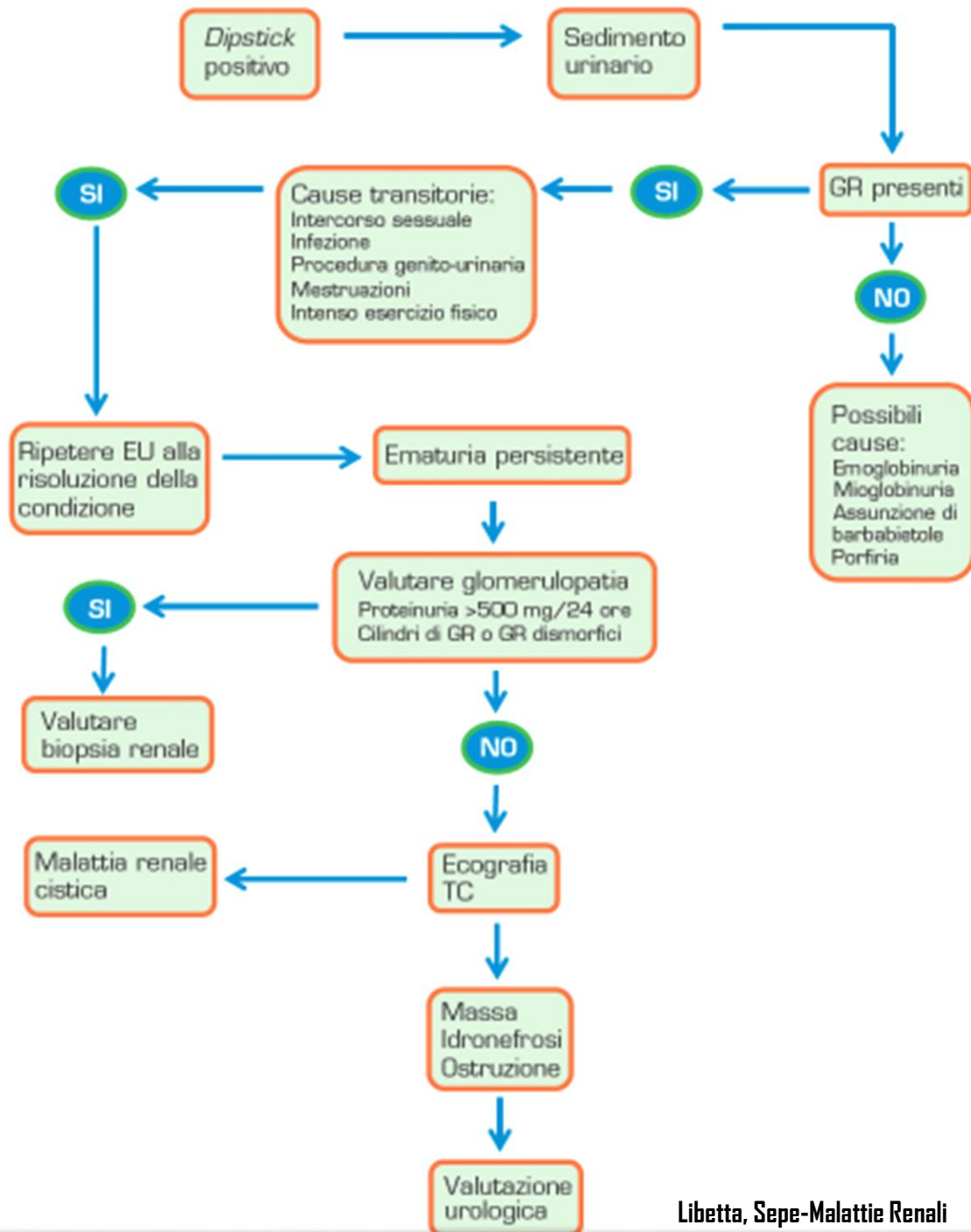


Carmelo  
Libetta

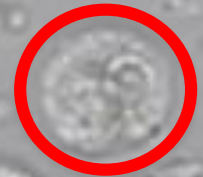
Ematuria eziologia



# Valutazione ematuria

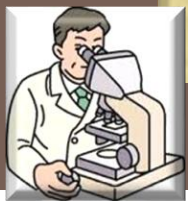
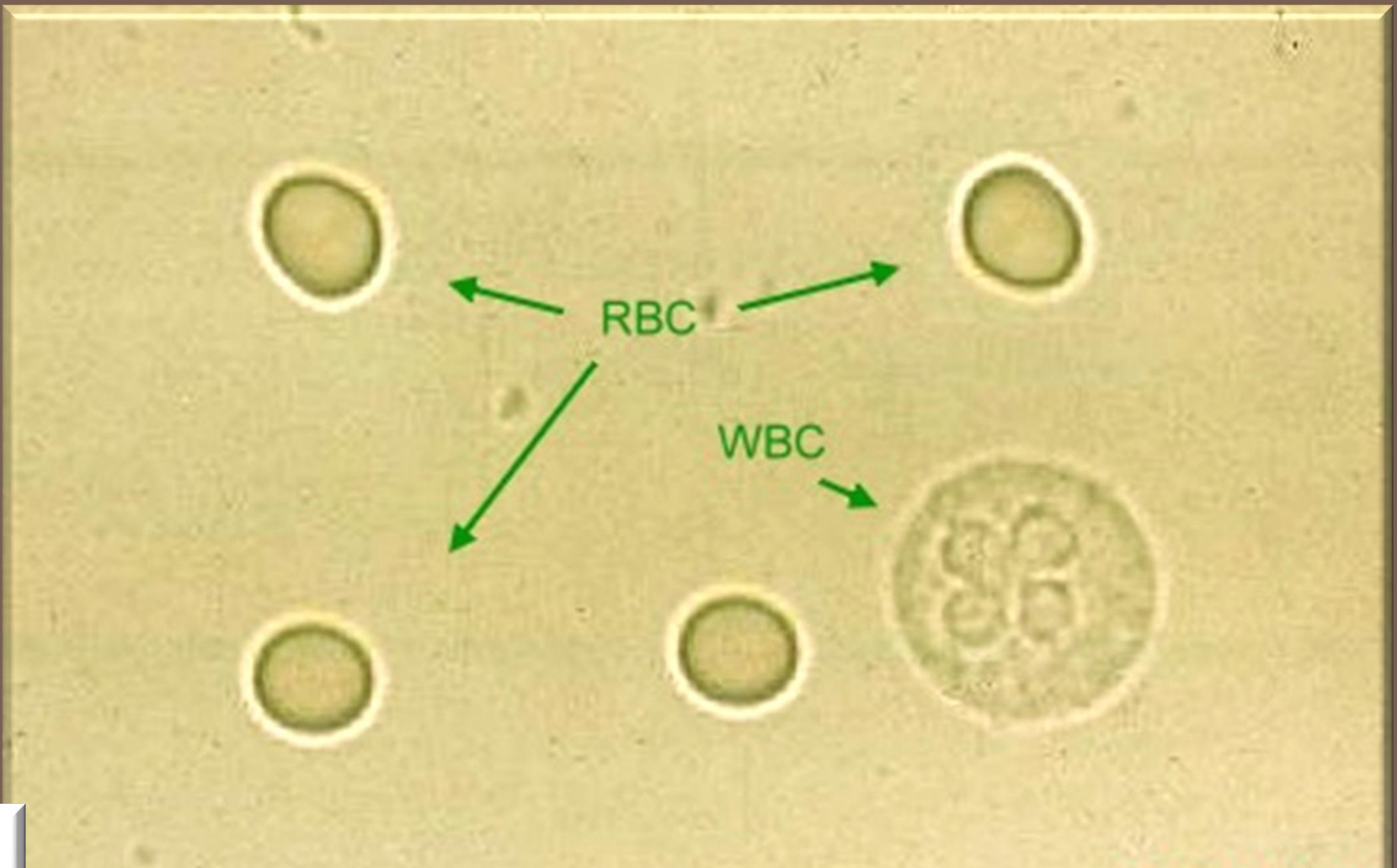


Carmelo  
Libetta



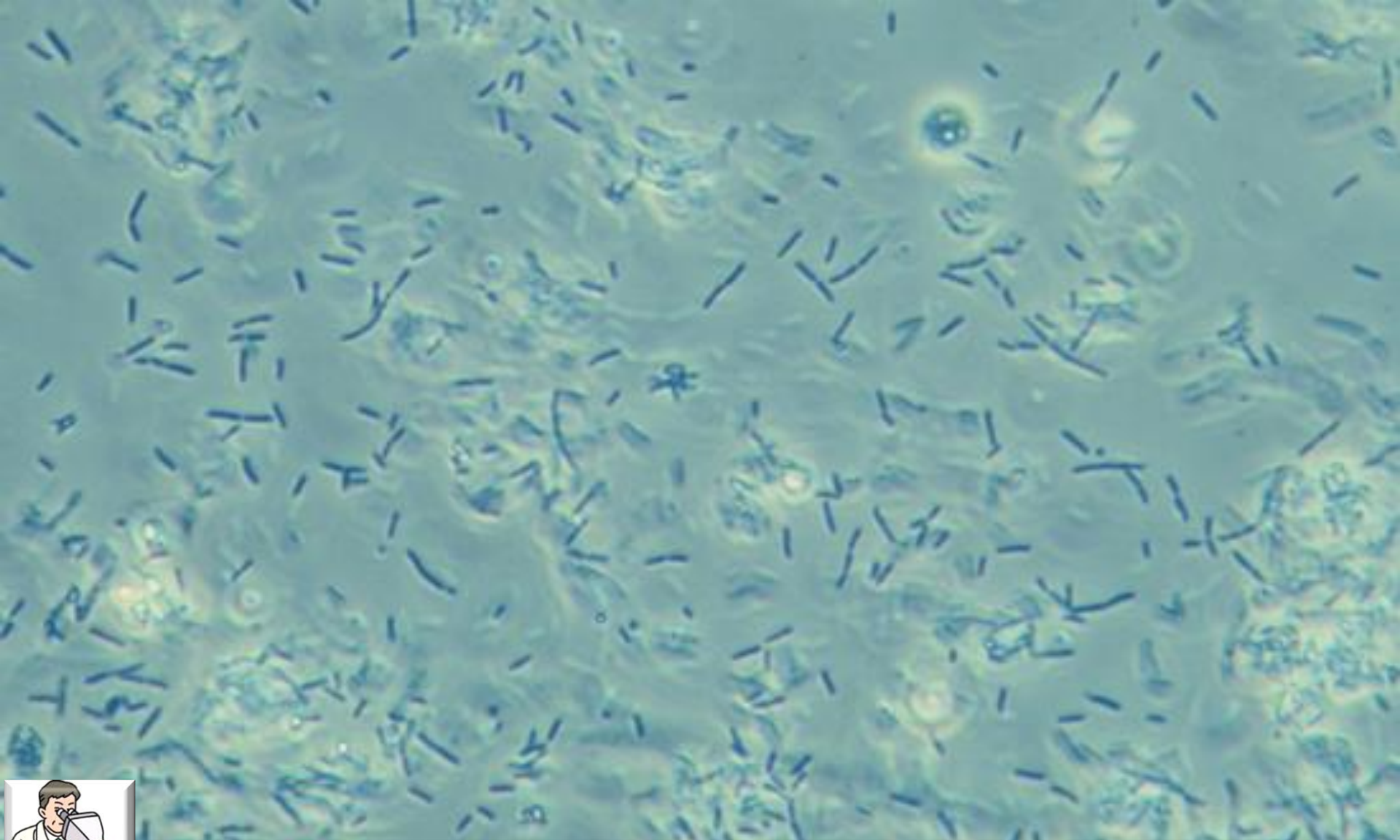
**Carmelo  
Libetta**

# Leucocyturia



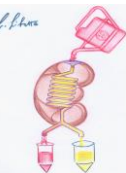
Carmelo  
Libetta

# Leucocyturia



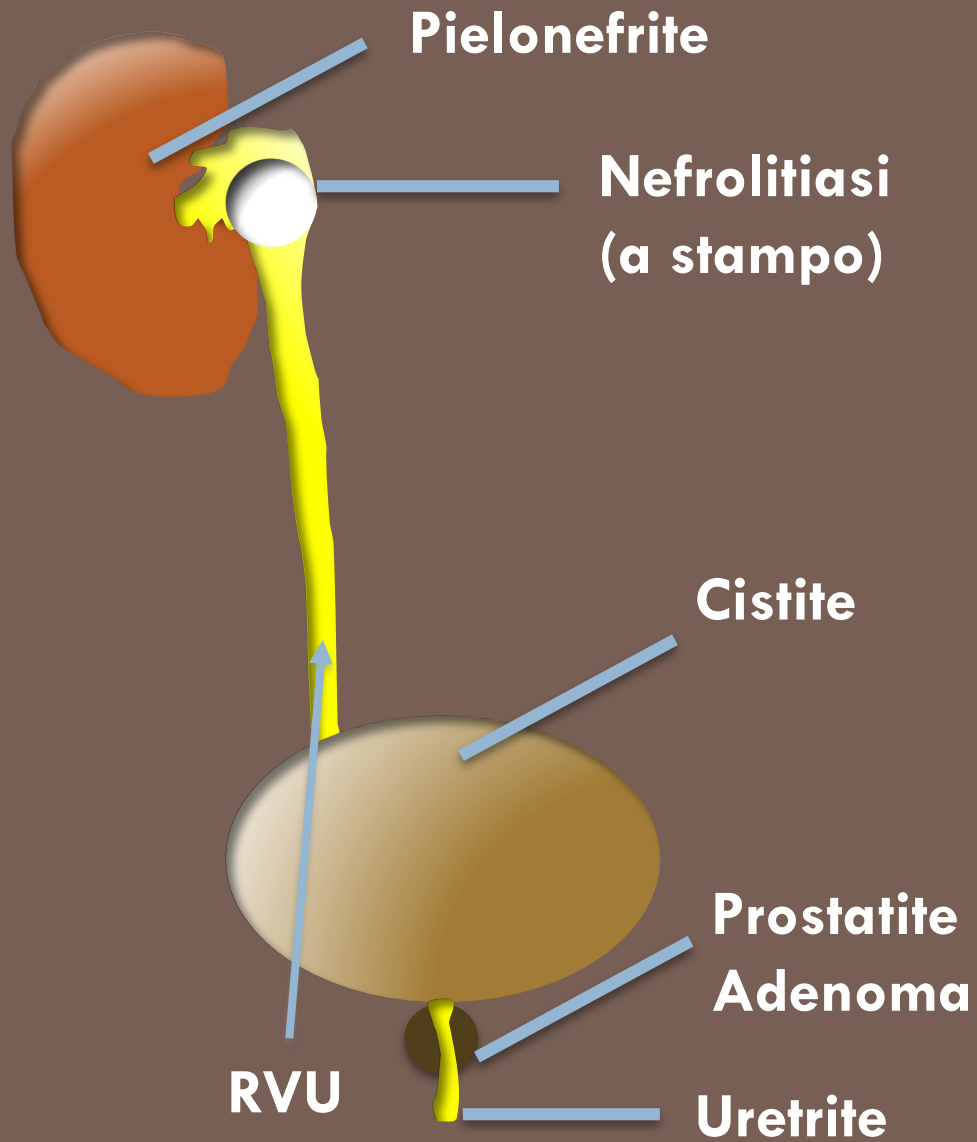
Carmelo  
Libetta

# Batteriuria



Carmelo  
Libetta

# MICETI

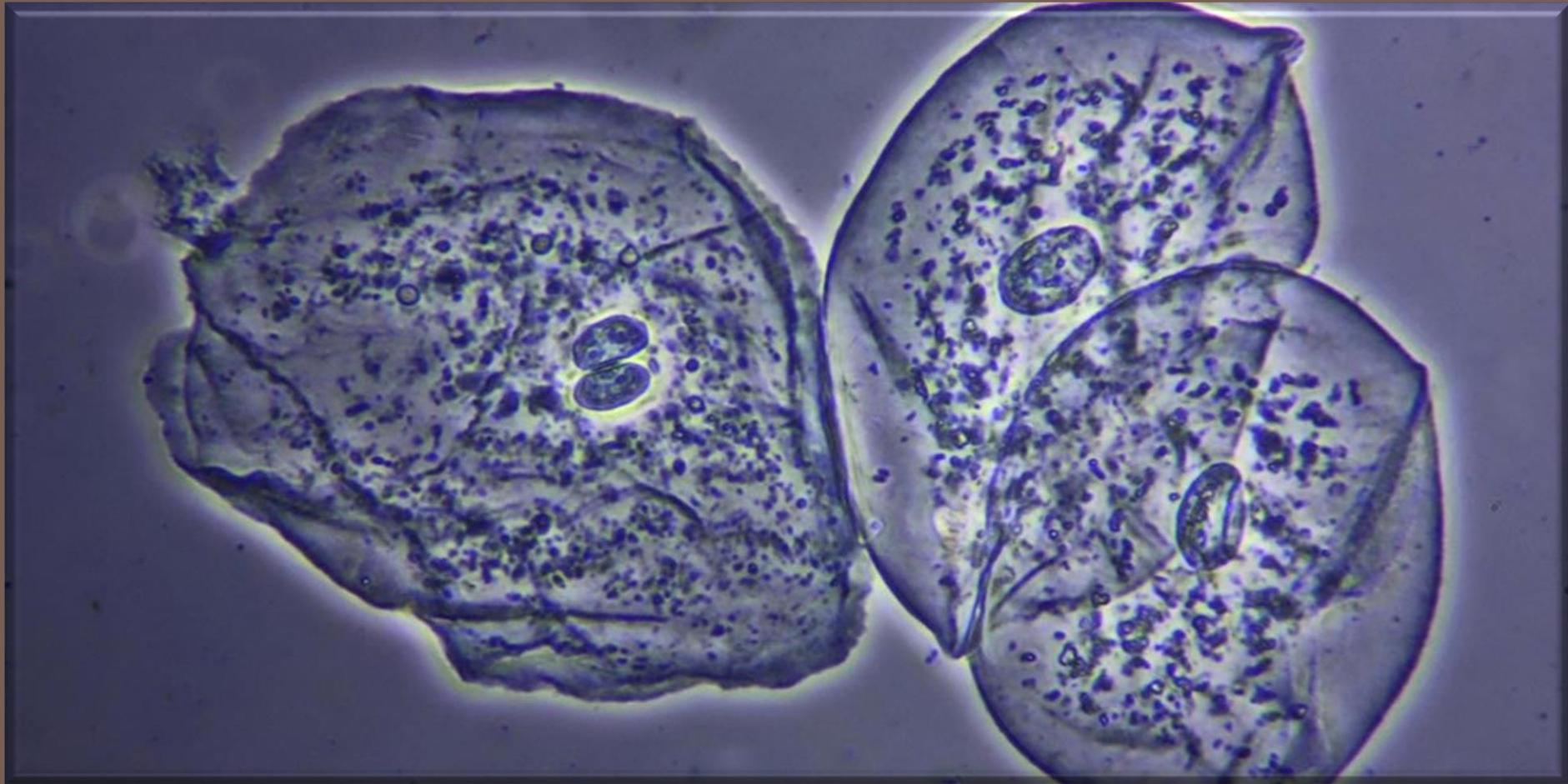


C. Libetta



Carmelo  
Libetta

# Eziologia leucocituria



**Carmelo  
Libetta**

**Cellule epiteliali di sfaldamento**





Carmelo  
Libetta

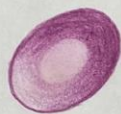
# Cellule tubulari

1. Erythrocytes (GN, stone, tumor, exogenous)
2. Renal tubular epithelial cells (many renal diseases)
  - Oval Fat bodies (Fat means nephrotic syndrome)
3. PMNs (Infection or sterile inflammation)
4. Eosinophils (Some allergic interstitial nephritis)
5. Squamous cells (CONTAMINATION)



Cellule ematiche

Emazie



Normali



Fantasma



Acantociti



Crenati

Dismorfiche

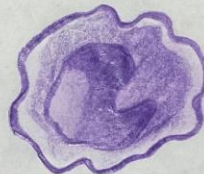
Leucociti



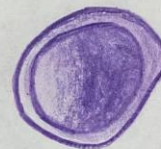
Neutrofili



Eosinofili



Monociti



Linfociti

Cellule epiteliali



Cellule tubulari



Transizionali



SPaldamento



Miceti, ife

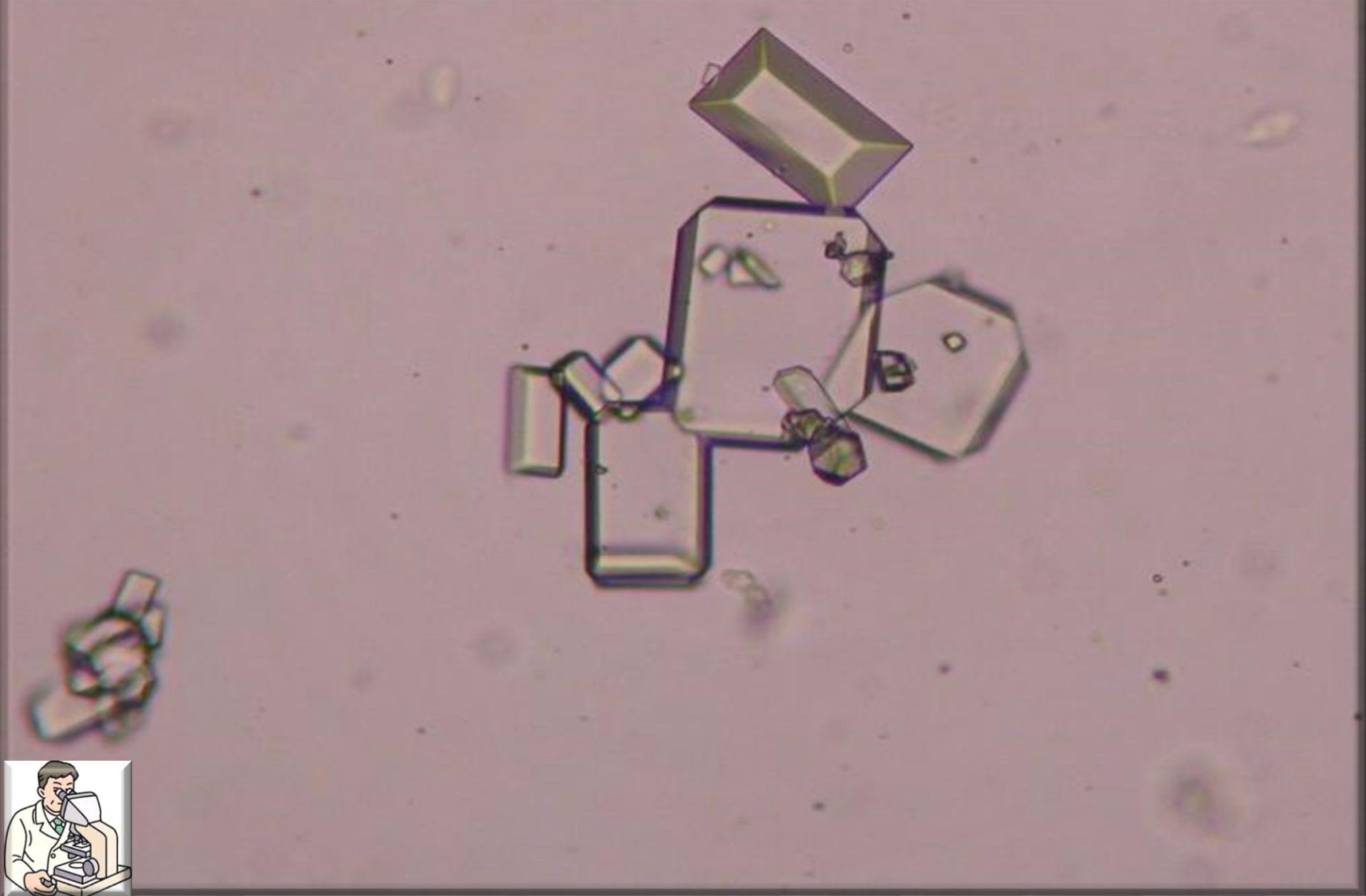


Batteri



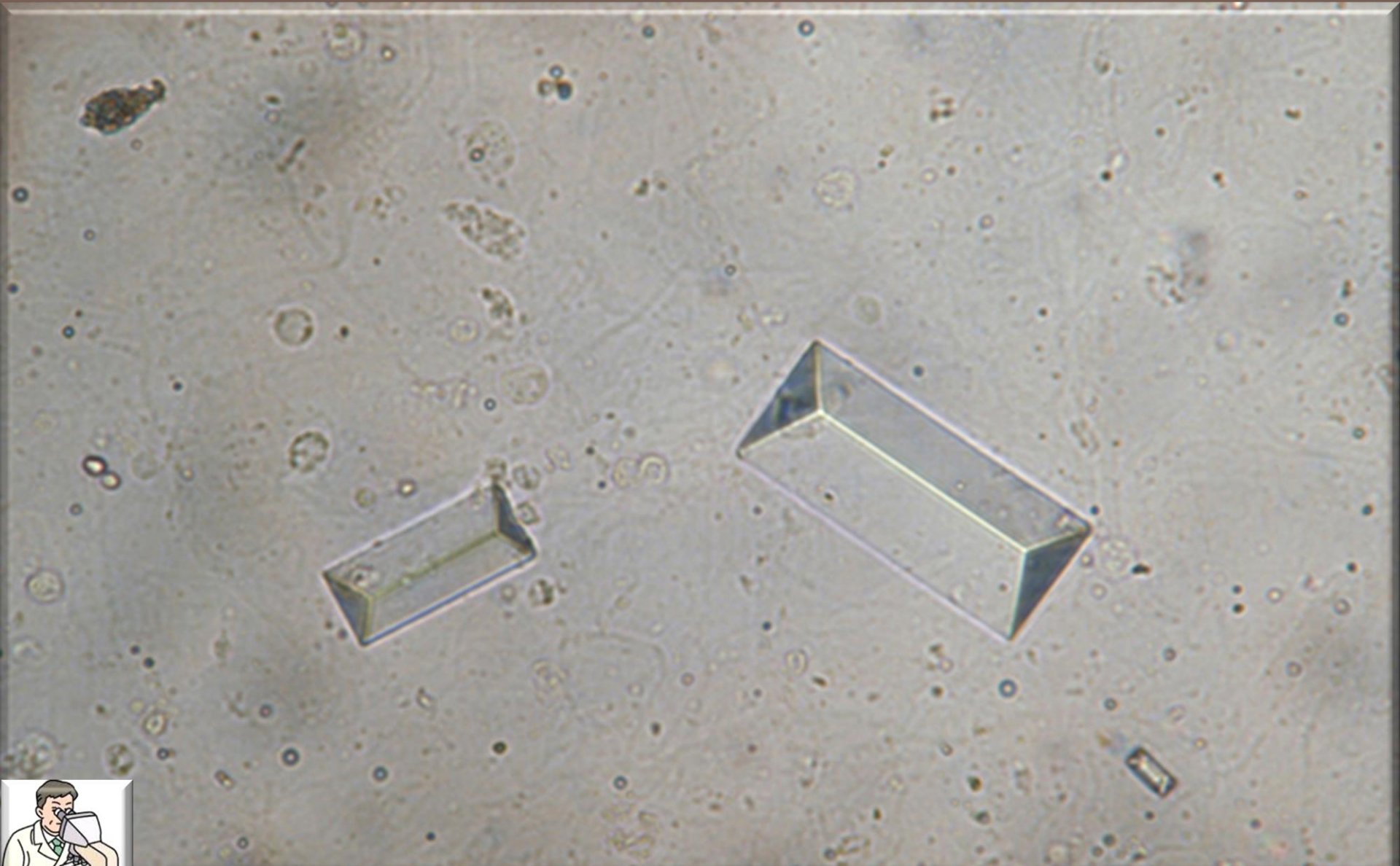
Carmelo  
Libetta

Summary



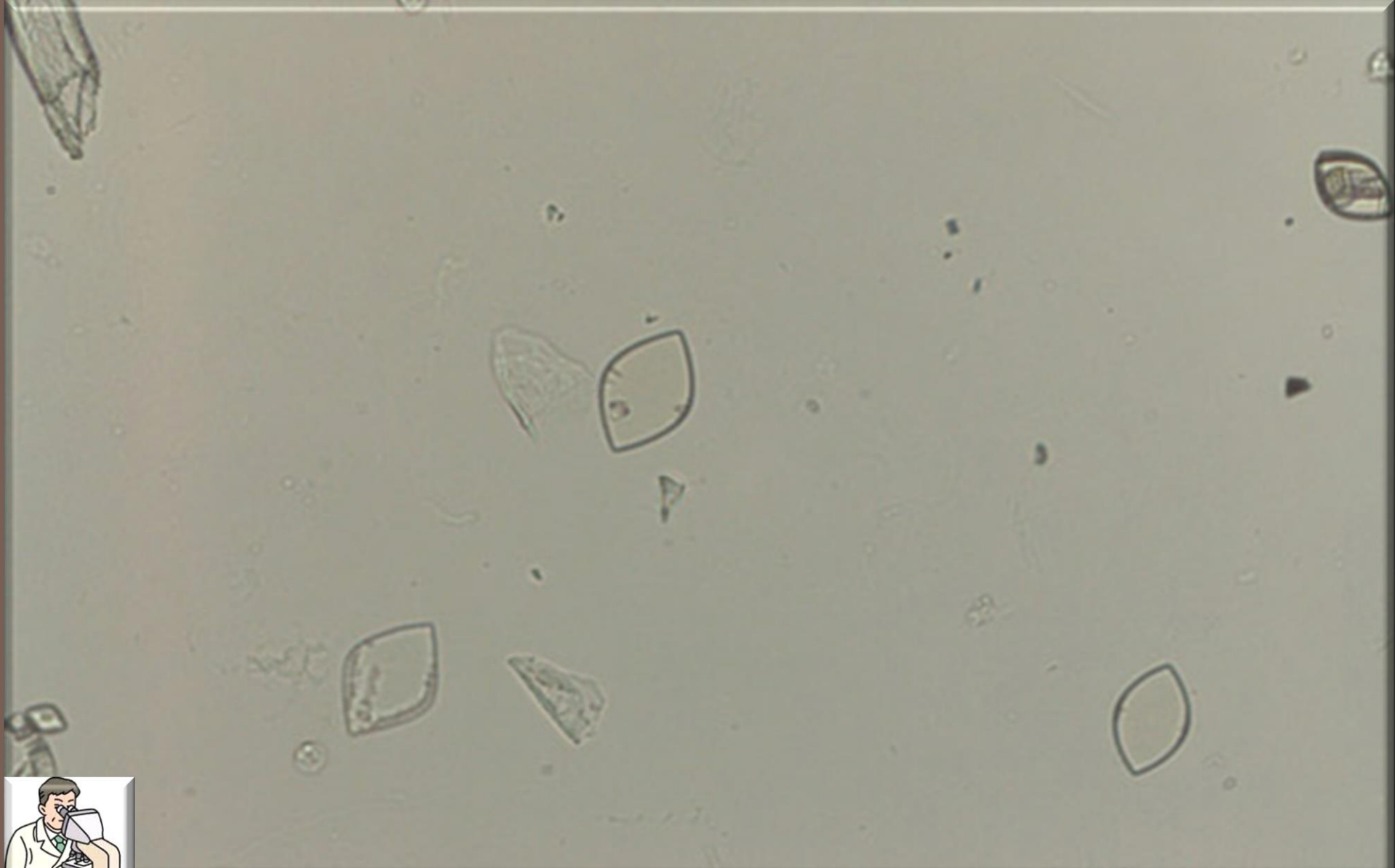
Carmelo  
Libetta

# CRISTALLURIA



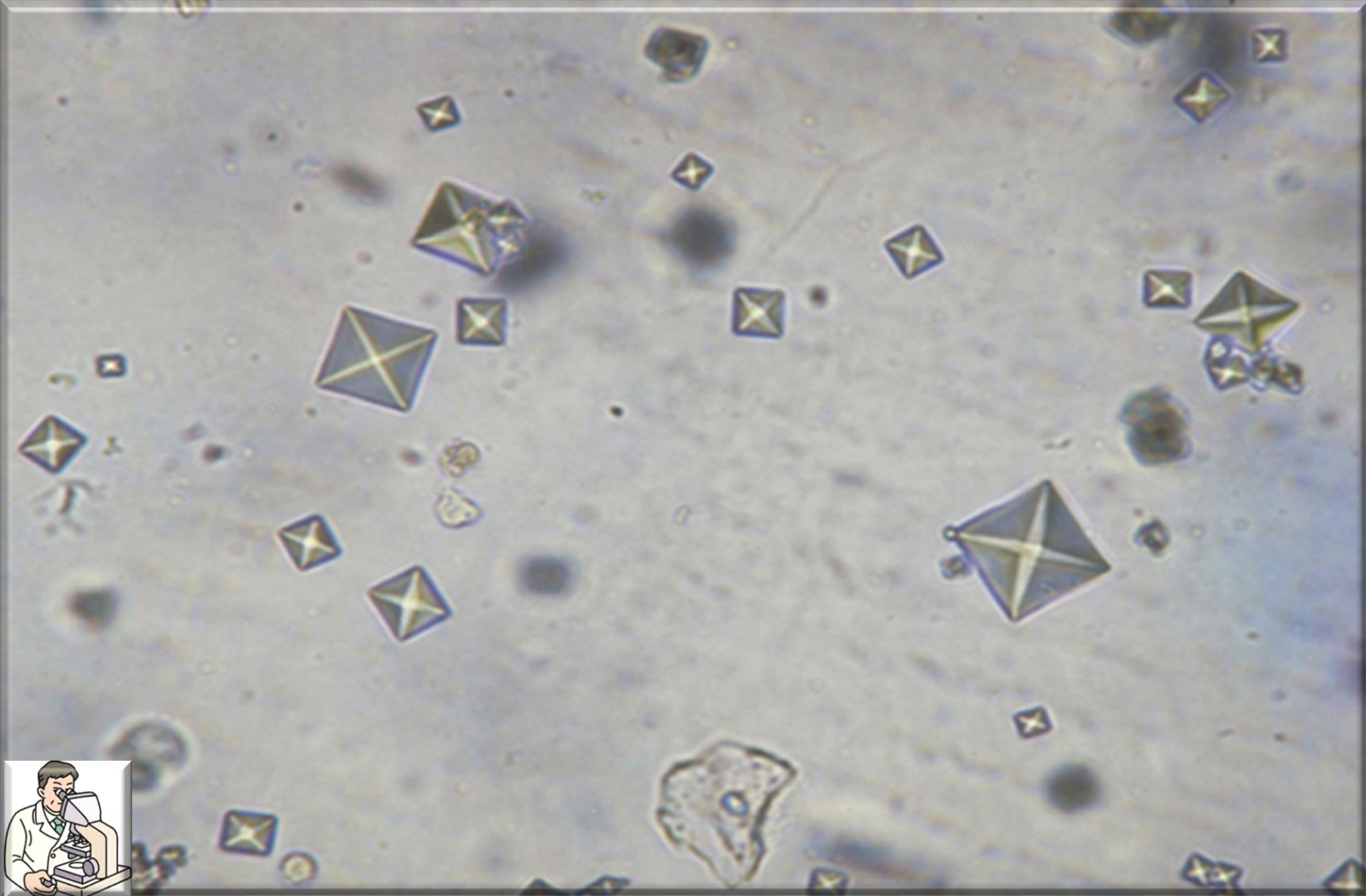
Carmelo  
Libetta

Fosfato ammonio magnesiaco



Carmelo  
Libetta

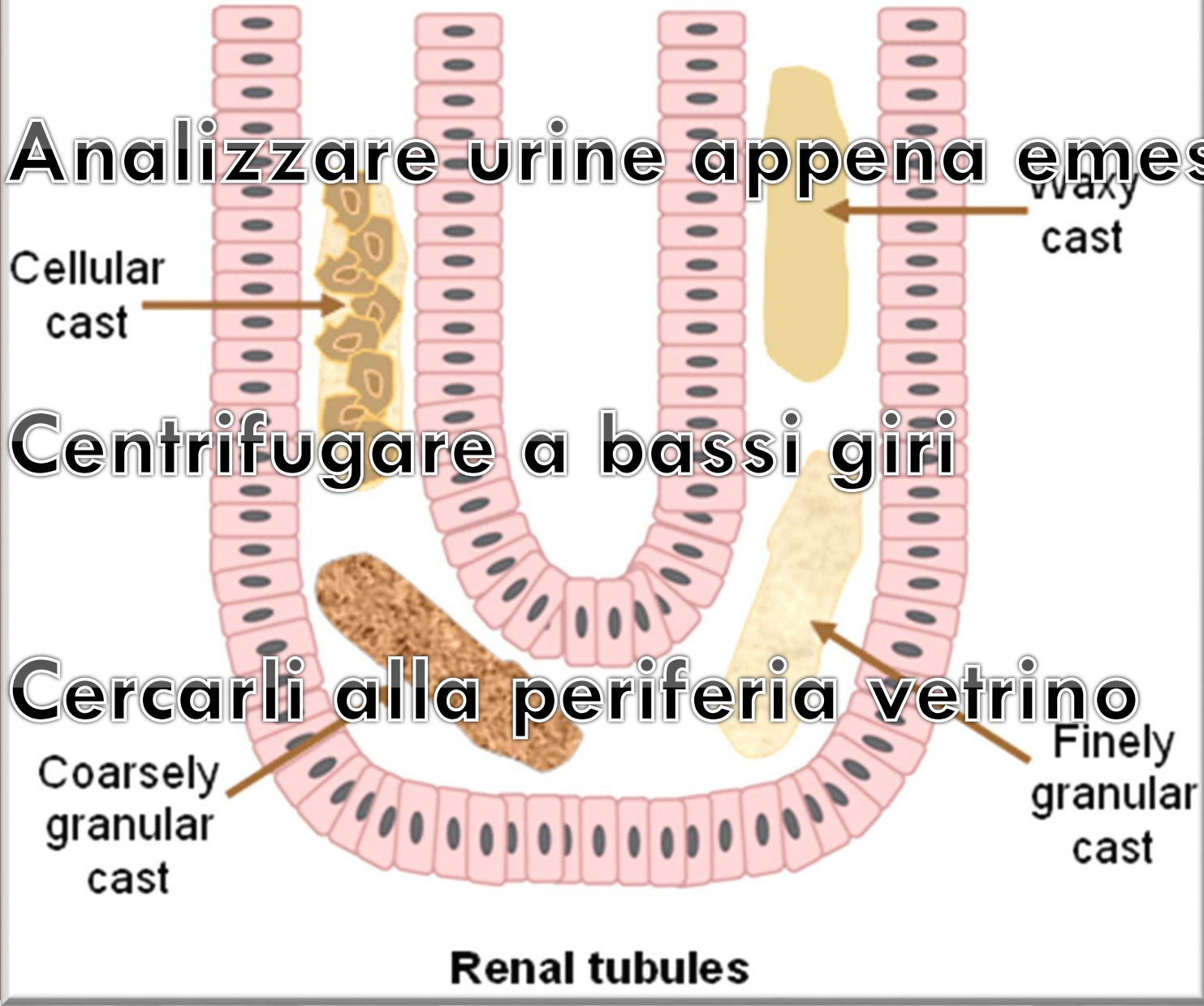
# Acido urico



Carmelo  
Libetta

# Ossalato di calcio

1) **Analizzare urine appena emesse**



2) **Centrifugare a bassi giri**

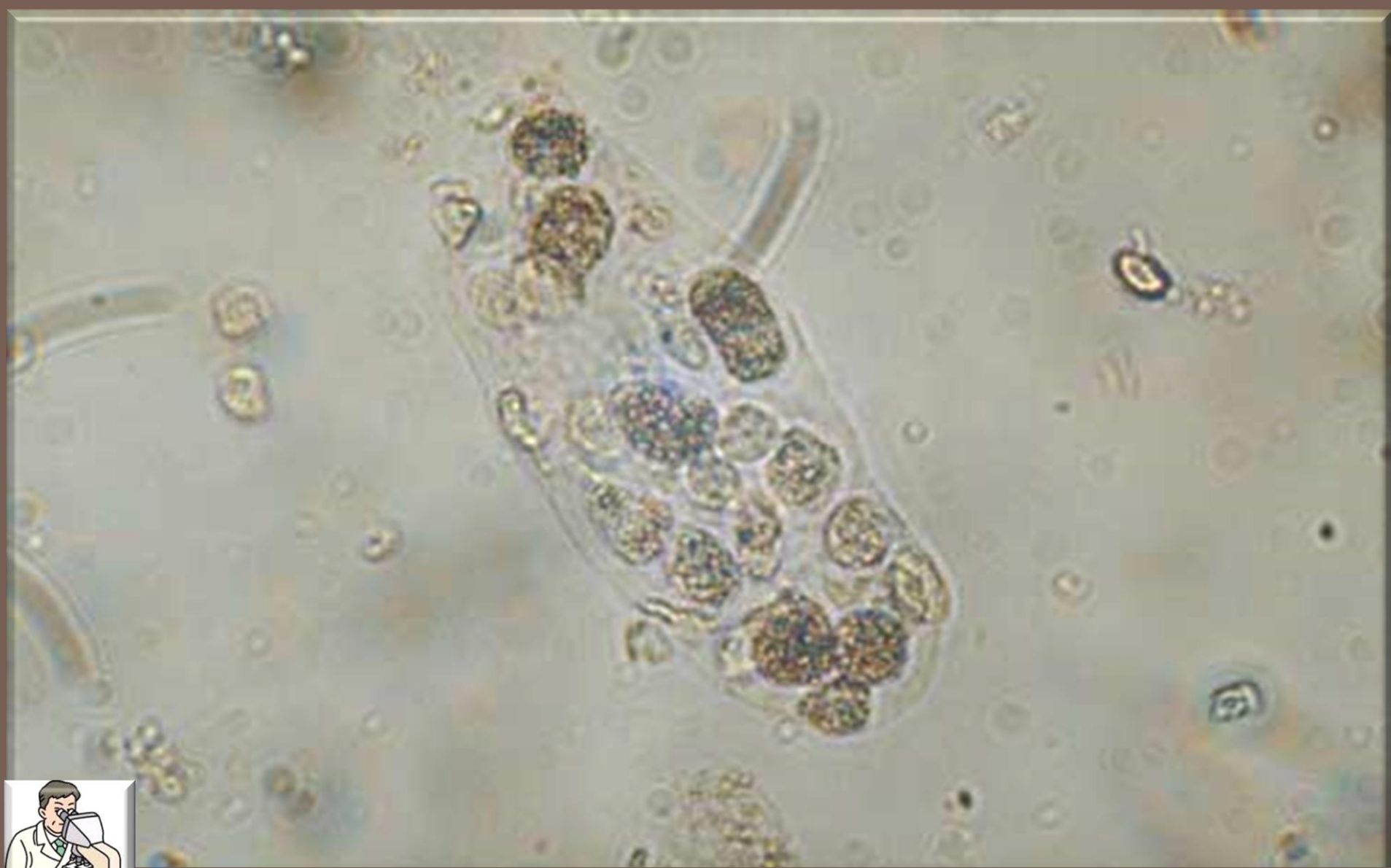
3) **Cercarli alla periferia vetrino**



**Carmelo  
Libetta**

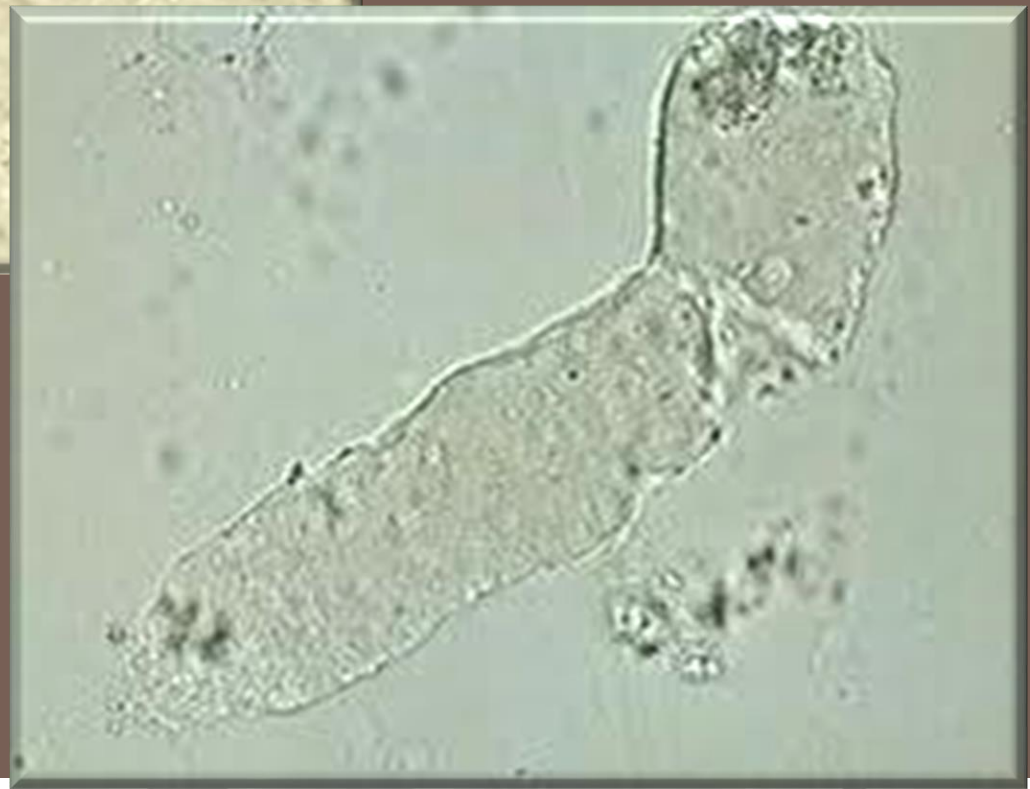
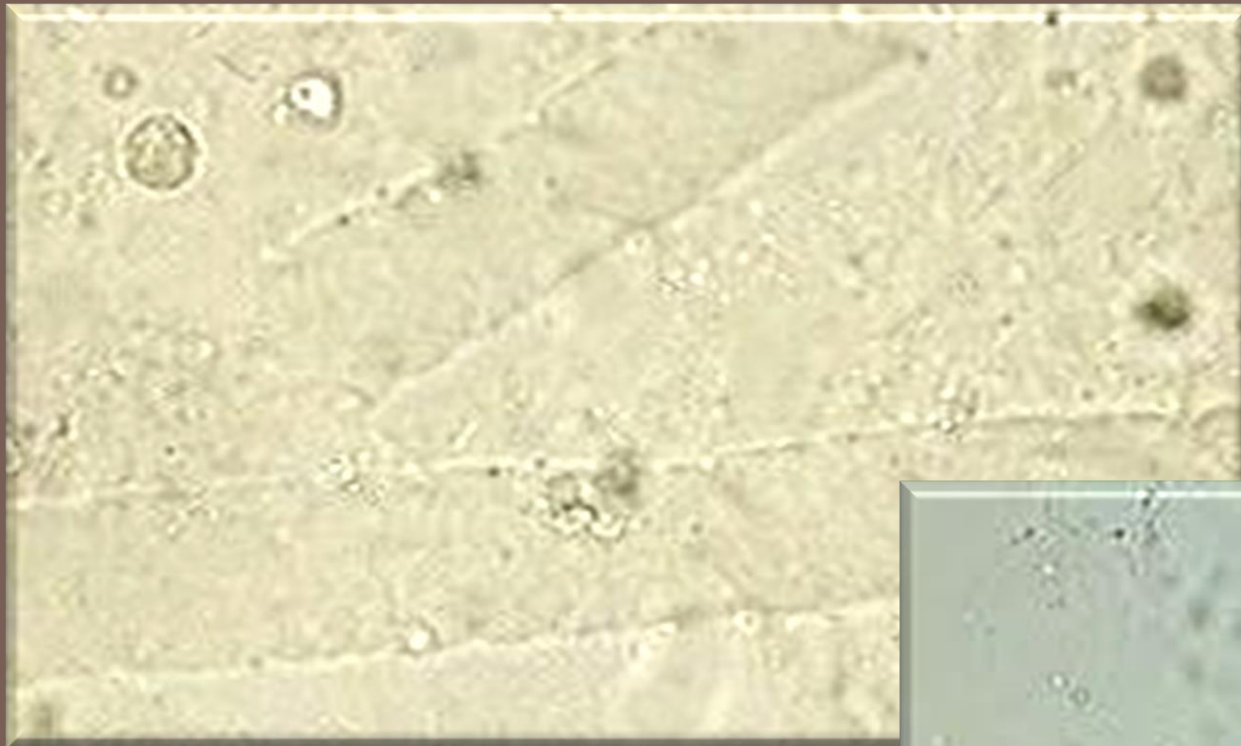
**Formazione di Cilindri**





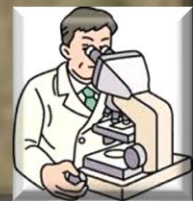
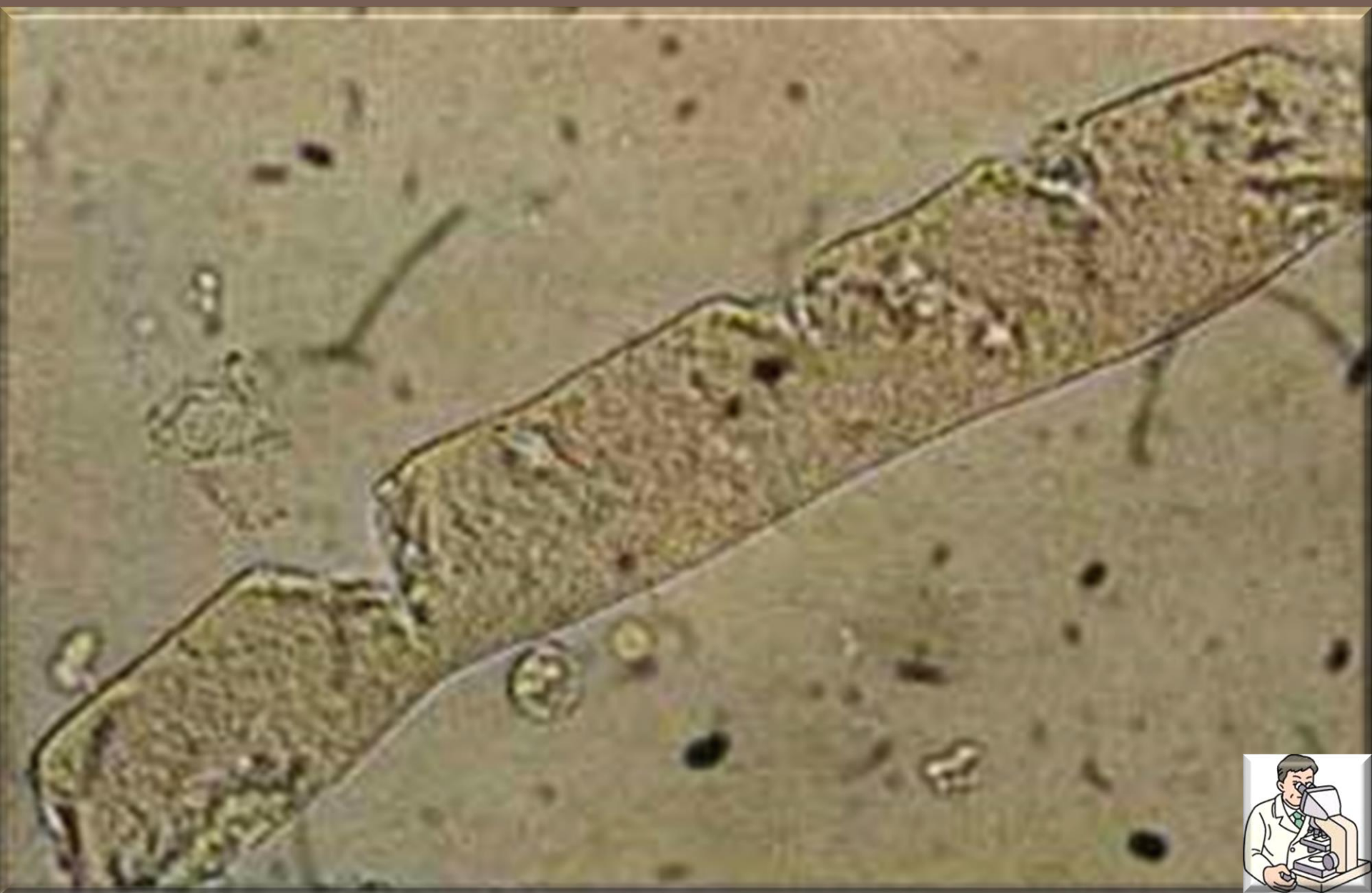
Carmelo  
Libetta

Cilindro cellulare misto



Carmelo  
Libetta

# Cilindri ialini

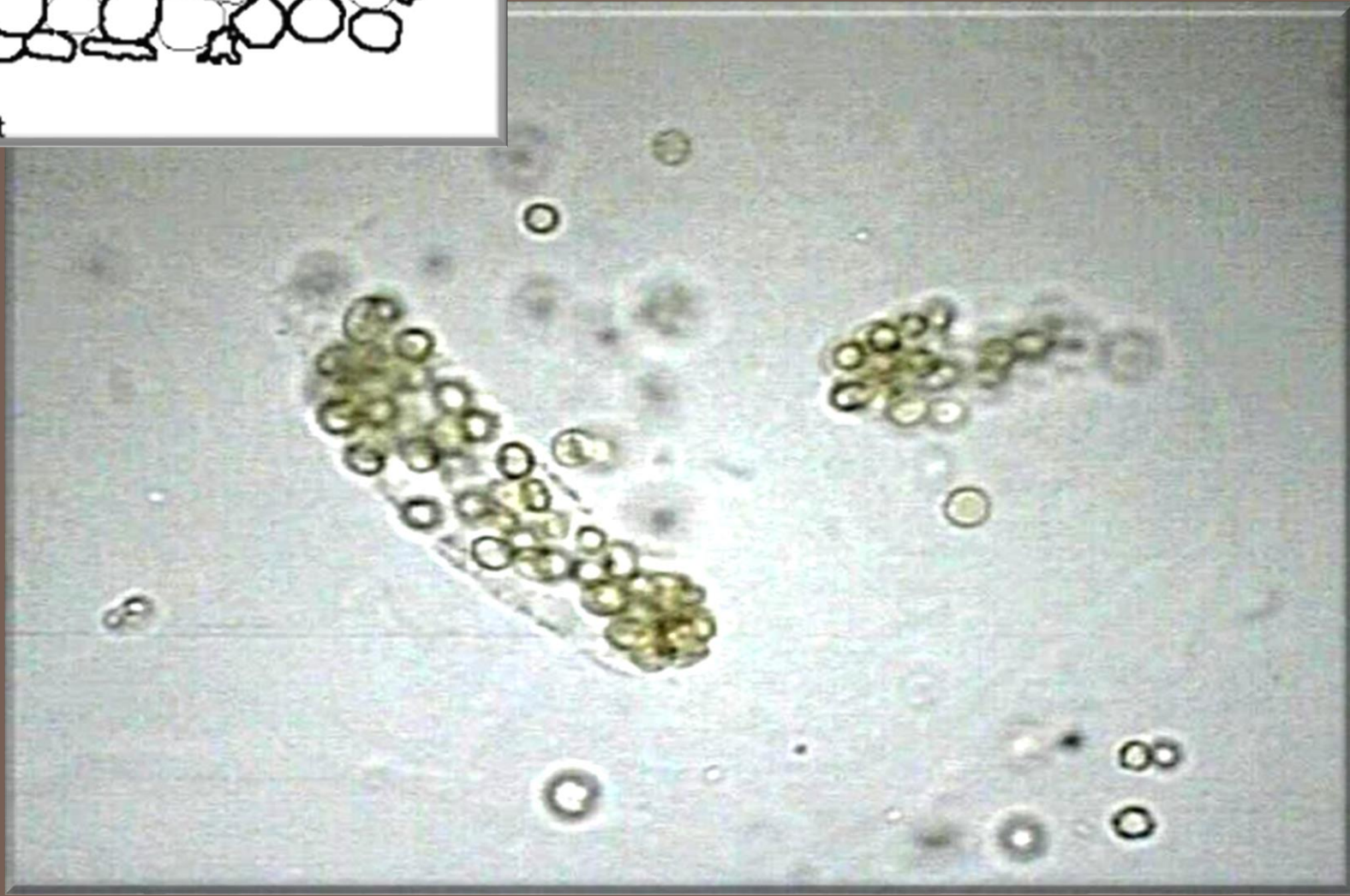


Carmelo  
Libetta

Cilindro cereo

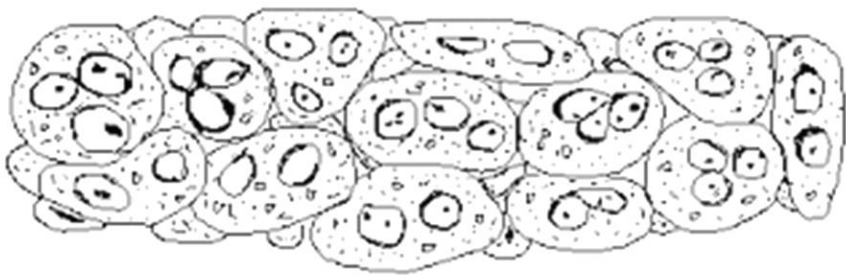


Red Blood Cell Cast

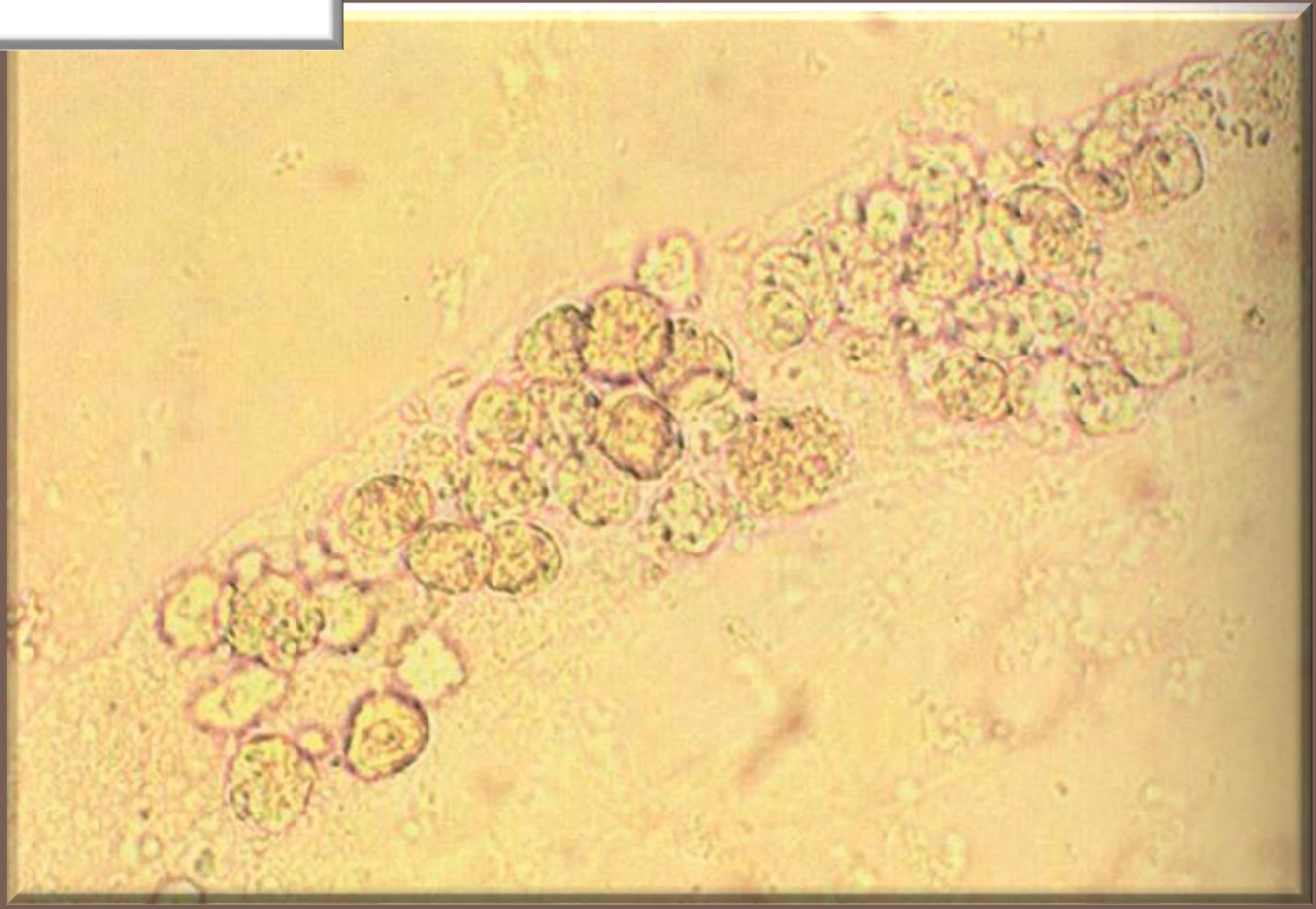


Carmelo  
Libetta

Cilindri di globuli rossi



White Blood Cell Cast



Carmelo  
Libetta

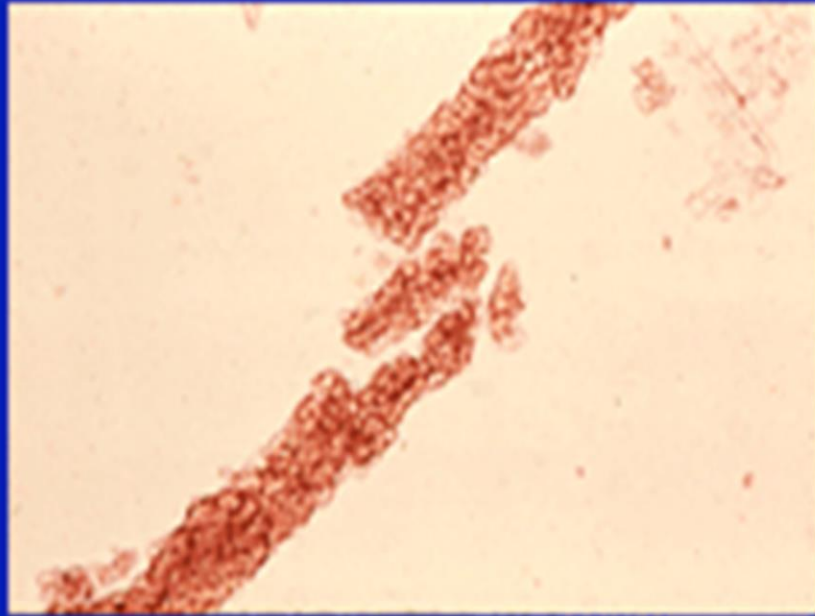
Cilindri globuli bianchi



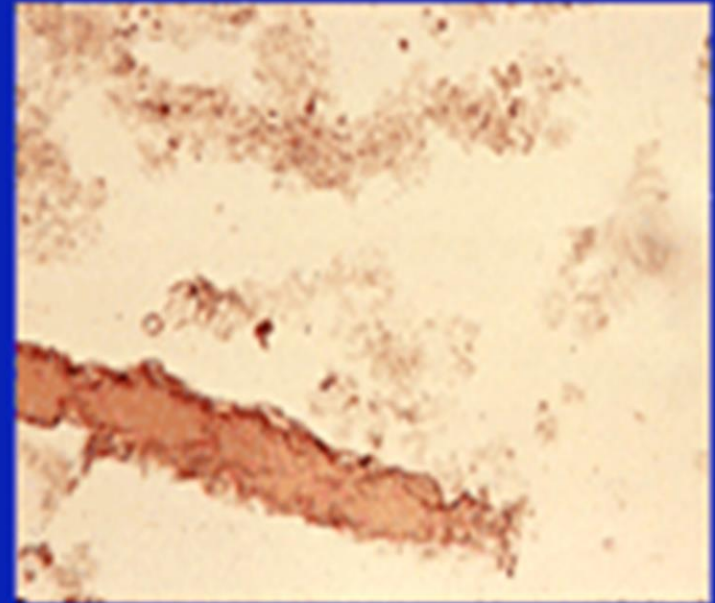
Carmelo  
Libetta

# Cilindro granulare

RBC Cast

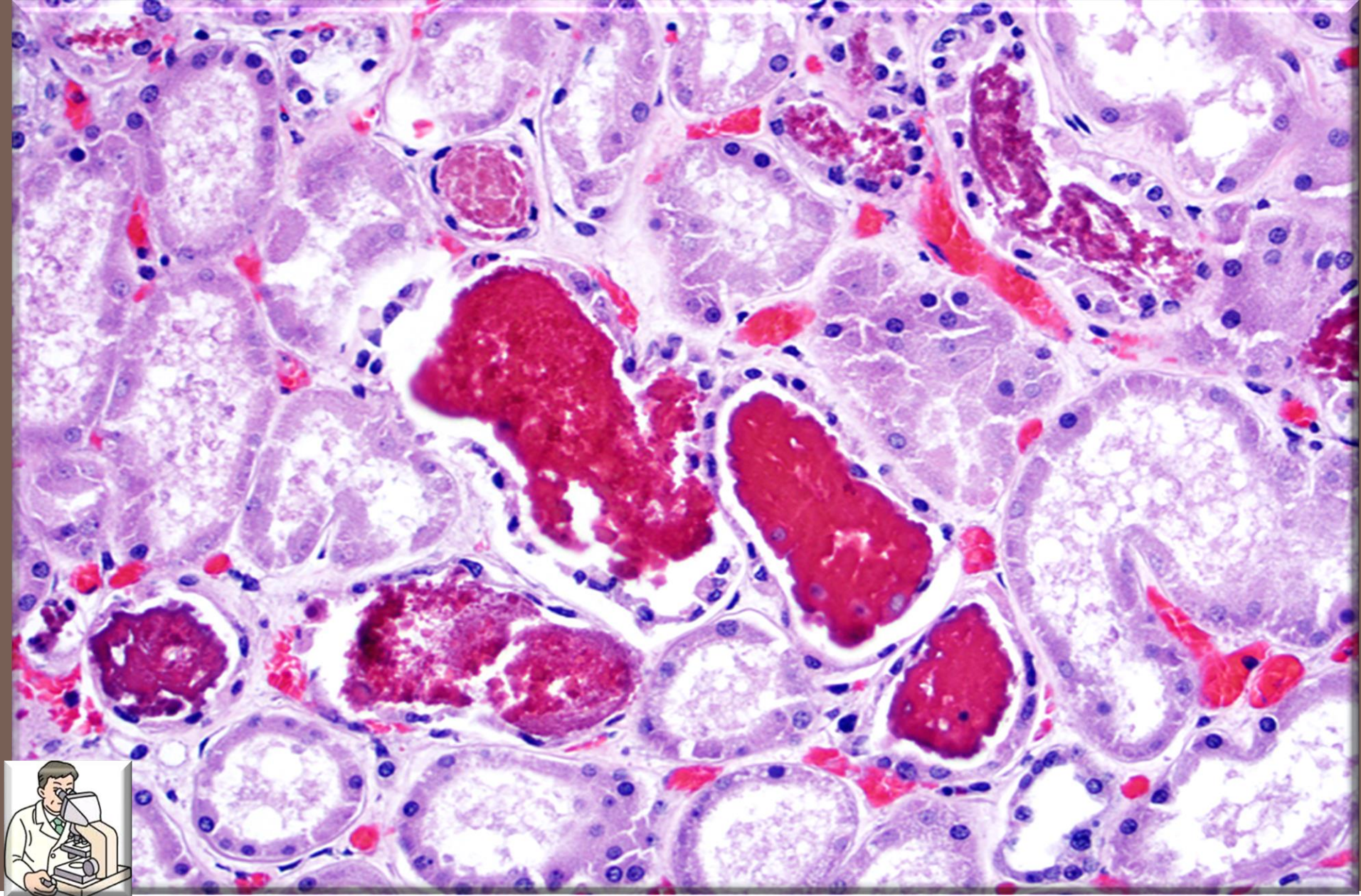


Myoglobin Cast



Carmelo  
Libetta

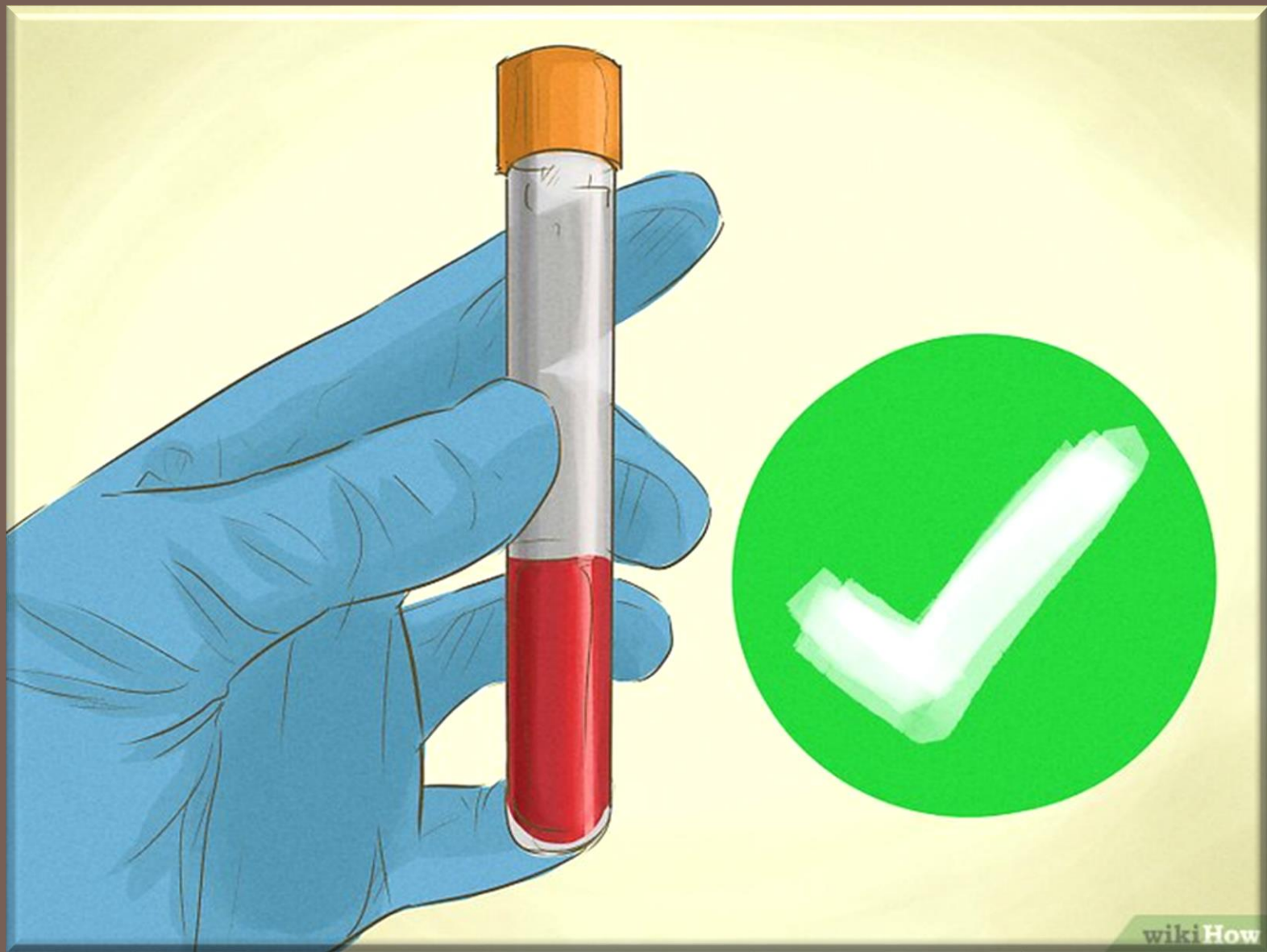
Cilindri di mioglobina



Carmelo  
Libetta

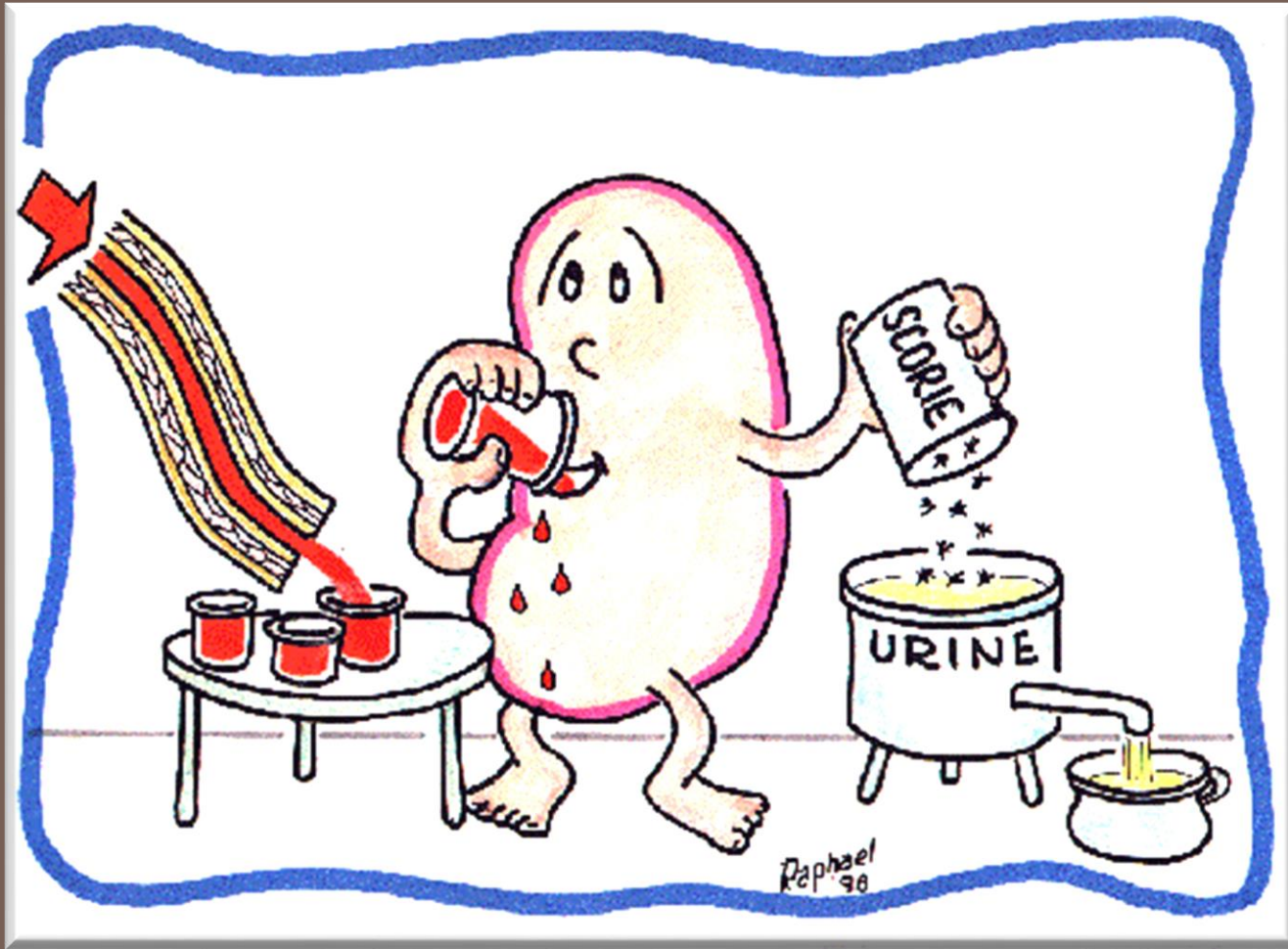
Cilindri di mioglobina





Carmelo  
Libetta

# Esami del sangue

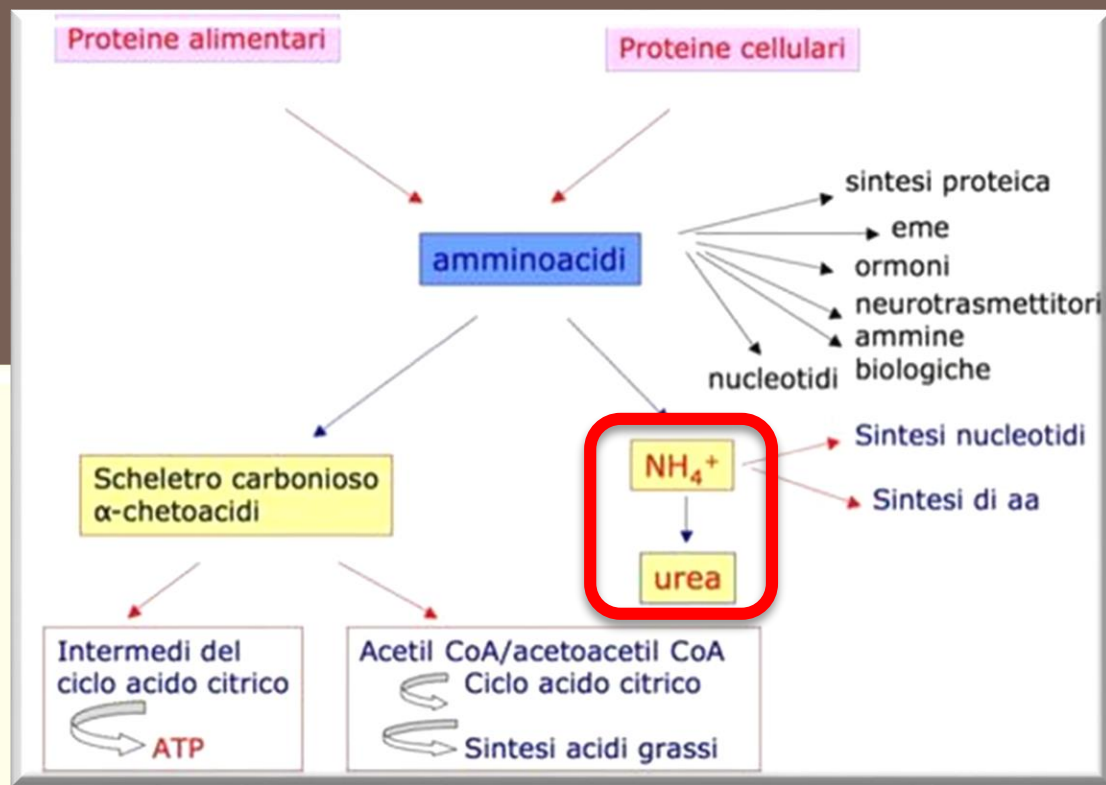
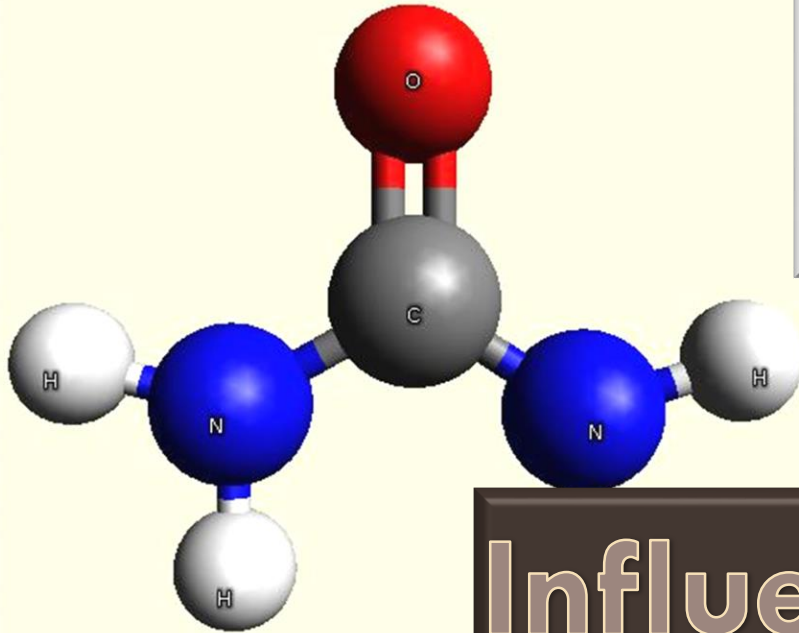


Carmelo  
Libetta

# Esami di funzione renale

60 Da

# UREA

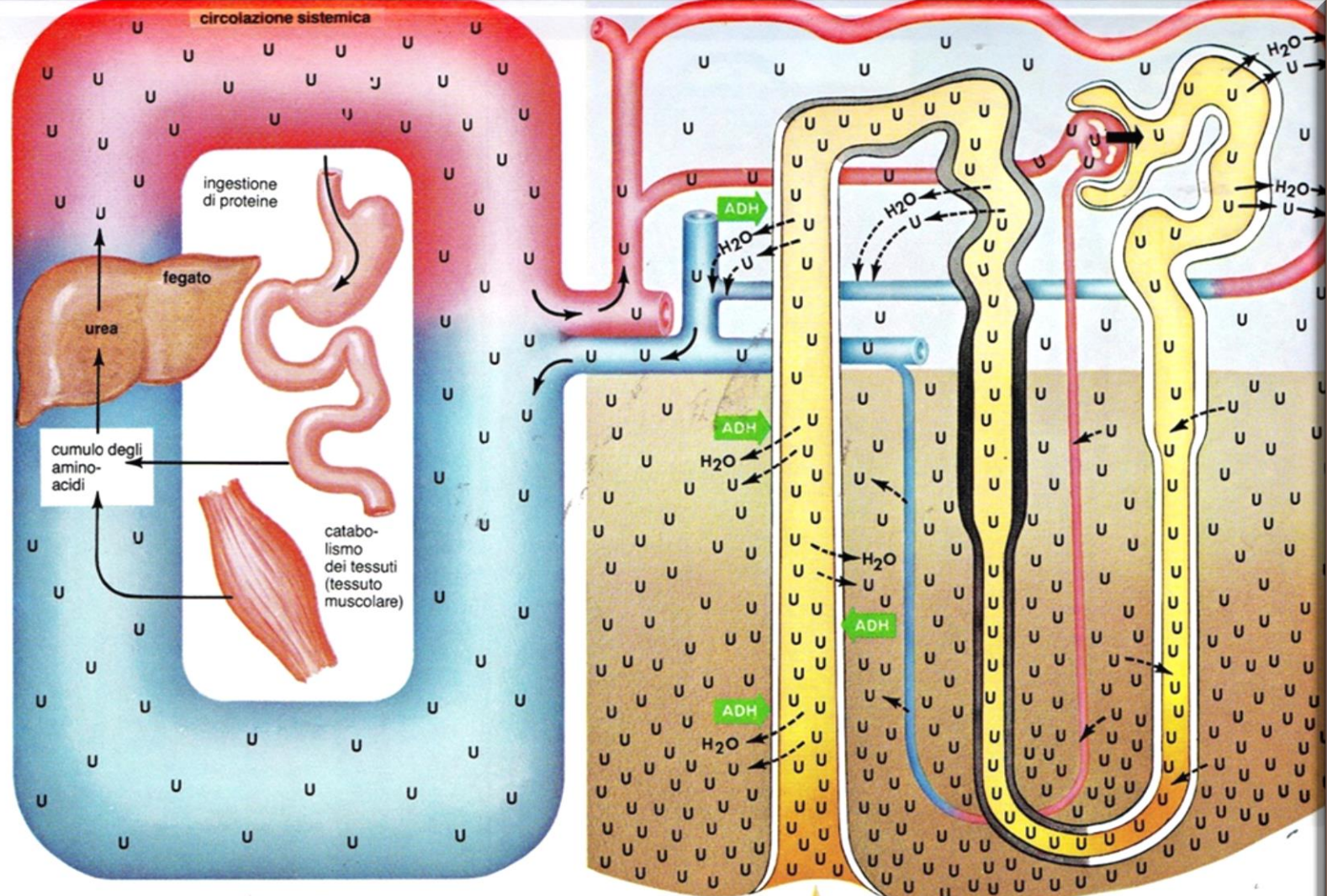


Influenzata dalla dieta



Carmelo Libetta

UREA



la produzione di urea varia con le proteine della dieta, col catabolismo dei tessuti e con l'attività del fegato (U = UREA)

nella diuresi (flusso > 2 ml/min) (soltanto frecce continue): la clearance dell'urea = 60% della VFG o della clearance dell'inulina



nella antiuresi (flusso < 2 ml/min) (frecce continue più frecce tratteggiate): la clearance dell'urea è ridotta

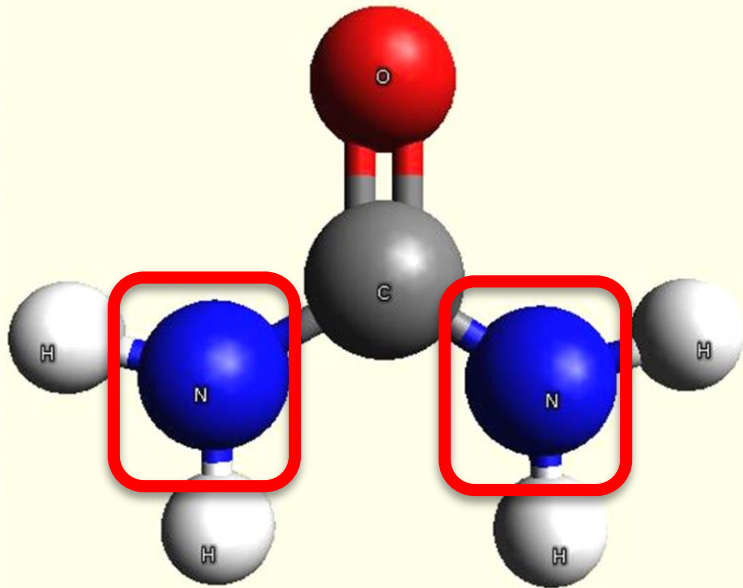
Carmelo Libetta

UREA



60 Da

UREA



+

- ◆ Aminoacidi
- ◆ Polipeptidi
- ◆ Acido urico
- ◆ Creatinina
- ◆ Amoniacca

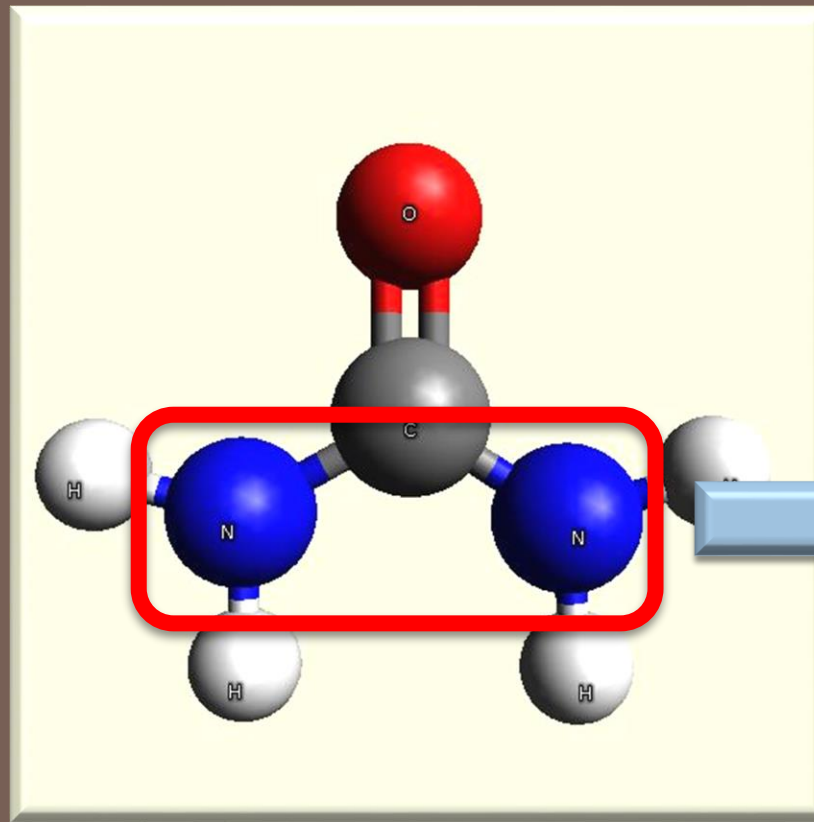
v.n. 20-40 mg/dl



Carmelo  
Libetta

AZOTEMIA (azoto non proteico)

v.n. 20-40 mg/dl



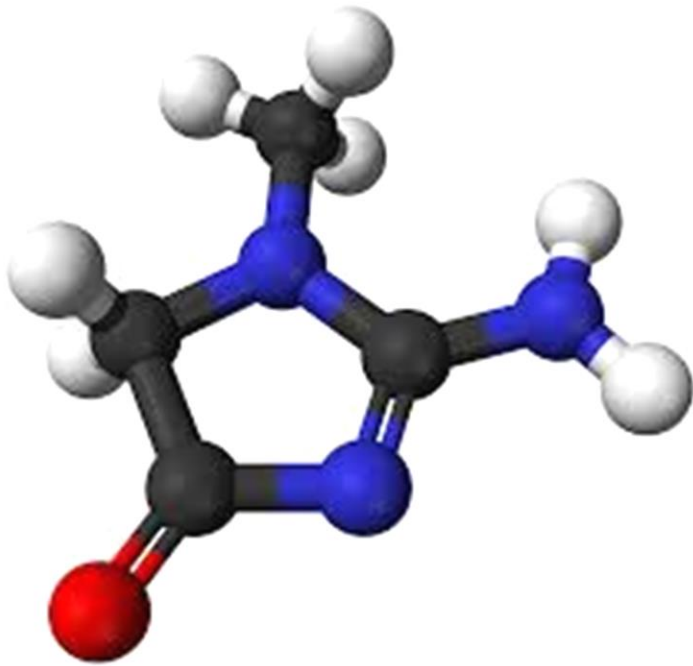
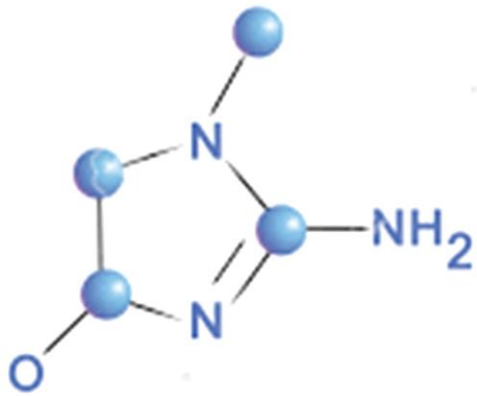
**BUN**

- ① Azoto ureico è circa la metà dell'azoto non proteico
- ② Azoto ureico è circa il 50% della molecola dell'urea



**Carmelo  
Libetta**

**UREA**



113 Da

(v.n. 0.7-1.2 mg/dl)



Carmelo  
Libetta

CREATININA

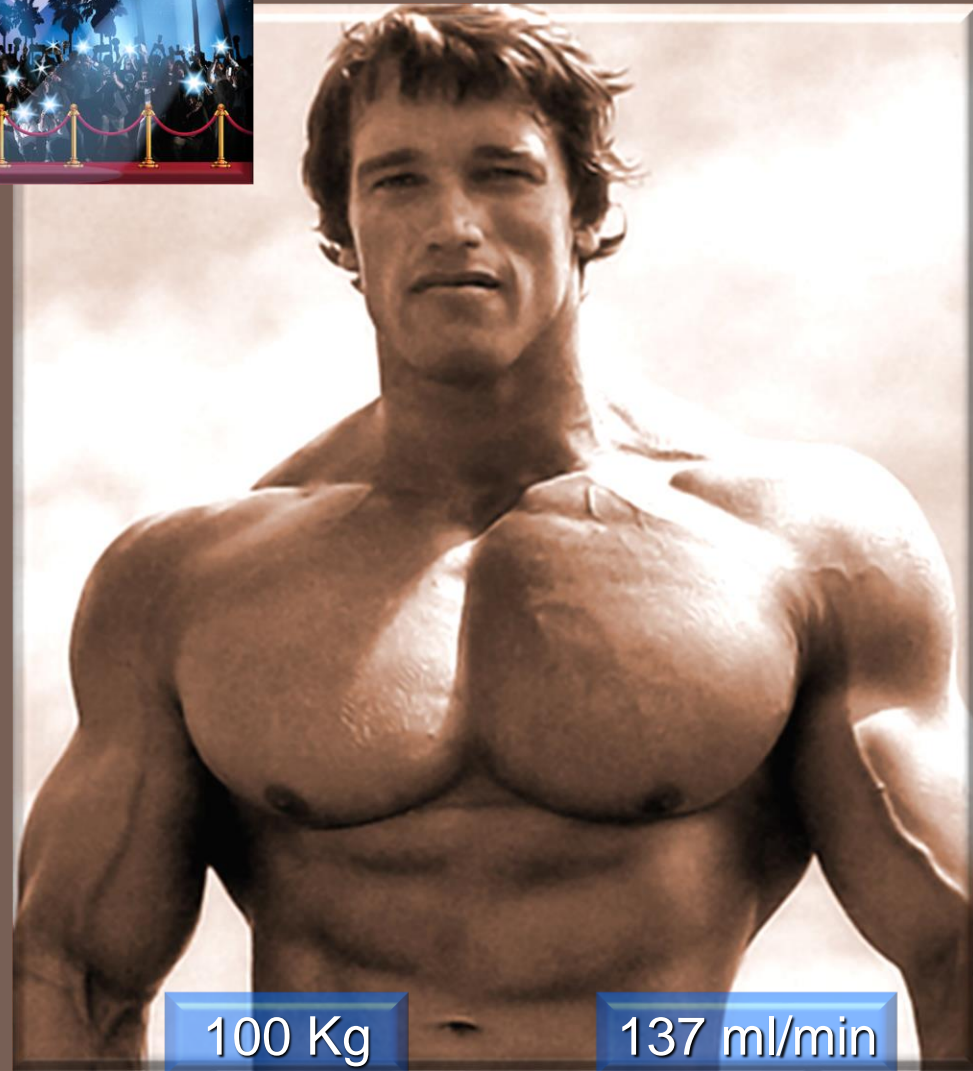




40 Kg

52 ml/min

Creatininemia 1 mg/dl



100 Kg

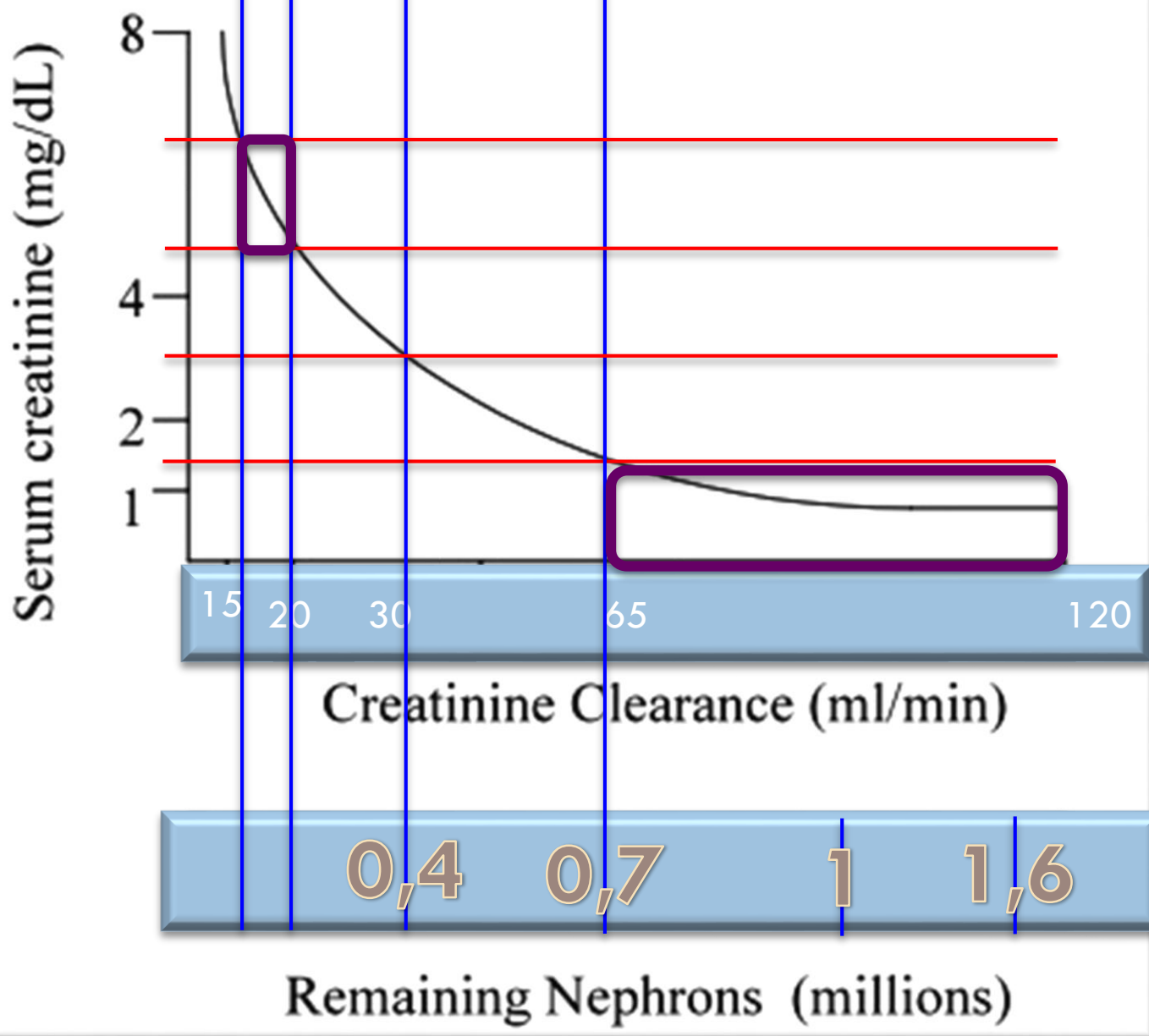
137 ml/min



Carmelo  
Libetta

L'inganno della creatininemia

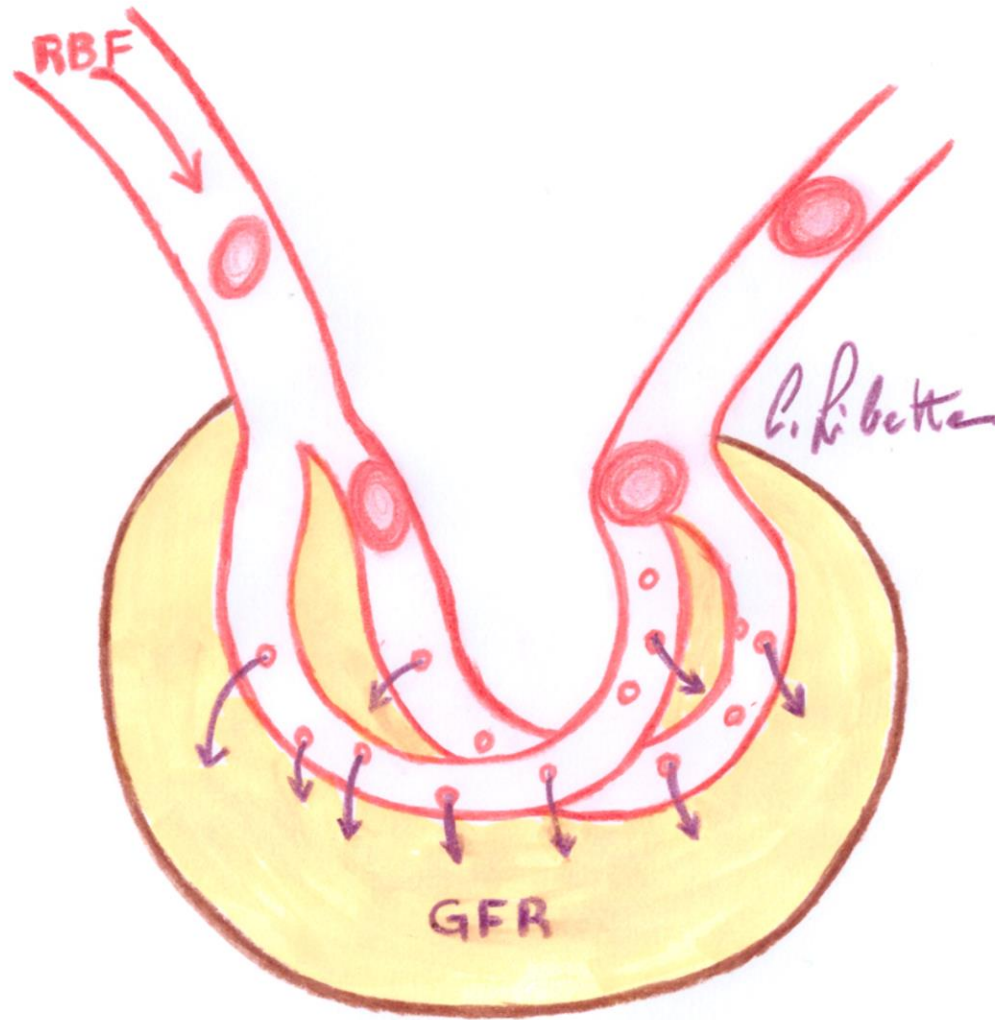




Carmelo  
Libetta

L'inganno della creatininemia





Carmelo  
Libetta

FILTRATO GLOMERULARE



# RENAL CLEARANCE

How quickly a substance is removed from plasma by kidney & excreted in urine

$\left[ \frac{\text{Volume of blood plasma cleared of X}}{\text{time (mins)}} \right]$

Concentration of X in urine

**URINE FLOW RATE**  
 $\left[ \frac{\text{Amount of urine excreted}}{\text{time (mins)}} \right]$

$$C = \frac{\uparrow [U]_{\infty} \times \dot{V}}{\downarrow [P]_{\infty}}$$

Plasma concentration of X



Carmelo Libetta

FILTRATO GLOMERULARE

Domenica Mattina



Intera giornata



Lunedì Mattina



FG sovrastimato (10-20%)

Carmelo  
Libetta

Clearance creatinina



Cr.

Peso

Età



Carmelo  
Libetta

FG Stimato

## Cockcroft-Gault

$$\text{Cr clearance, ml/min} = \frac{[140 - \text{age, years}] \times \text{weight, kg}}{[72 \times \text{Cr, mg/dl}]} \quad (\times 0.85 \text{ women})$$

## MDRD-4 (abbreviated)

$$\text{GFR (ml/min/1.73 m}^2\text{)} = 186 \times \text{Cr}^{-1.154} \times \text{age}^{-0.203} \times (0.742 \text{ if women and/or } 1.210 \text{ if African-Americans)}$$

## CKD-EPI

	SCr	Formula GFR* estimation
Women	≤0.7	$\text{GFR} = 144 \times (\text{SCr}/0.7)^{-0.329} \times (0.993)^{\text{age}}$
	>0.7	$\text{GFR} = 144 \times (\text{SCr}/0.7)^{-1.20} \times (0.993)^{\text{age}}$
Men	≤0.9	$\text{GFR} = 144 \times (\text{SCr}/0.7)^{-0.411} \times (0.993)^{\text{age}}$
	>0.9	$\text{GFR} = 144 \times (\text{SCr}/0.7)^{-0.411} \times (0.993)^{\text{age}}$

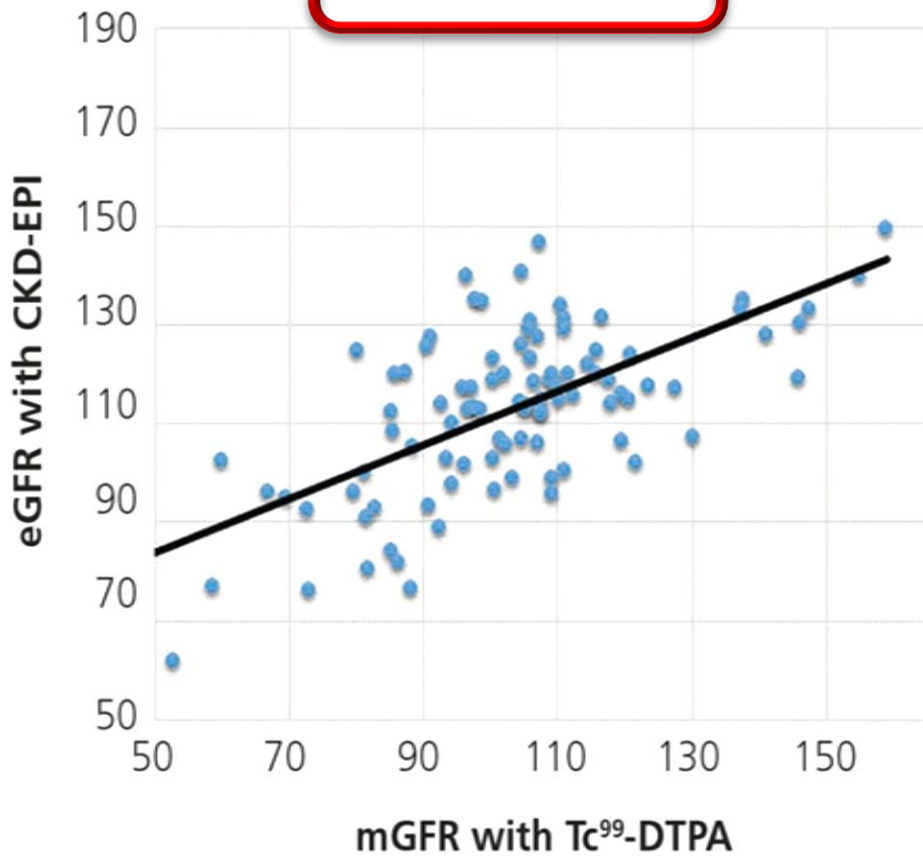
Carmelo  
Libetta

FG Stimato



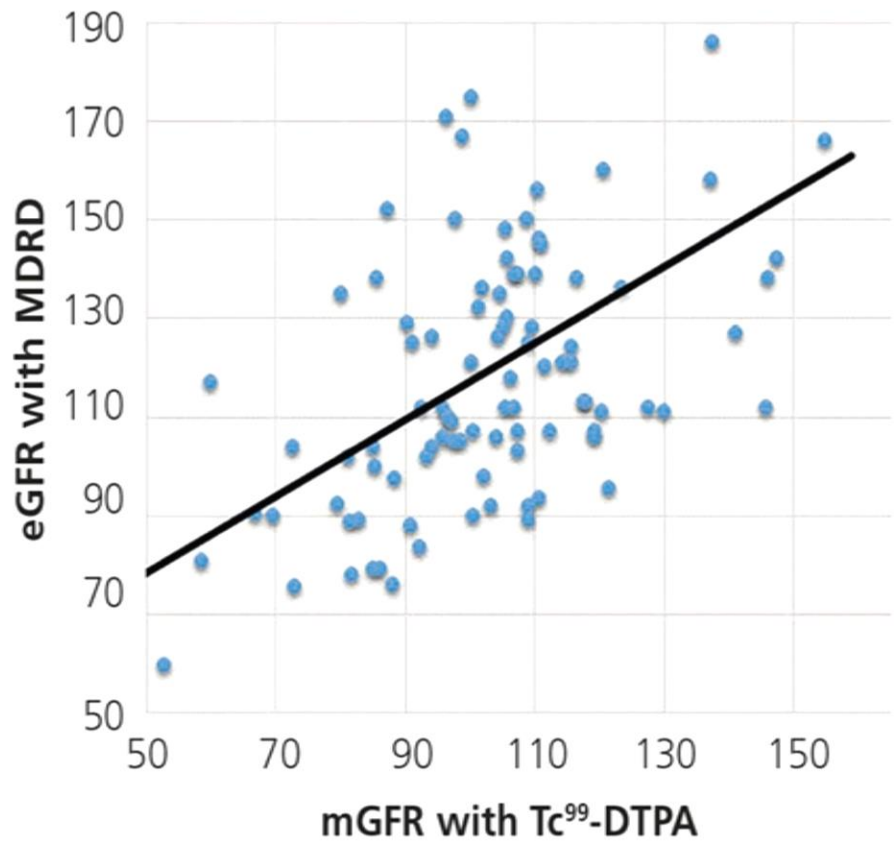
A

**CKD-EPI**



B

**MDRD-IDMS**



**Carmelo  
Libetta**

**Formule a confronto**



National **Kidney** Foundation™

Press Here for Clinical Use and Formula

S<sub>Cr</sub>:

mg/dL

Age:

years

Gender:

Male

Female

Race:

Black

Other

eGFR:

Clear All

mL/min/1.73 m<sup>2</sup>



Calculators



About GFR



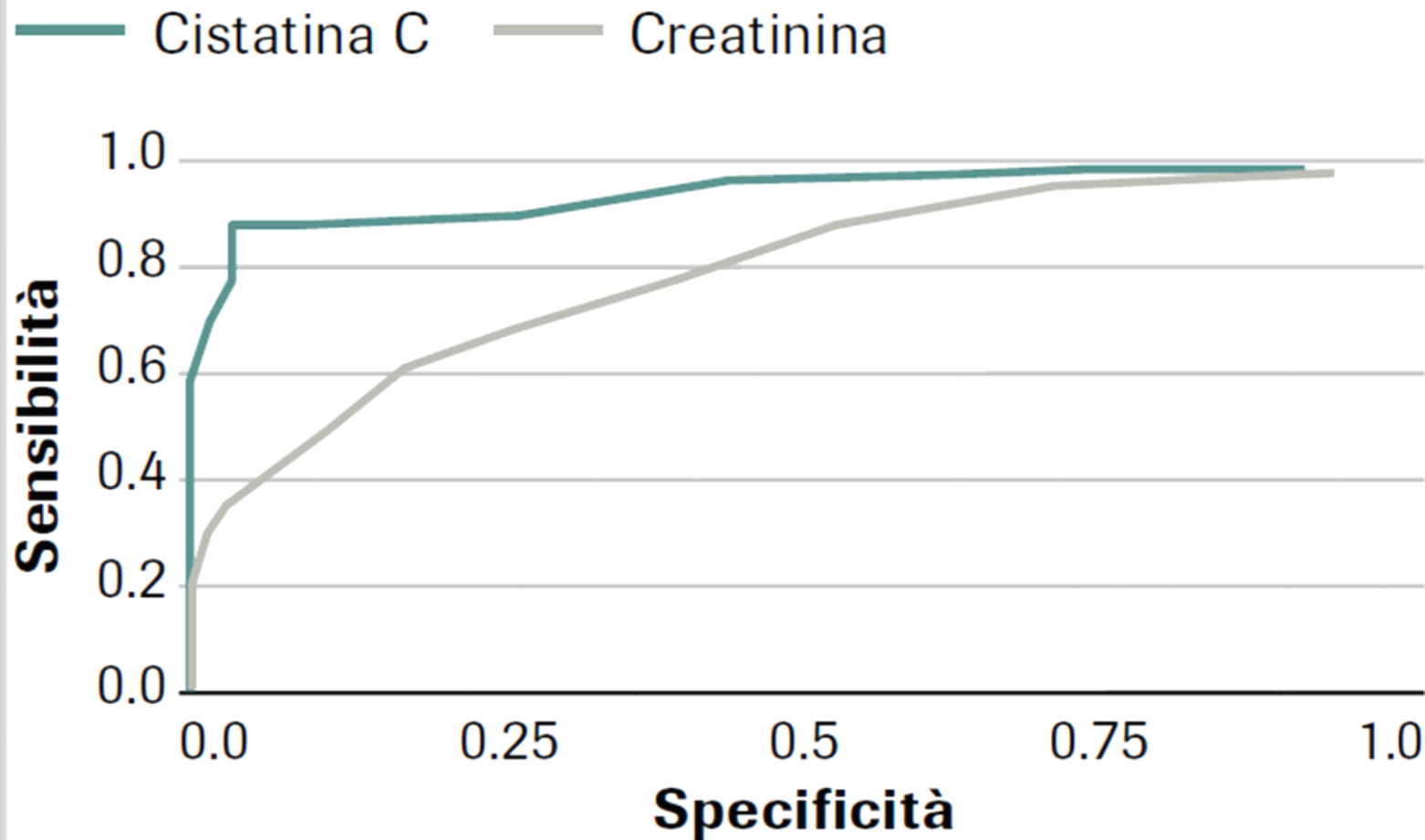
About CKD

Carmelo  
Libetta



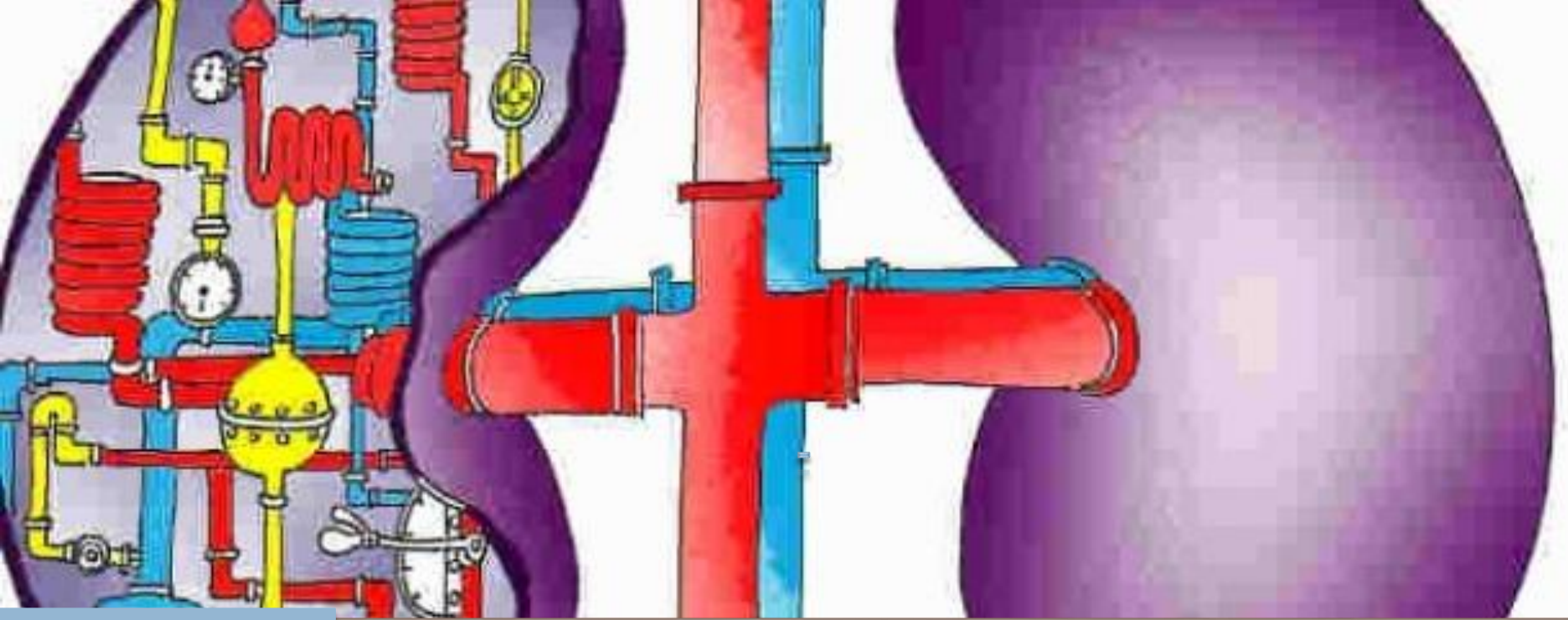


# Estremamente sensibile e specifico, non influenzato dai fattori fisici



Carmelo  
Libetta

Cistatina C



➤ **ECOGRAFIA**

➤ **UROGRAFIA**

➤ **TC**

➤ **URO-TC**

➤ **ANGIO-TC RENALE**

➤ **ARTERIOGRAFIA RENALE**

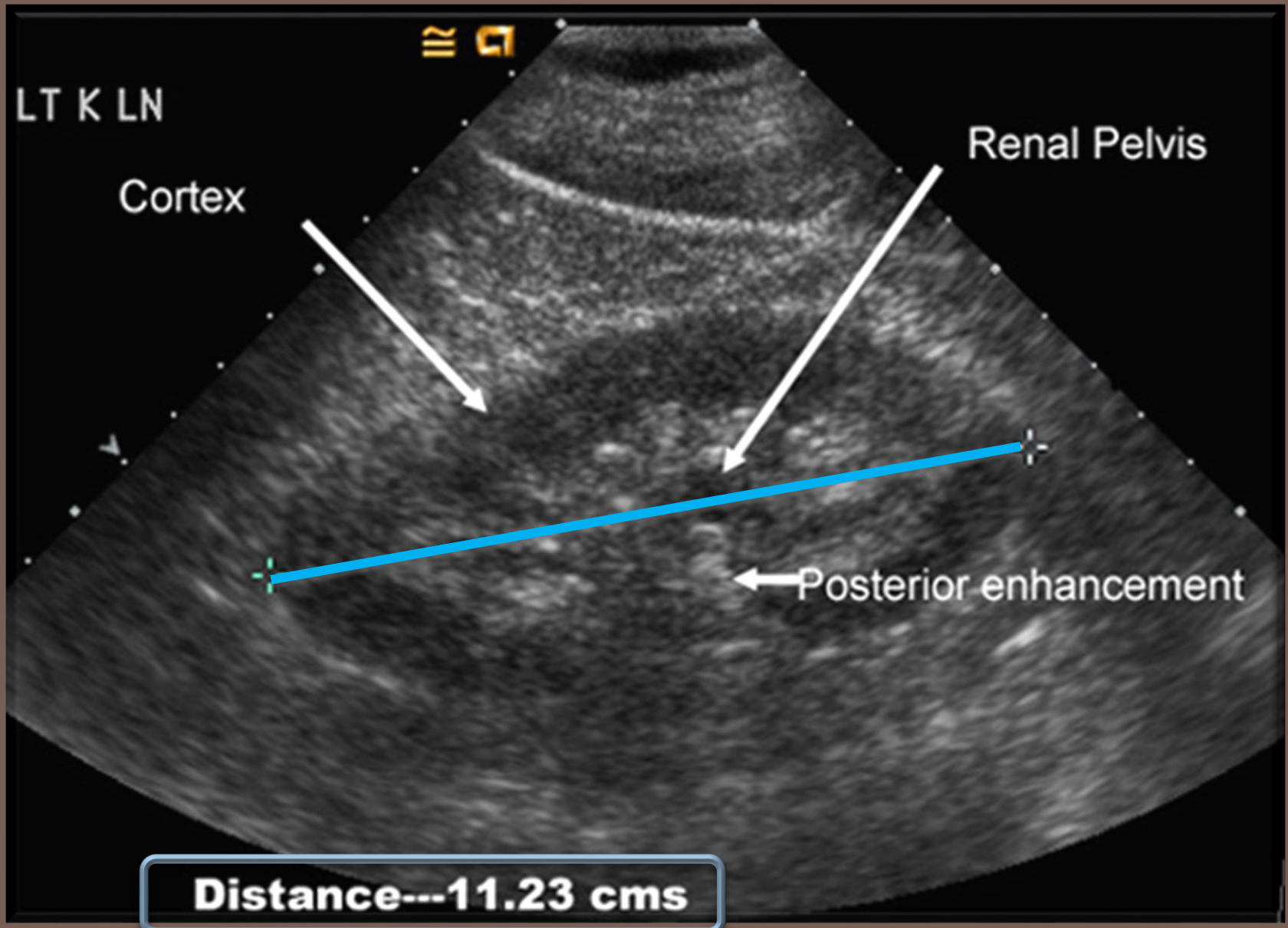
➤ **RISONANZA MAGNETICA**

➤ **SCINTIGRAFIA RENALE**

Carmelo  
Libetta

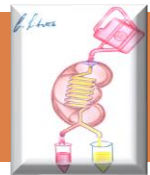
DIAGNOSTICA STUMENTALE





**Carmelo  
Libetta**

Ecografia (scansione longitudinale)

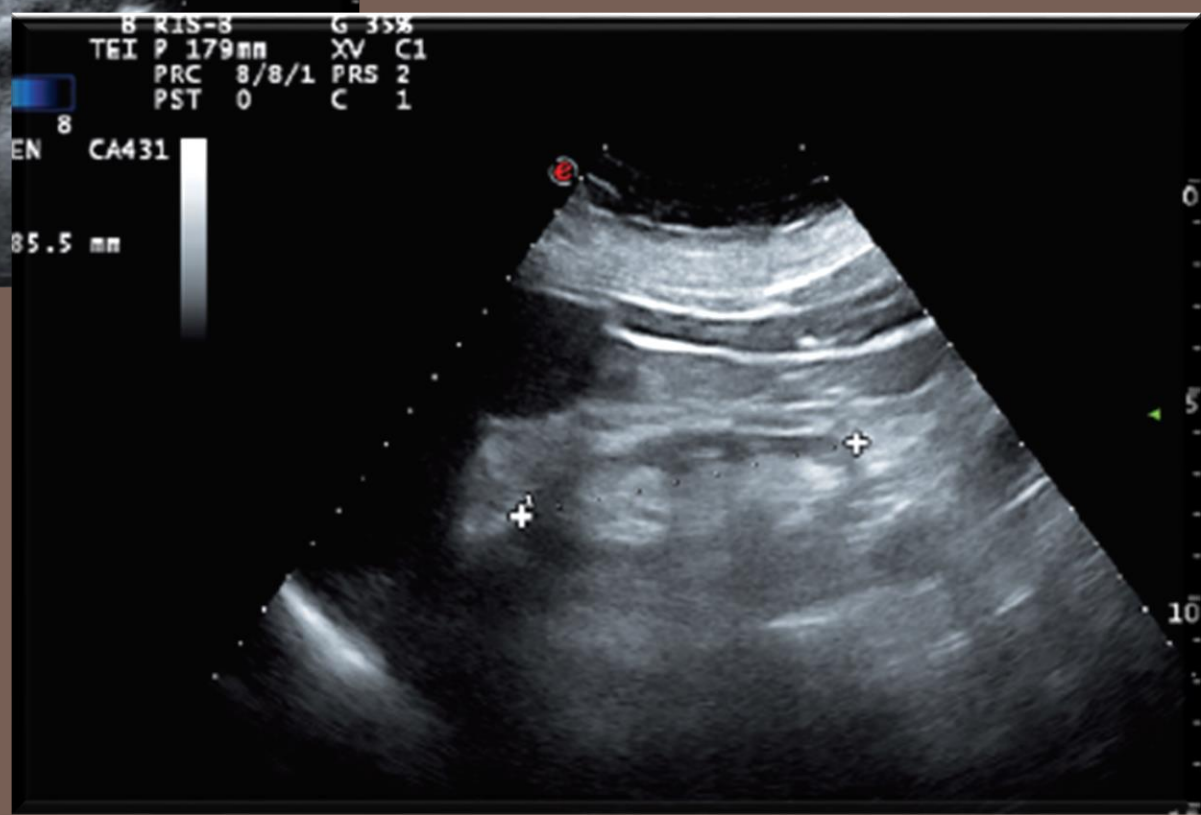


Carmelo  
Libetta

Ecografia (scansione trasversale)



Rene normale

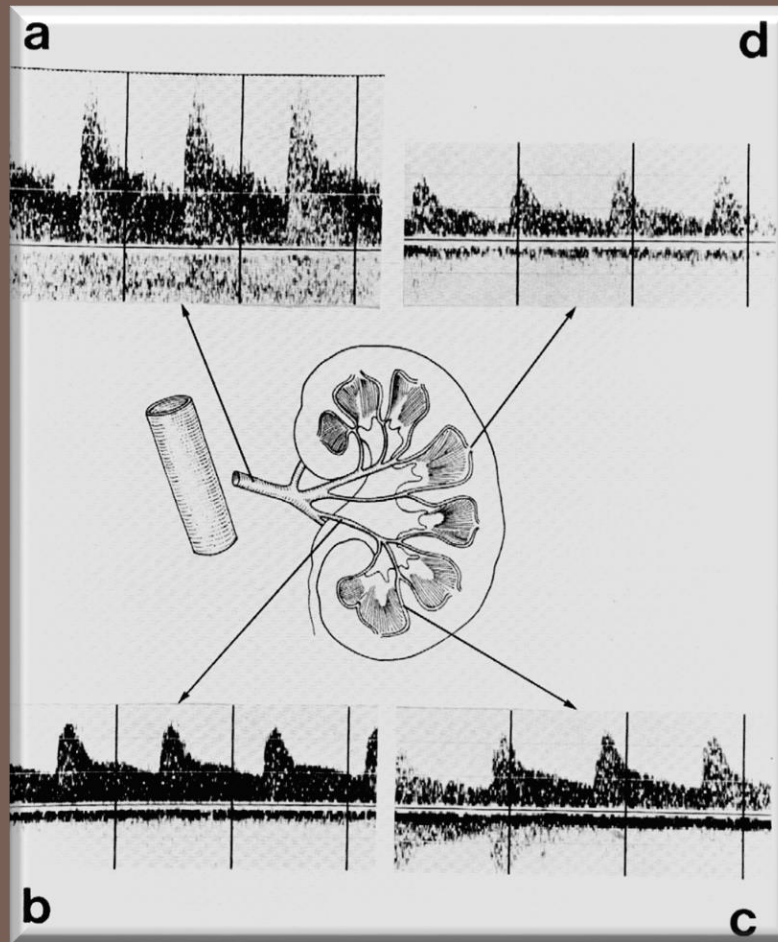


Rene MRC



Carmelo Libetta

Ecografia



$$RI=0,56-0,62$$



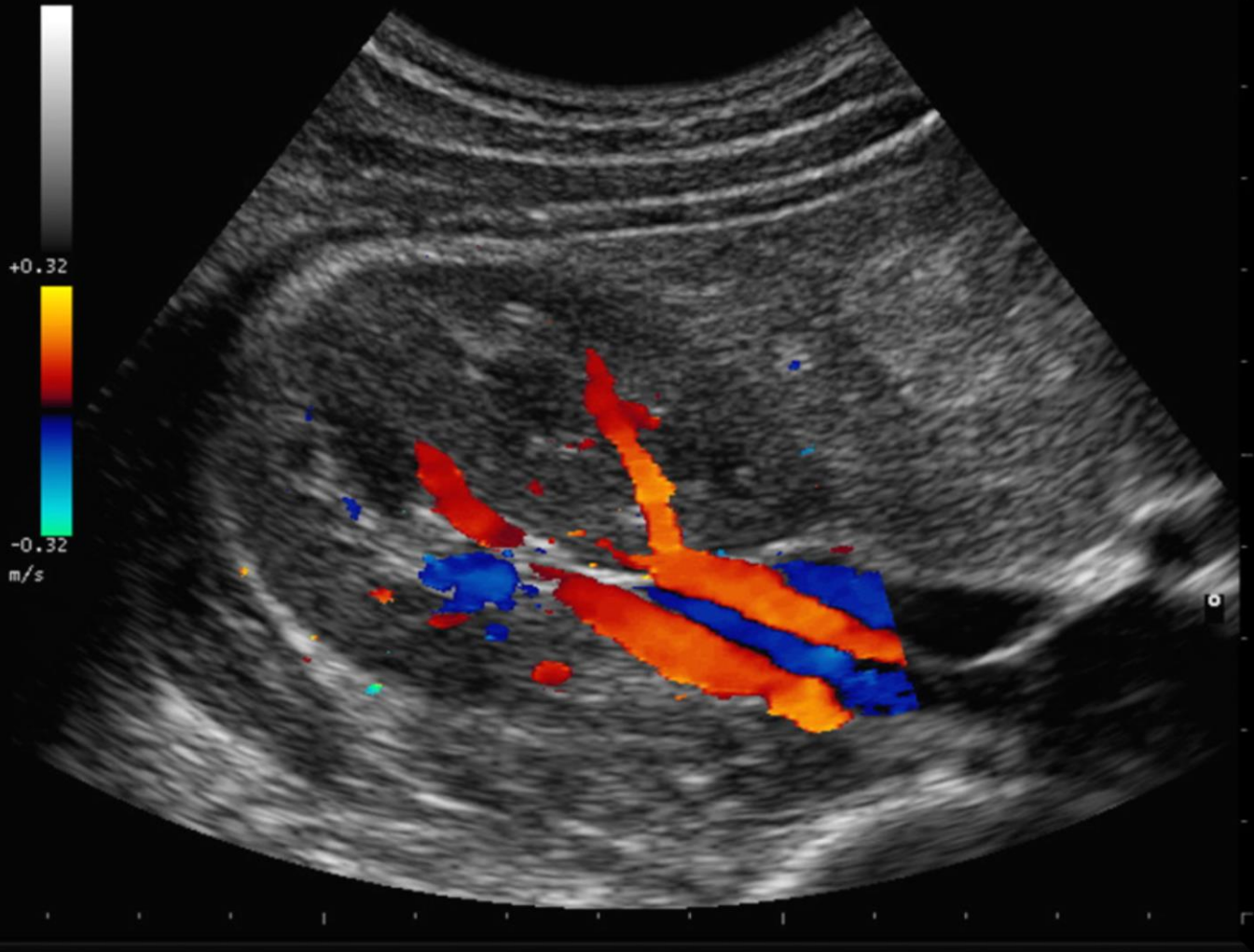
Carmelo  
Libetta

Ecodoppler arterie renali

SIEMENS

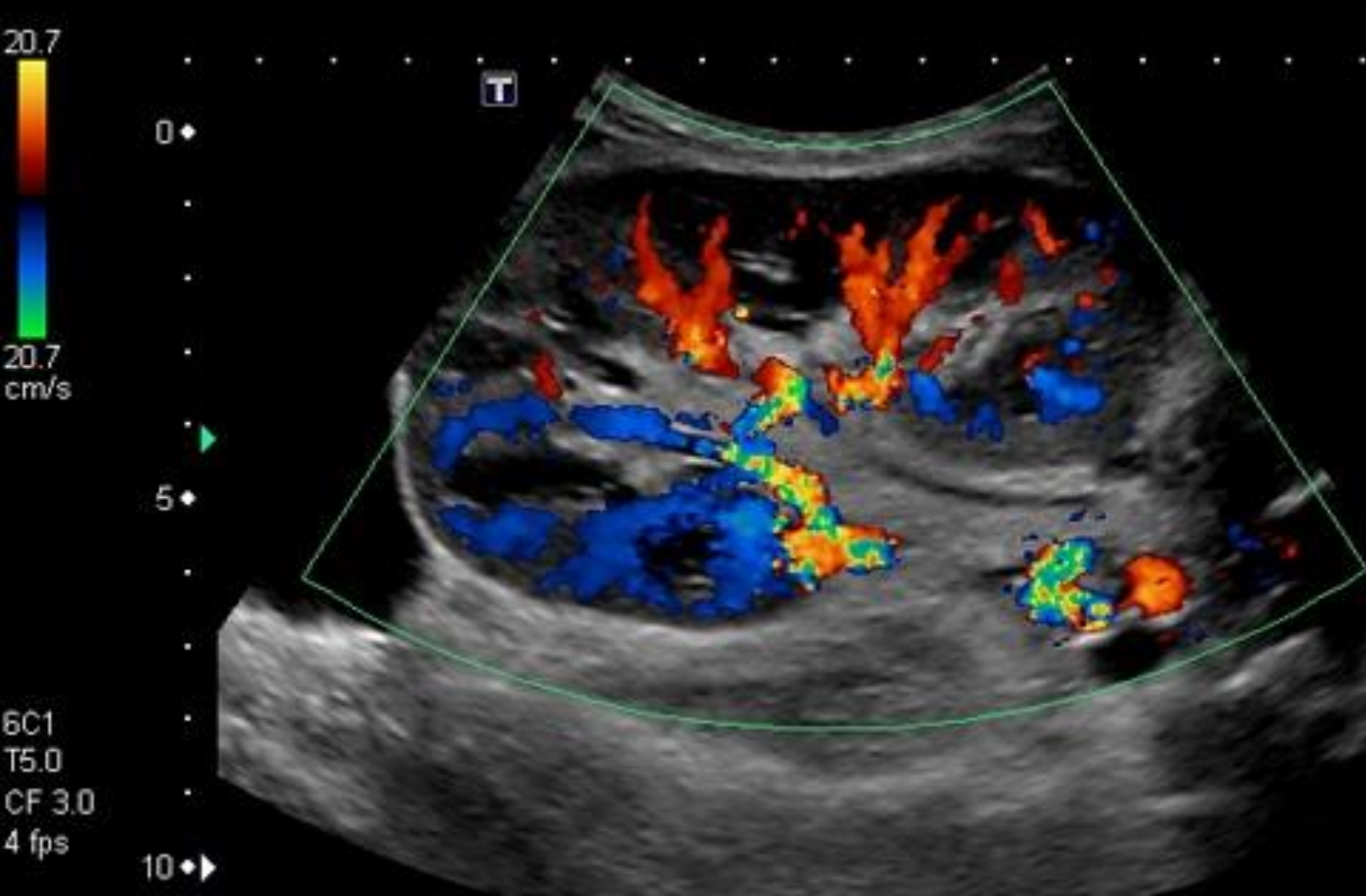
B	F	G	G	28%	CFM	F	2.5 MHz	G	66%
TEI	D	10 cm	XV	2		PRF	2.1kHz		
	PRC	15-4-H	PRS	3		PRC	3-L-H	PRS	4
	PST	3				WF	M		

FACTORY CA431



Carmelo  
Libetta

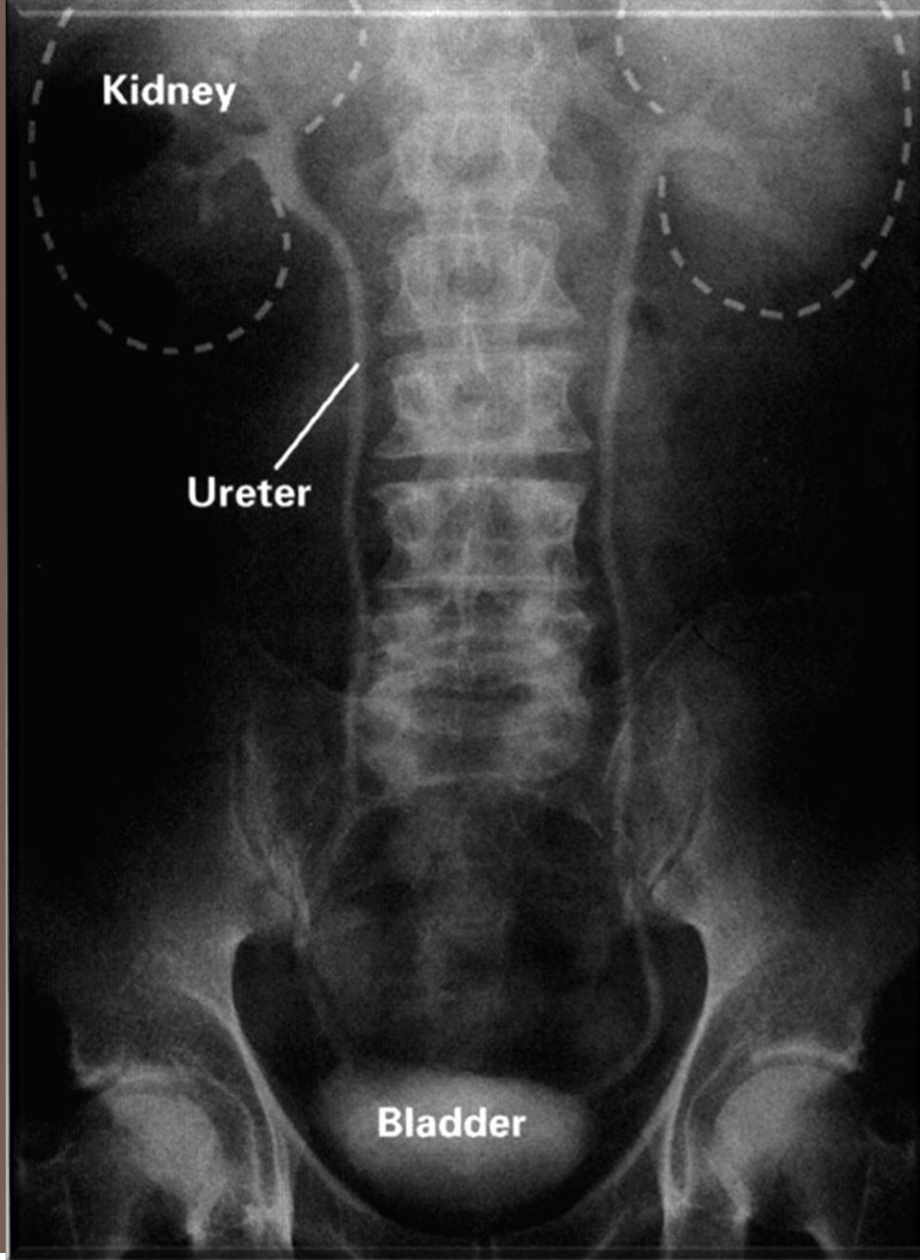
Ecocolor-doppler arterie renali



Carmelo  
Libetta

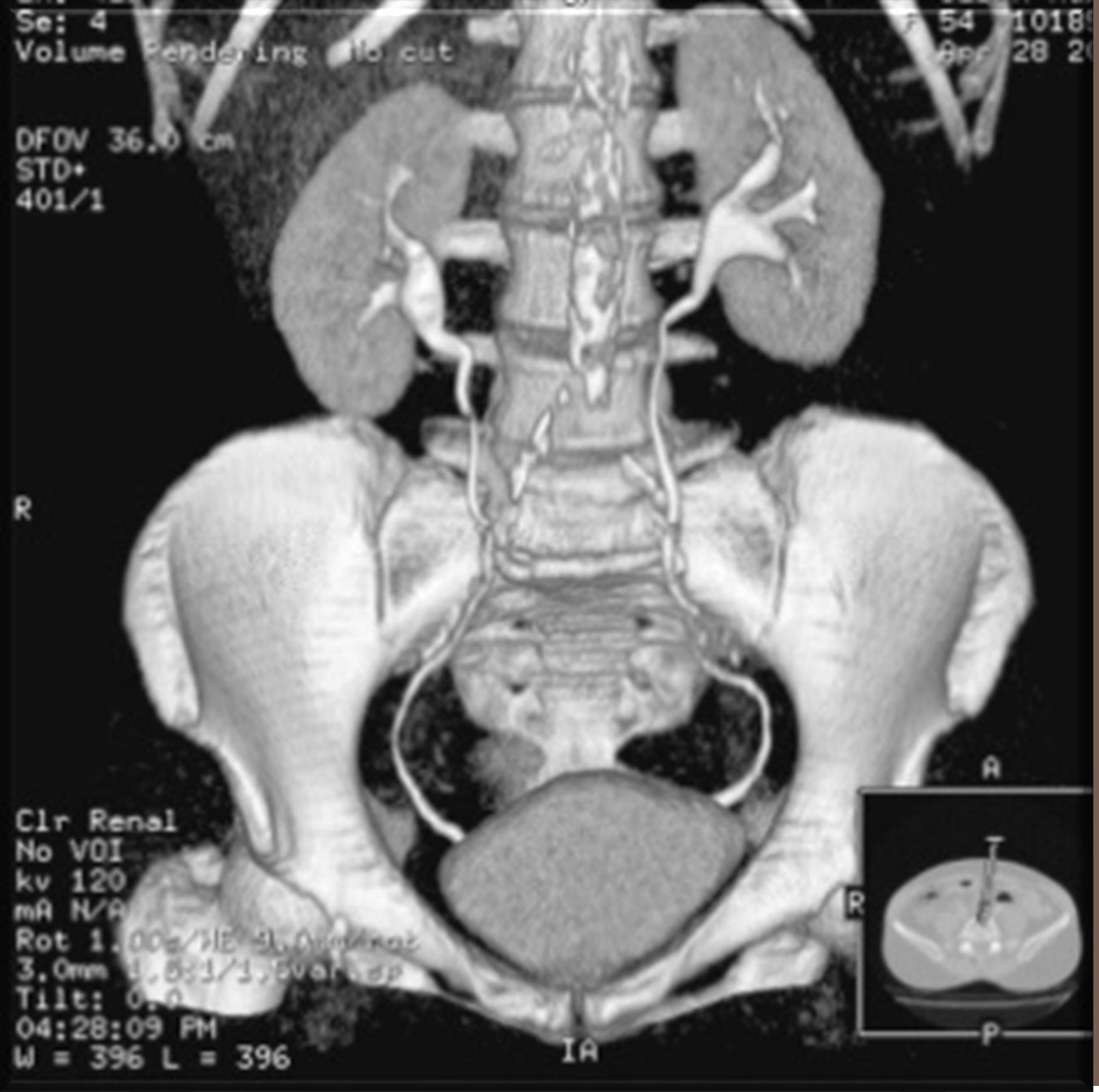
# Ecocolor-doppler Parenchimale





**Carmelo  
Libetta**

# UROGRAFIA



Carmelo  
Libetta

# URO-TAC



Fegato

Rene destro

Ghiandola surrenale destra

Ghiandola surrenale sinistra

Milza



B

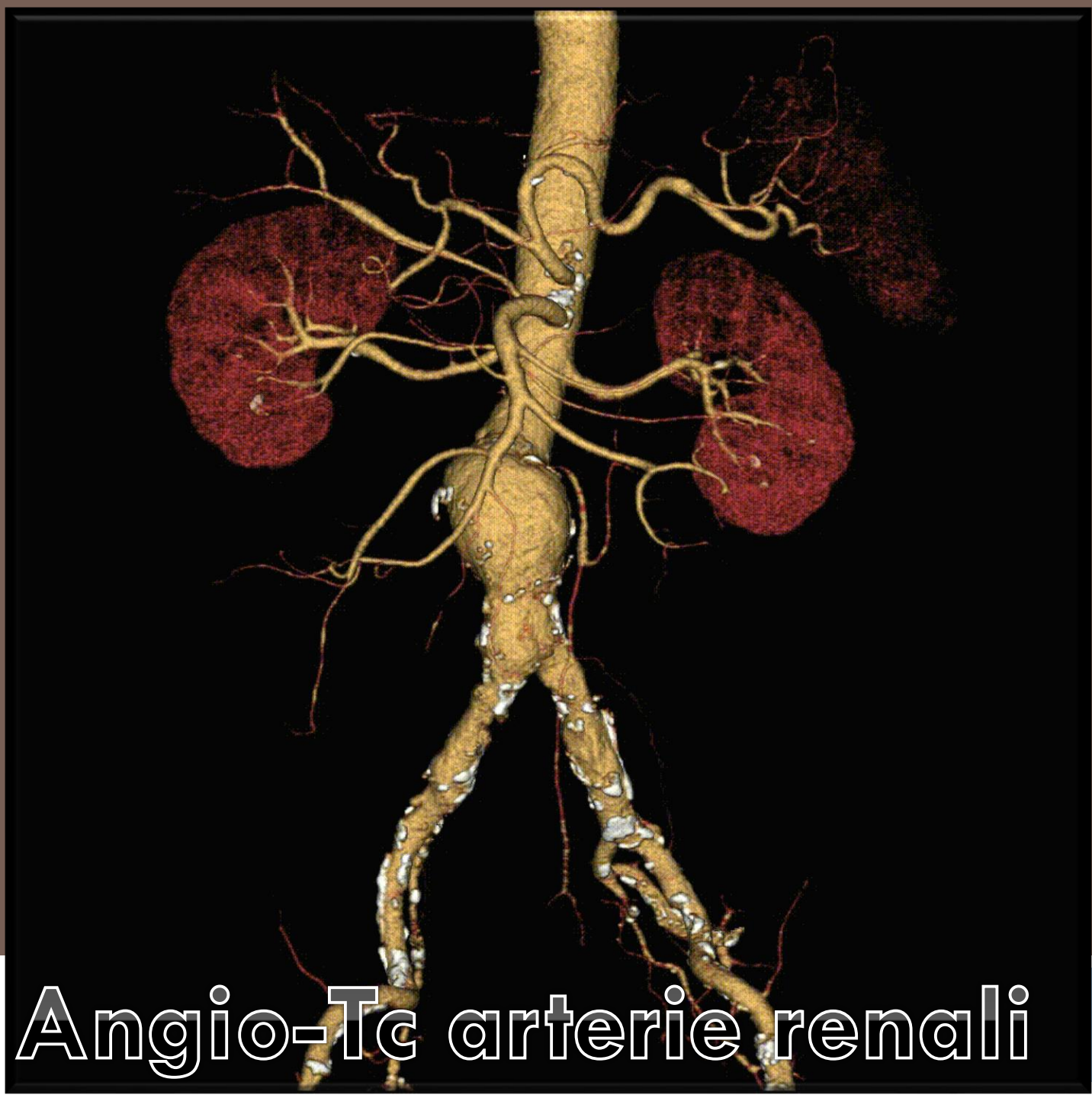
Muscolo grande psoas sinistro

Rene sinistro



Carmelo  
Libetta

TC addome



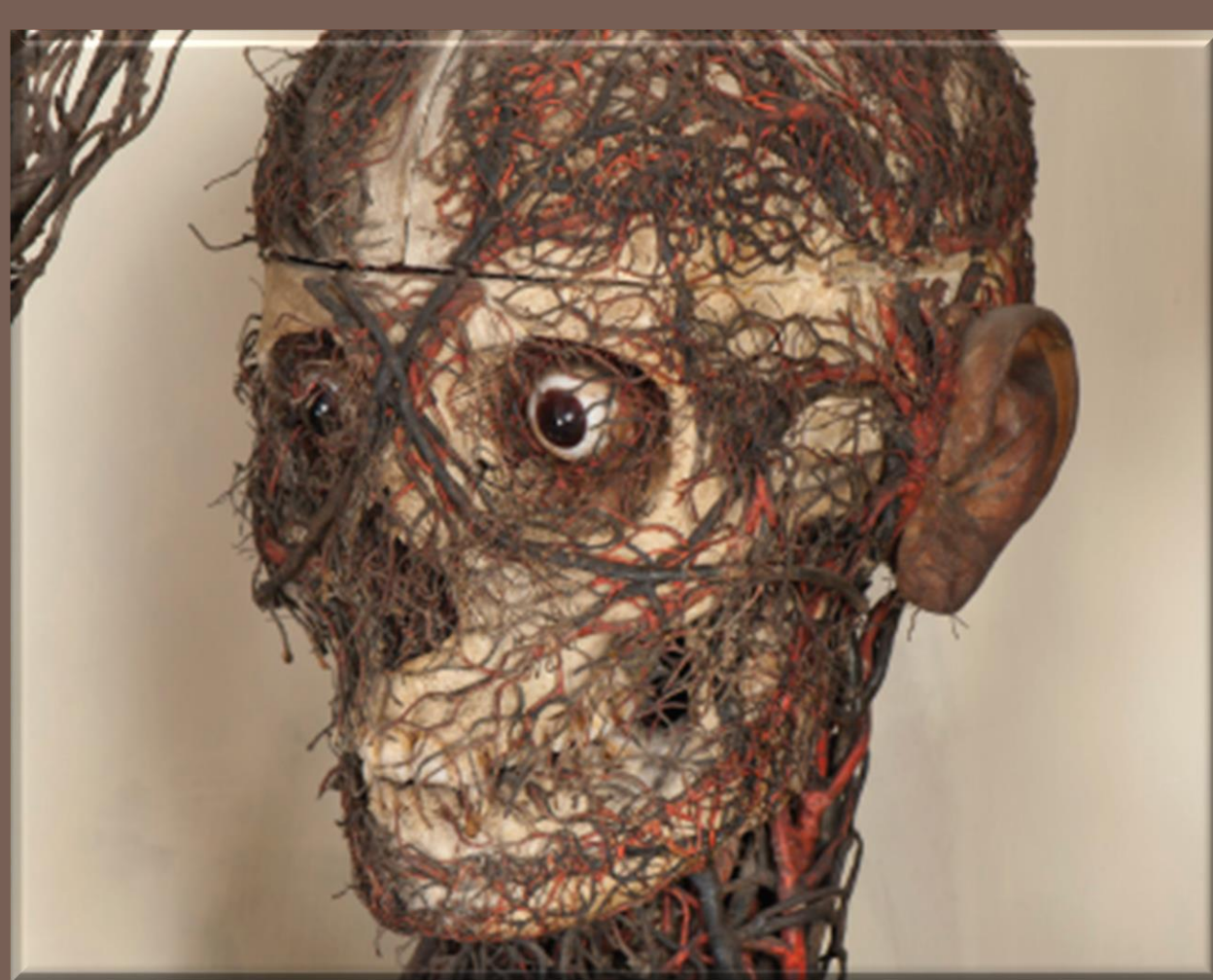
Carmelo  
Libetta

# Angio-Tc arterie renali

# NAPOLI



**Cappella dei Principi di Sansevero**

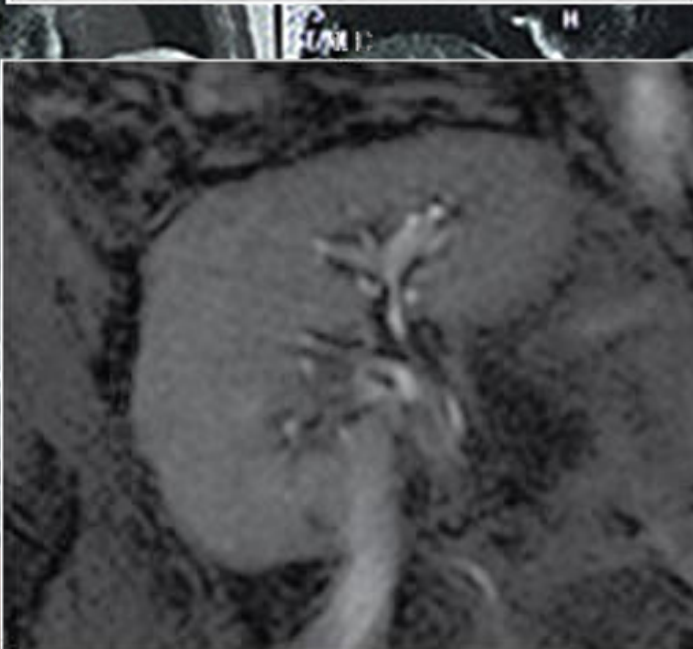
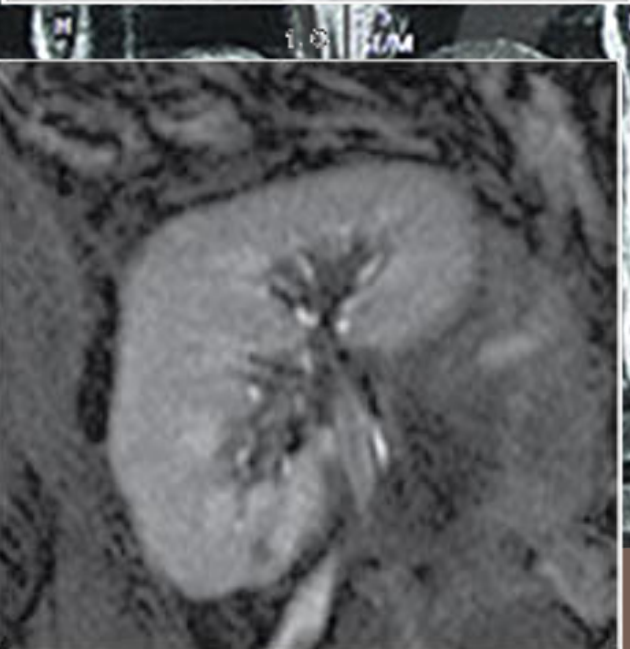
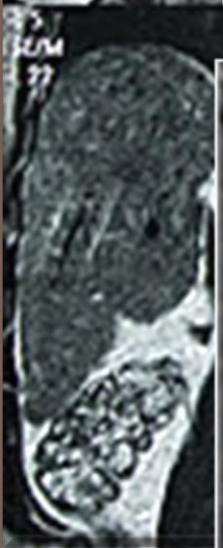
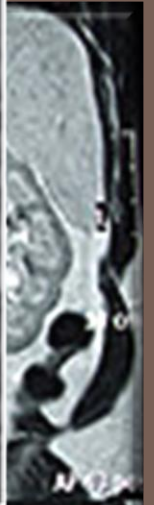
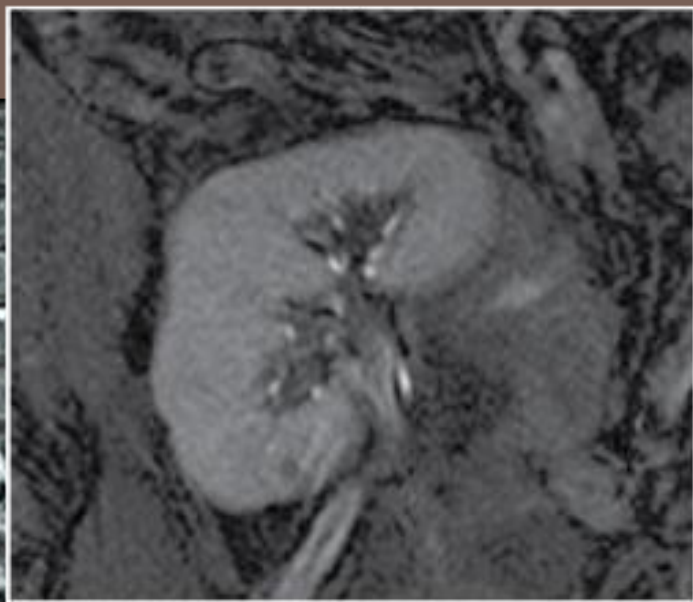
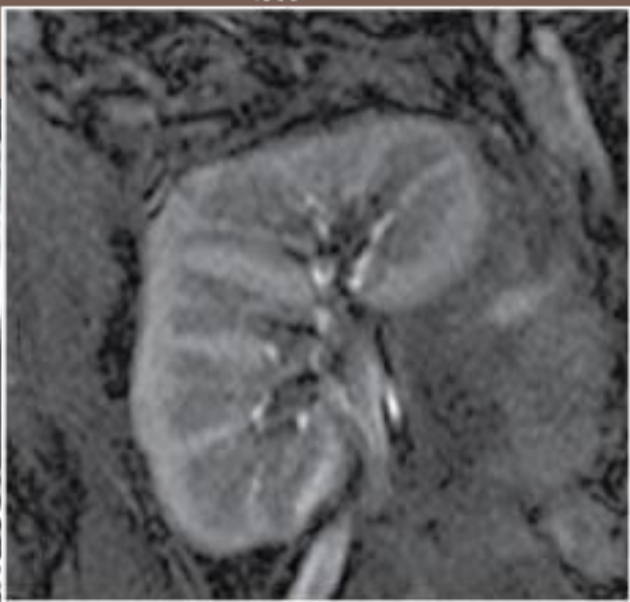


Raimondo di Sangro



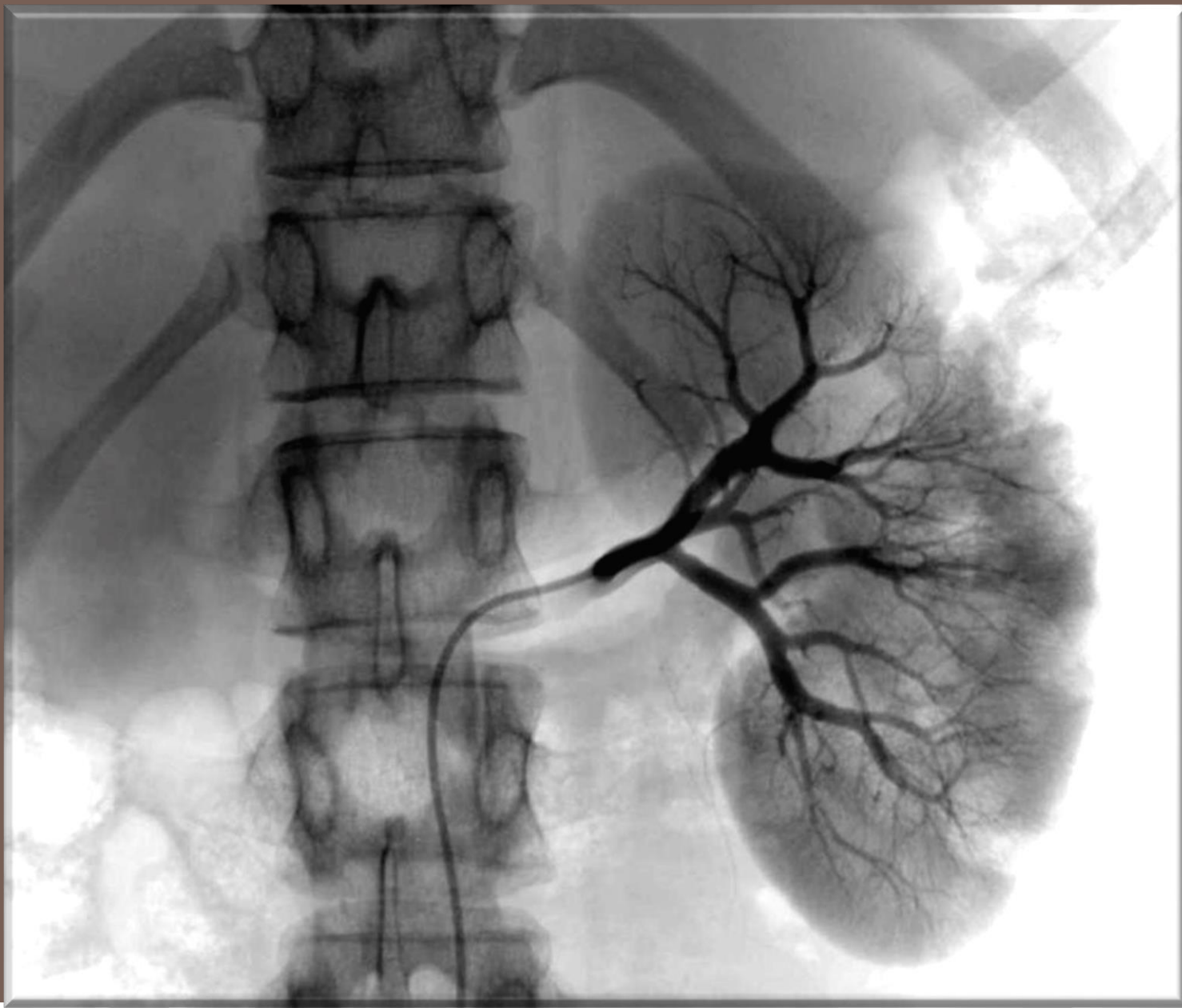
Carmelo  
Libetta

Macchine anatomiche



Carmelo  
Libetta

# RISONANZA MAGNETICA



**Carmelo  
Libetta**

**ARTERIOGRAFIA RENALE SELETTIVA**





# Radioisotopi

§  $^{99m}\text{Tc}$ -MAG3

(mercaptoacetiltriglicina)

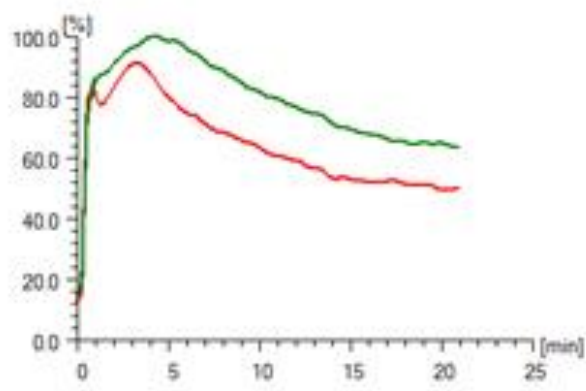
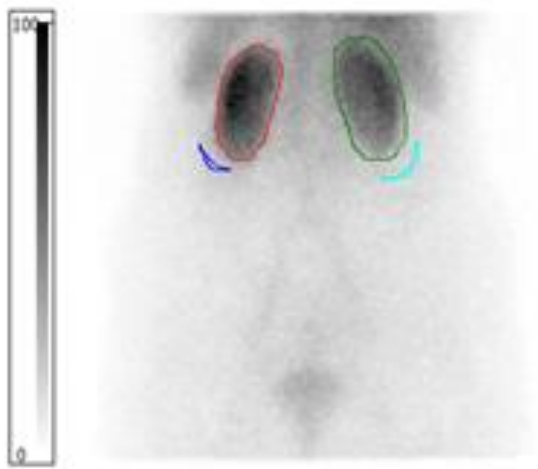
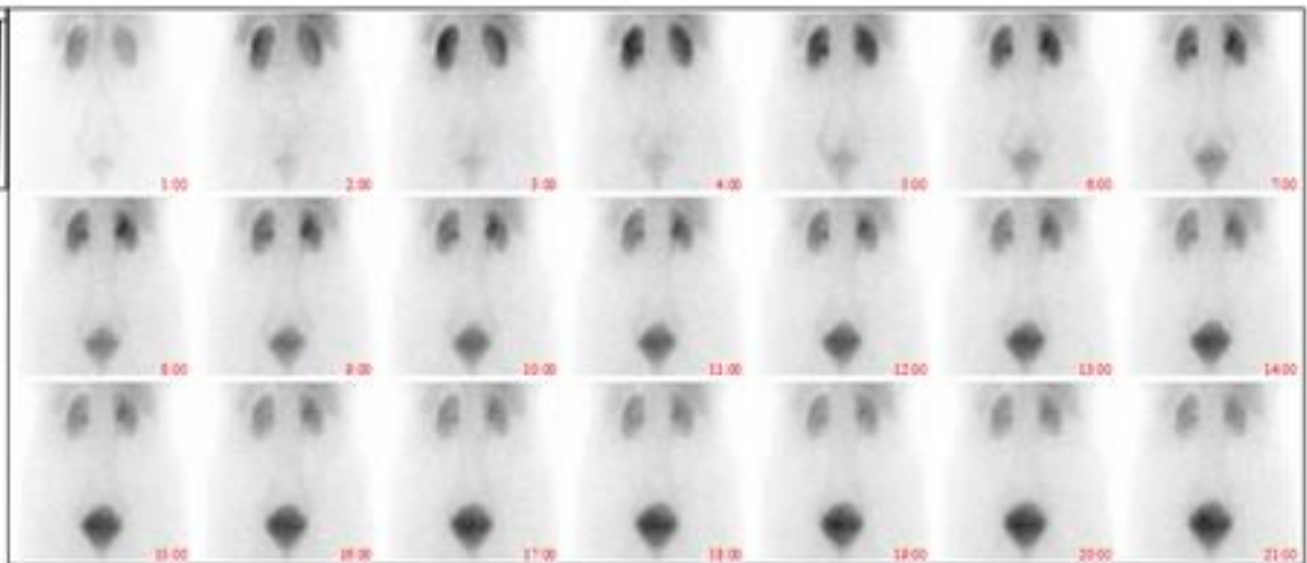
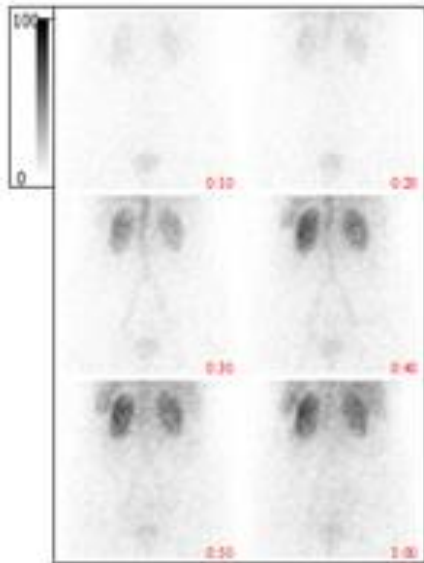
§  $^{99m}\text{Tc}$ -DTPA

(acido dietilene-triamino-pentacetico)



Carmelo  
Libetta

SCINTIGRAFIA RENALE



Size [cm] : 162  
 Weight [kg] : 60.0  
 Syringe net decay corrected [MBq]: 360.94  
 GFR [ml/min] : 102.1  
 right [%] : 51.7  
 left [%] : 48.3

Report Created by GAMMA SCANS

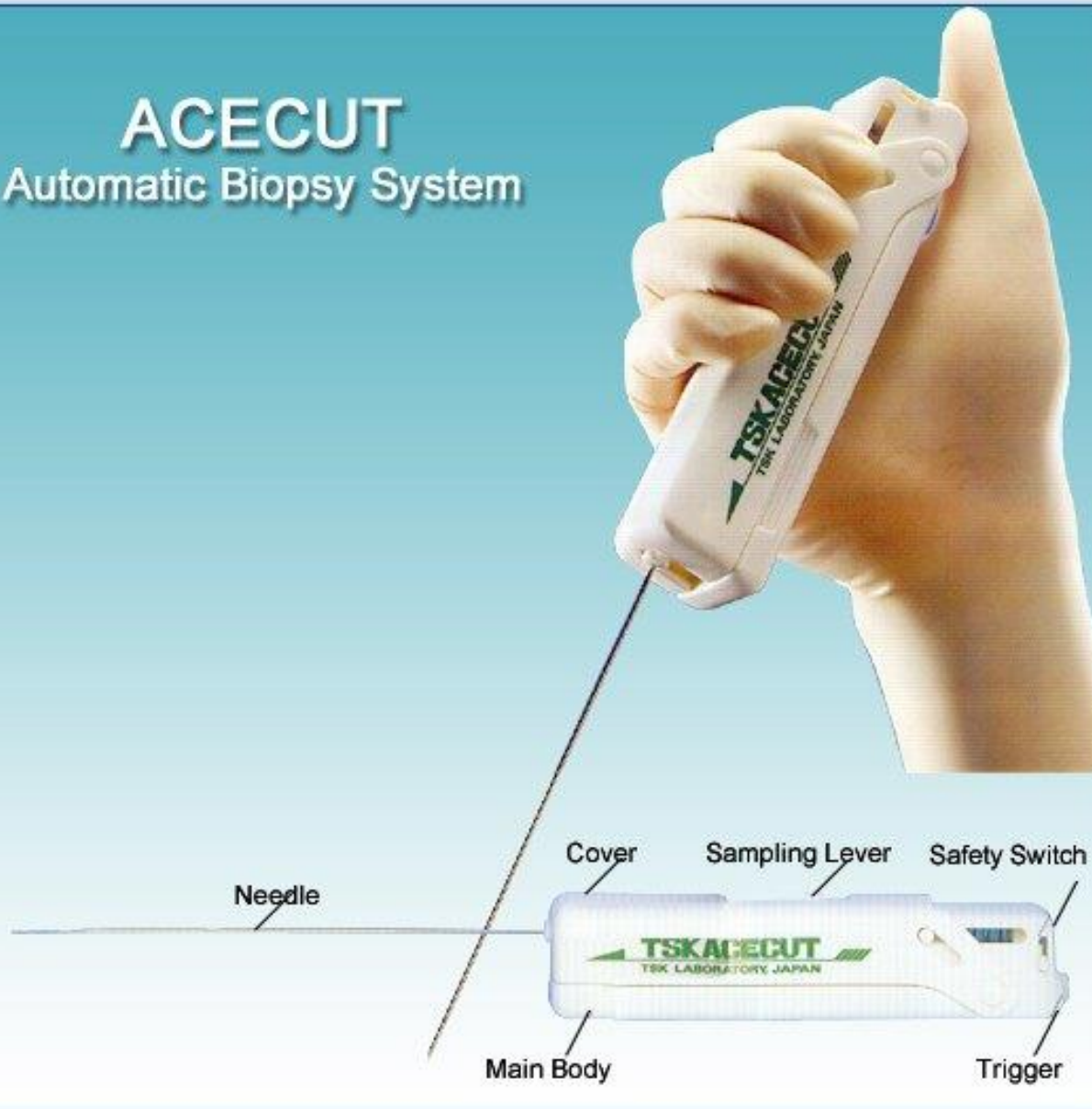


Carmelo  
Libetta

# SCINTIGRAFIA RENALE

# ACECUT

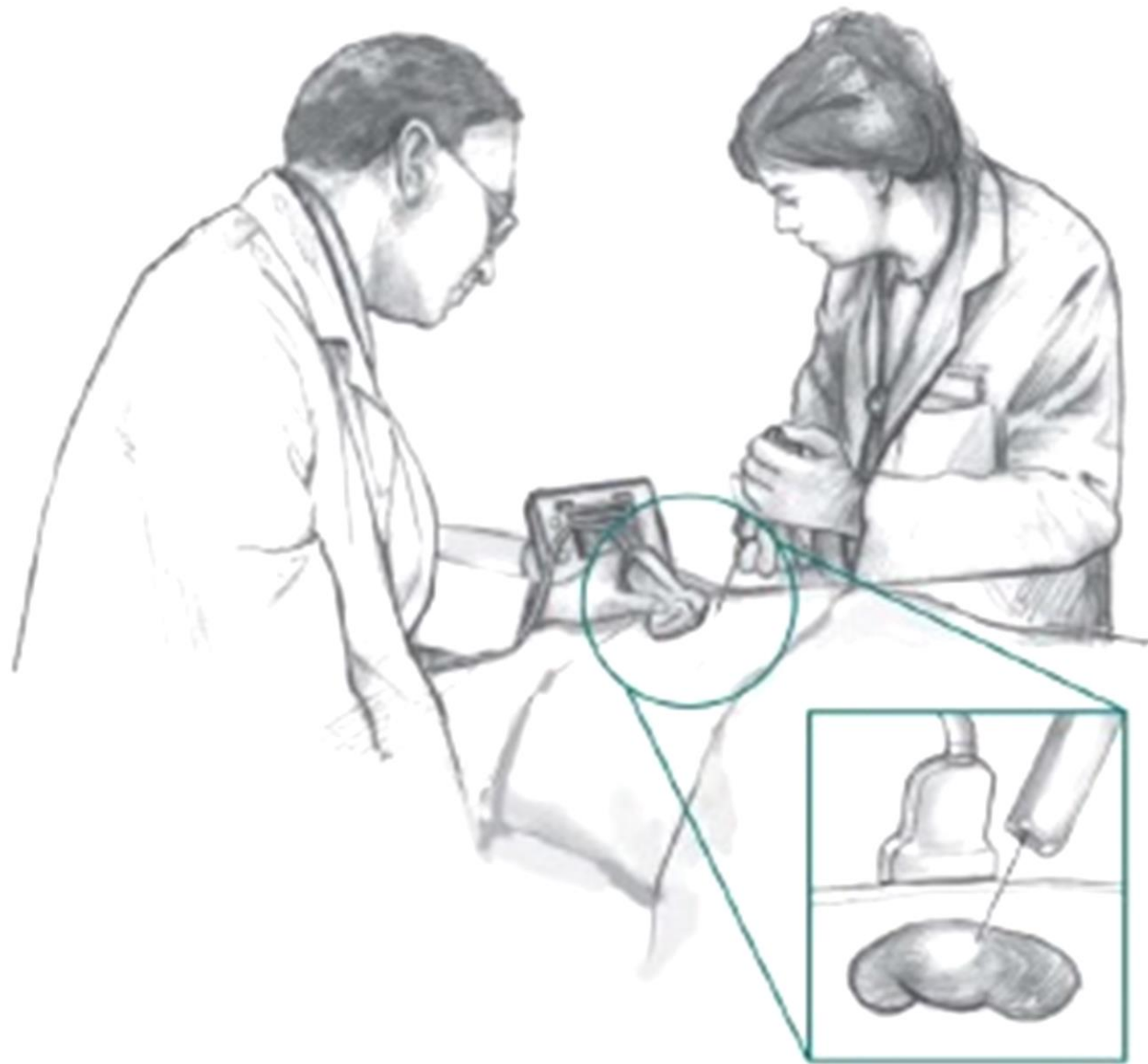
Automatic Biopsy System



Carmelo  
Libetta

Sistema automatico biopsia





Carmelo  
Libetta

# Biopsia renale





Carmelo  
Libetta

Monitor ecografico



B



A



Carmelo  
Libetta

Ago da Biopsia



**Carmelo  
Libetta**

**Frustolo bioptico**

➤ **DIATESI EMORRAGICA**

➤ **RENE UNICO**

➤ **NEOPLASIA RENALE**

➤ **RENE POLICISTICO**

➤ **MRC STADI AVANZATI**

➤ **IPERTENSIONE MALIGNA**

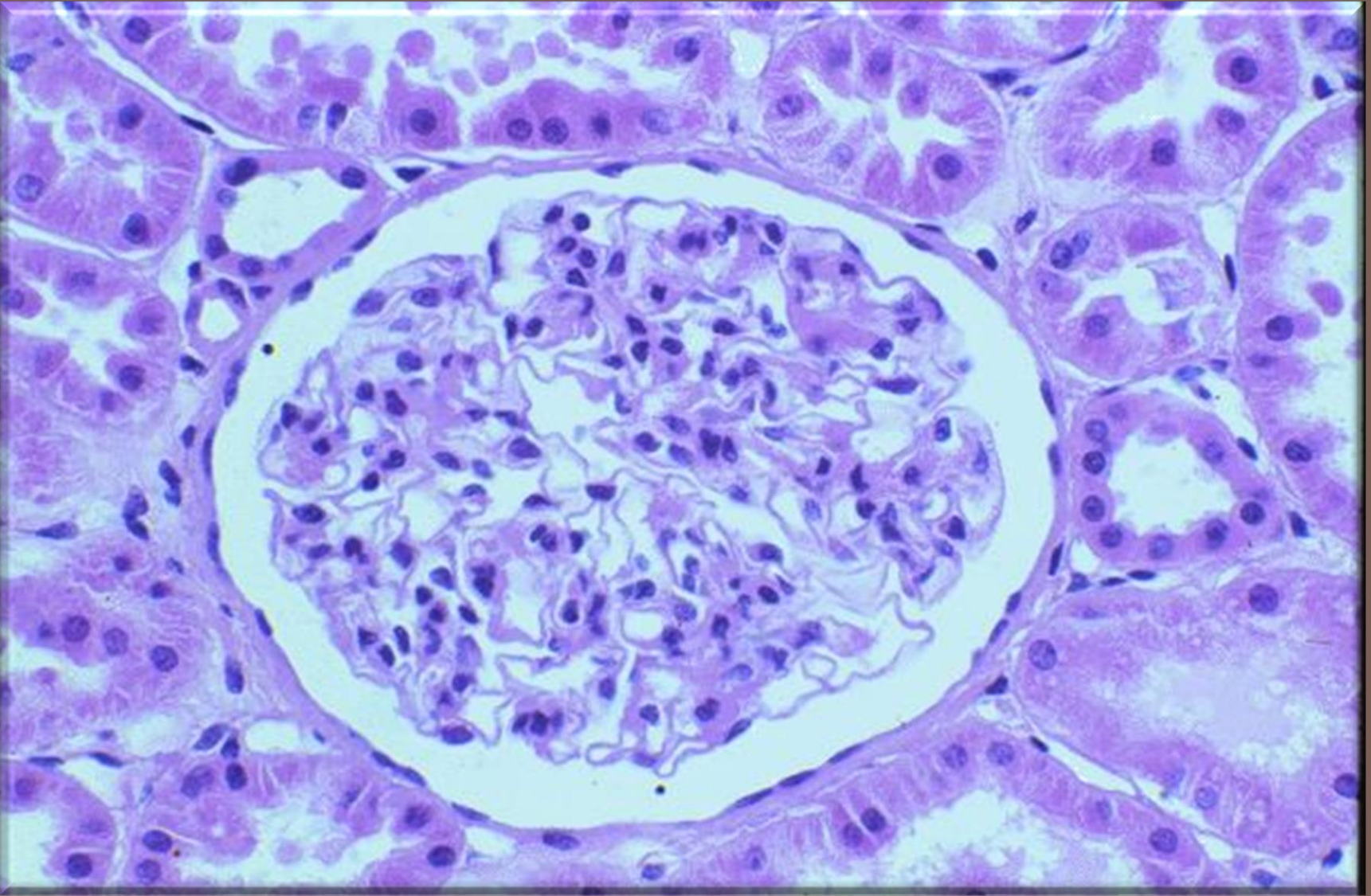


**Carmelo  
Libetta**

**Biopsia: controindicazioni**



# Colorazione ematossilina-eosina



Carmelo  
Libetta

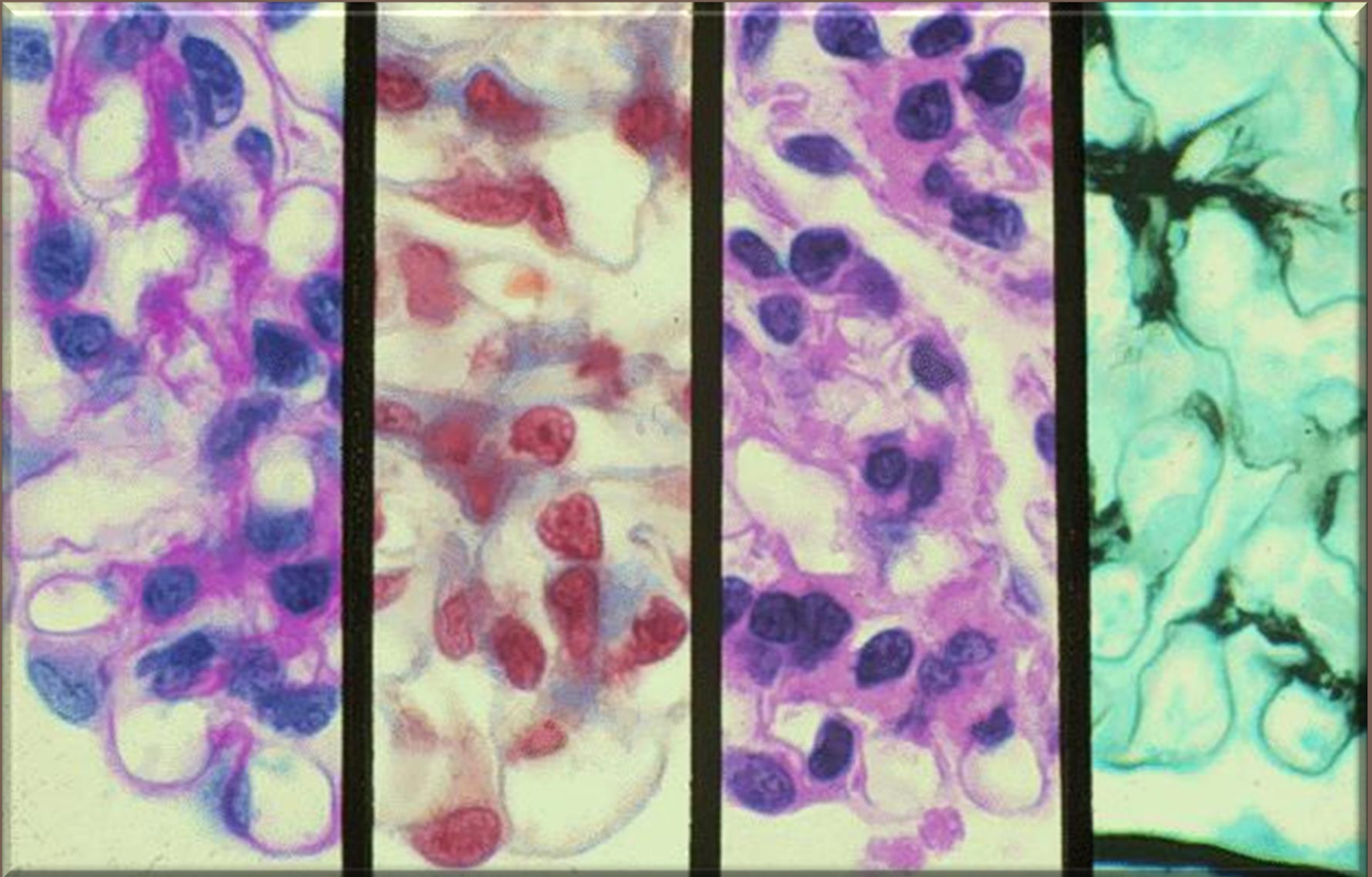
Microscopia ottica

PAS

ematossilina-eosina

Tricromica

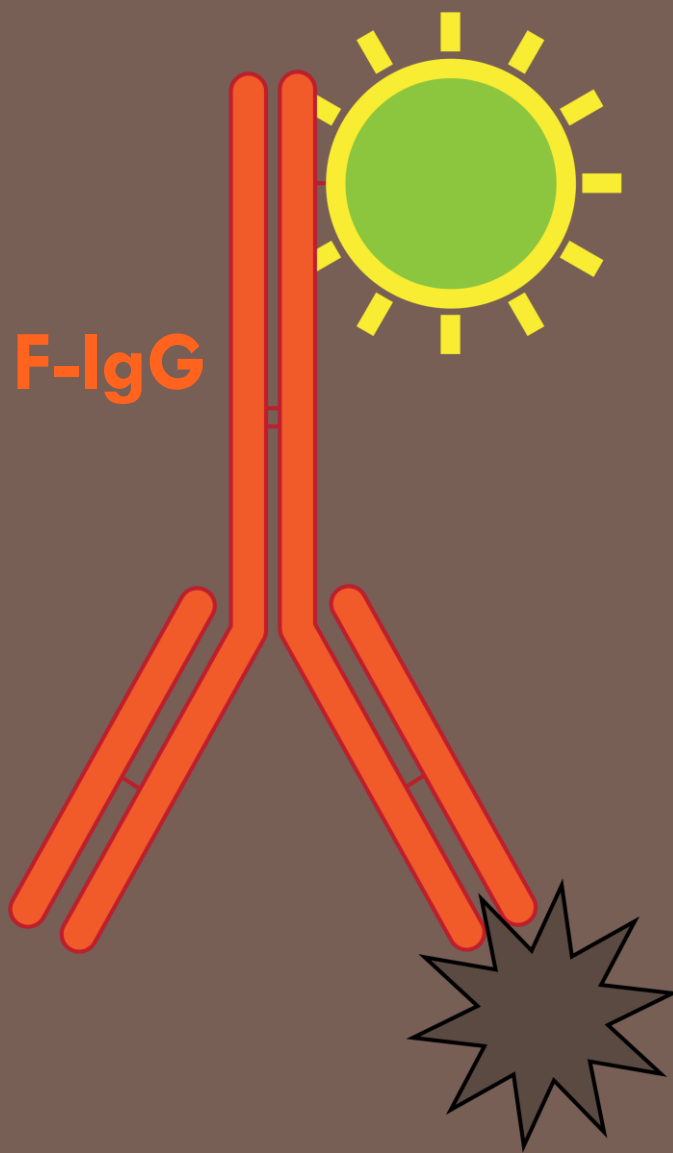
Jones Argentica



Carmelo  
Libetta

Istologia renale "colorazioni"



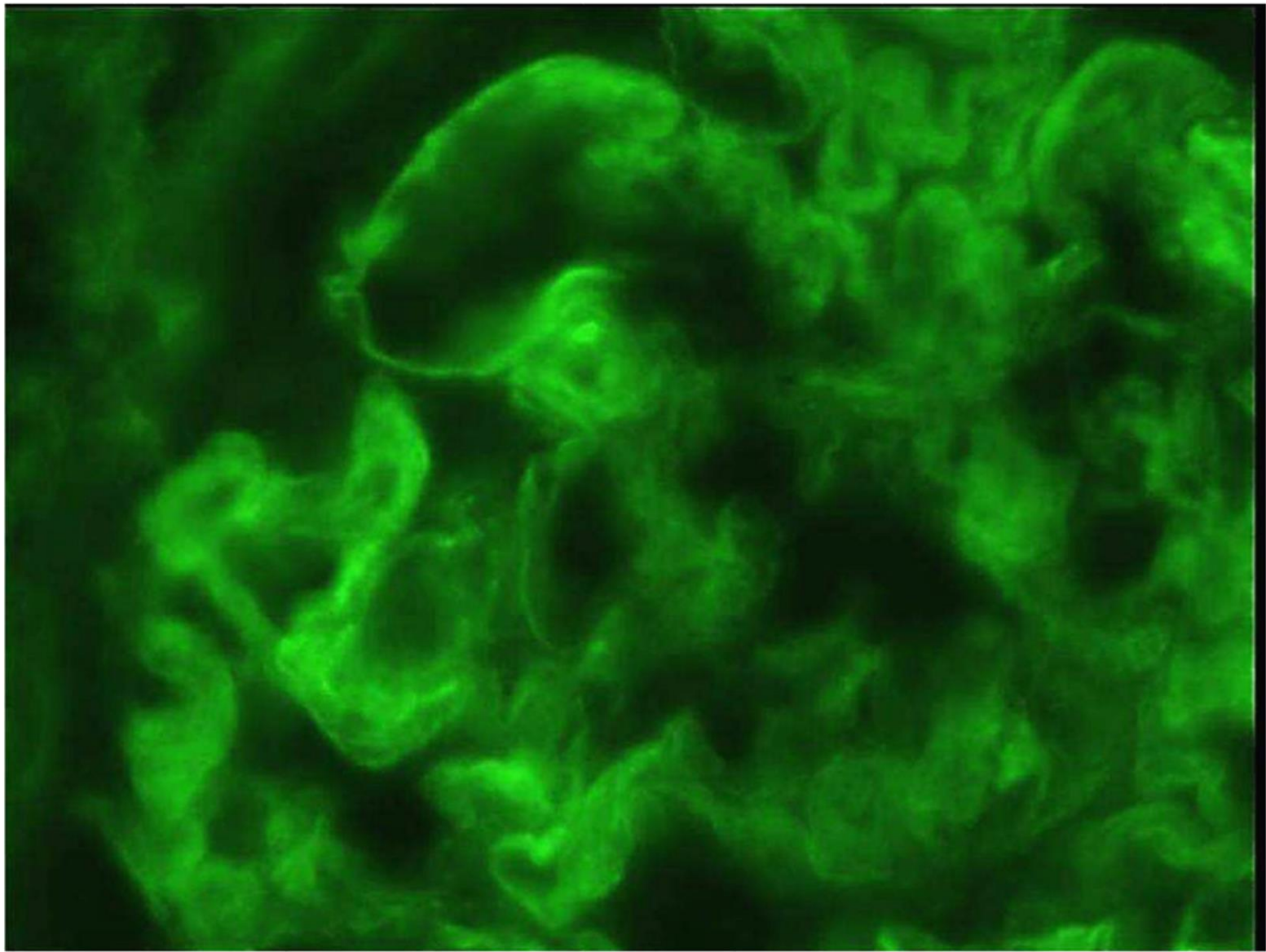


- F-IgG anti-IgG
- F-IgG anti-IgA
- F-IgG anti-IgM
- F-IgG anti-C3



Carmelo  
Libetta

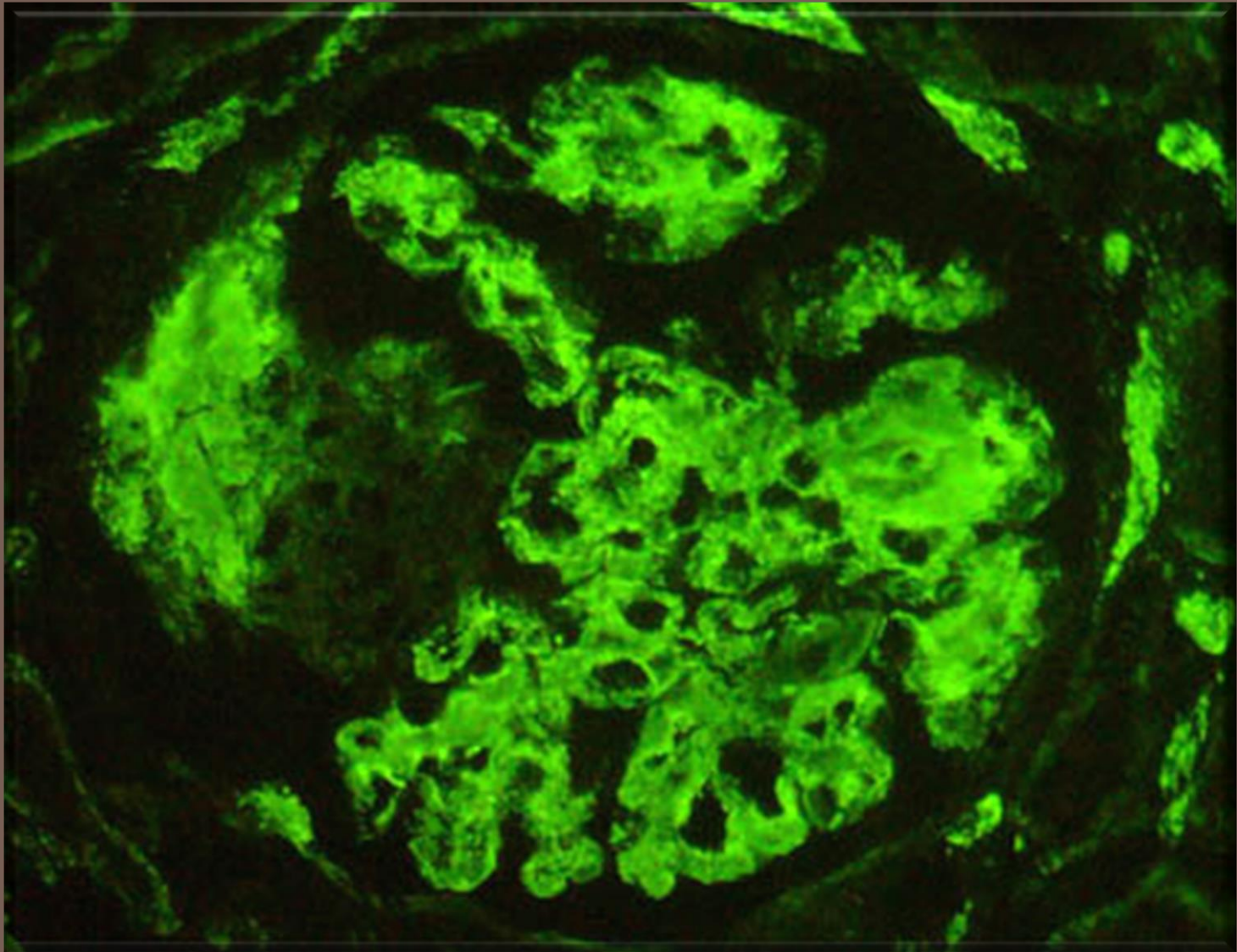
ImmunoFluorescenza



Carmelo  
Libetta

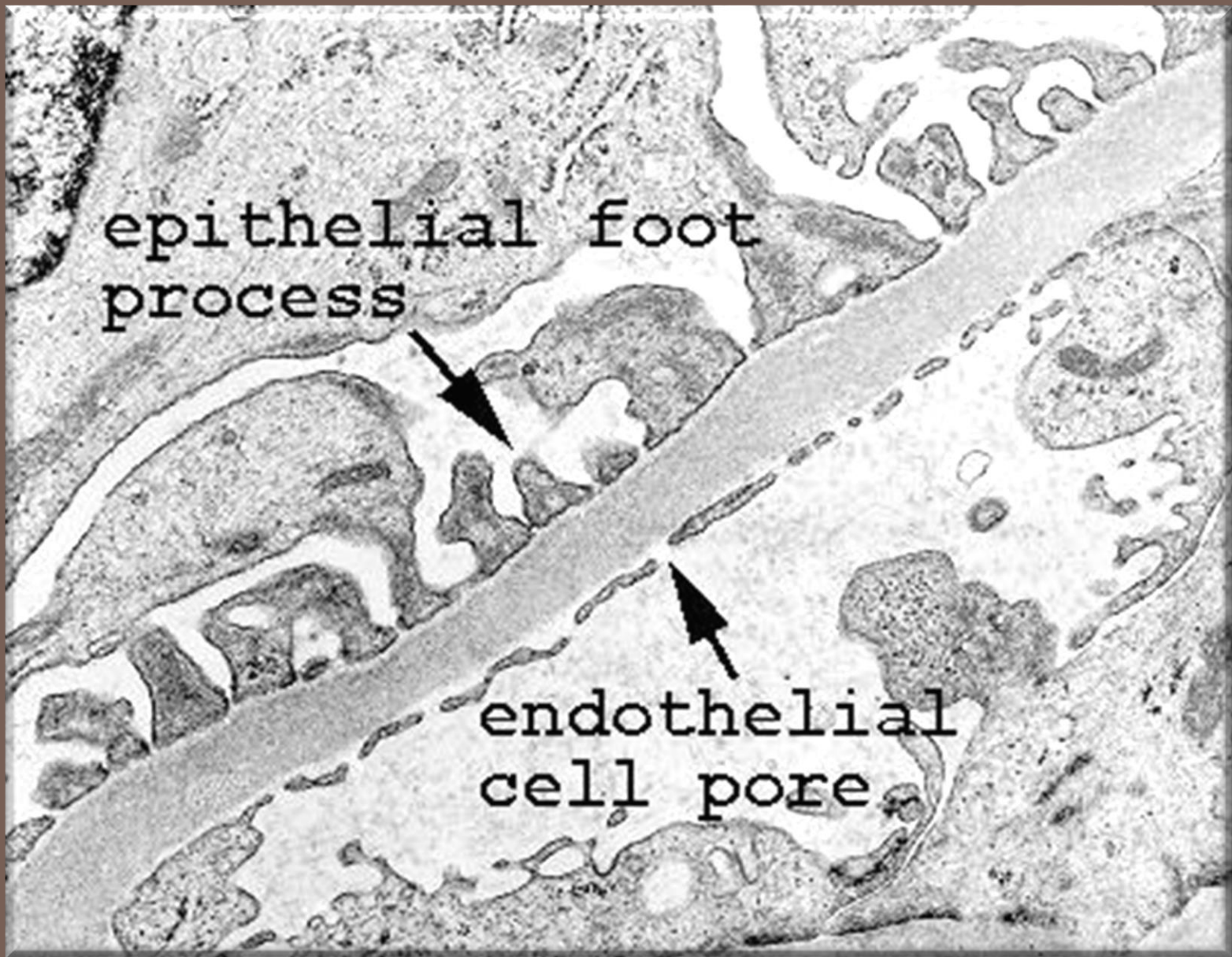
ImmunoFluorescenza





Carmelo  
Libetta

ImmunoFluorescenza



Carmelo  
Libetta

Microscopia elettronica

THE END



Carmelo  
Libetta

Chapter 2°