Sociedad Argentina de Reumatología

LÍQUIDO SINOVIAL

Dr. Oscar Luis Rillo

Jefe del Servicio de Reumatología

Htal. Gral. de Agudos "Dr. I. Pirovano".

HOSPITAL GENERAL DE AGUDOS
DR. IGNACIO PIROVANO

Secretaría de Salud - Gob. Ciudad Autónoma de Buenos Aires

LÍQUIDO SINOVIAL

- El líquido sinovial (LS) es un ultrafiltrado plasmático al que se le agrega el ácido hialurónico.
- Su aspecto es claro y su consistencia “simil clara de huevo”.
- Escaso en articulaciones normales y en procesos no inflamatorios; mayor volumen en etapas inflamatorias.
- Posee proteínas de alto peso molecular (fibrinógeno, inmunoglobulinas y lipoproteínas) que aumentan en los procesos inflamatorios.

LÍQUIDO SINOVIAL

	NORMAL	NO INFLAMATORIO (Grupo I)	INFLAMATORIO (Grupo II)	SÉPTICO (Grupo III)
VOLUMEN (RODILLA)	<1 ml	Frecuentemente > 4 ml	A menudo varios ml	A menudo varios ml
VISCOSIDAD	Alta	Alta	Baja	Variable
COLOR	Incoloro o amarillo pálido	Amarillento	Amarillento	Variable
CLARIDAD	Transparente	Transparente	Opaco	Opaco
GLÓBULOS BLANCOS (GB/ mm^3)	<200	Hasta 3000	>3000	> 100000 frecuentemente
PMN (%)	<25	<25	>50	>85
CULTIVO	Negativo	Negativo	Negativo	Positivo Frecuentemente

ARTROCENTESIS

A

B

Artrocentesis (Punción/ Aspiración de una articulación; de rodilla: Fig. A por "cara interna" y Fig. B por "vía lateral")

Procedimiento en el cual debemos respetar siempre las normas de asepsia ("bioseguridad")
Permite extraer el LS de las articulaciones para analizarlo posteriormente.

Es diagnóstico y terapéutico.

EXAMEN DEL LÍQUIDO SINOVIAL

SIEMPRE:

Apreciar el aspecto macroscópico (color, transparencia, viscosidad)

Realizar preparación “en fresco” (una gota de LS entre porta y cubre-objeto)

Observación microscópica (sobre todo citológico y presencia de cristales)

CUANDO ESTÉ INDICADO POR HALLAZGOS CLÍNICOS:

Solicitar el cultivo; tinción de Gram.

NO ES NECESARIO:

Valorar el coágulo de mucina ni el recuento de GR.

EXAMEN MACROSCÓPICO

- **Viscosidad**

- Se mide observando la filancia.
- Normal : 3-5 cm.
- Disminuida : Cae “gota a gota”.
- Aumentada: > 6 cm (por ej. Hipotiroidismo

LS inflamatorio con viscosidad disminuida.

LÍQUIDO SINOVIAL

CELULARIDAD NORMAL

SINOVIOCITOS	5%
MACRÓFAGOS	10%
LEUCOCITO S	85%
► Polimorfonucleares	7%
► Linfocitos	30%
► Monocitos	48%

EXAMEN MACROSCÓPICO

- Color:

- Incoloro o amarillo claro, transparente → LS no inflamatorio.
- Purulento
  - Artritis séptica.
  - AR.
  - Artritis cristálicas.
- Hemorrágico
  - Iatrogenia (“hilos de sangre”).
  - Hemorragia difusa → LS hemorrágico.
- Incoloro
  - Derrames secundarios a edemas.
  - Descenso brusco de esteroides.
- Quiloso → En artritis o bursitis crónicas (gran cantidad de cristales de colesterol).
- “Lechada de cal” → Gran cantidad de cristales de UMS o de Hidroxiapatita

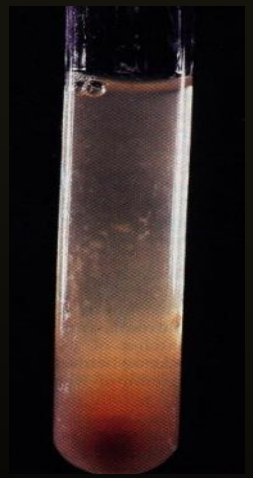
LÍQUIDO SINOVIAL
EXAMEN MACROSCÓPICO

A

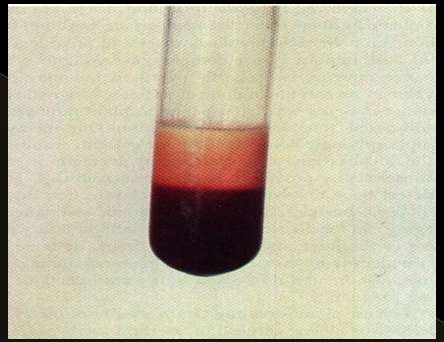
B C D E

A……..Normal (poco volumen; amarillento claro; alta viscocidad)
B……..No Inflamatorio (Ej. OA)
C……..Inflamatorio (Ej. AR)
D……..Séptico
E……..Hemorrágico (Ej. Trauma; Hemofilia; cristálicas)

CON CRISTALES
DE COLESTEROL



SÉPTICO



LS CENTRIFUGADO: POS FRACTURA (MATERIAL LIPÍDICO)

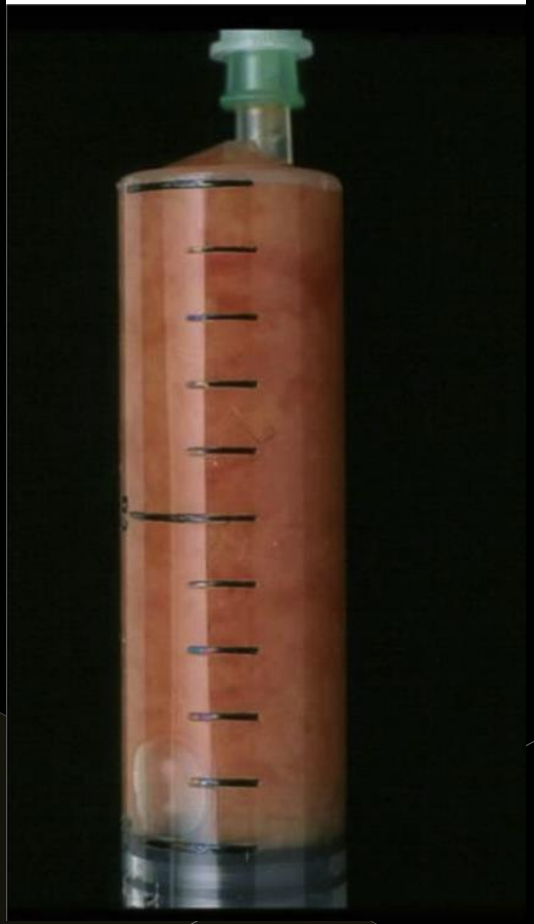
A

A. NO INFLAMATORIO

B

B. INFLAMATORIO

C

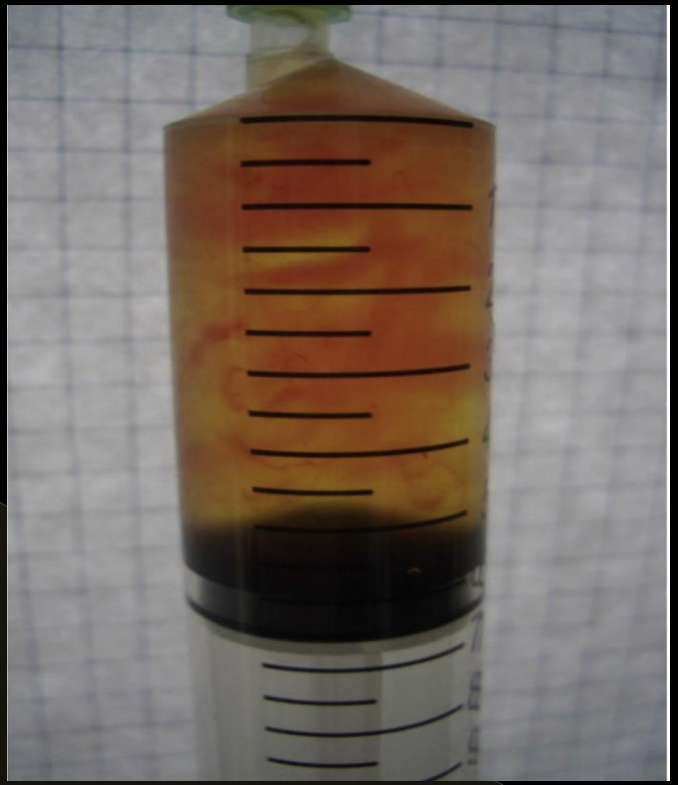


C. SÉPTICO

A

A. Hemartrosis

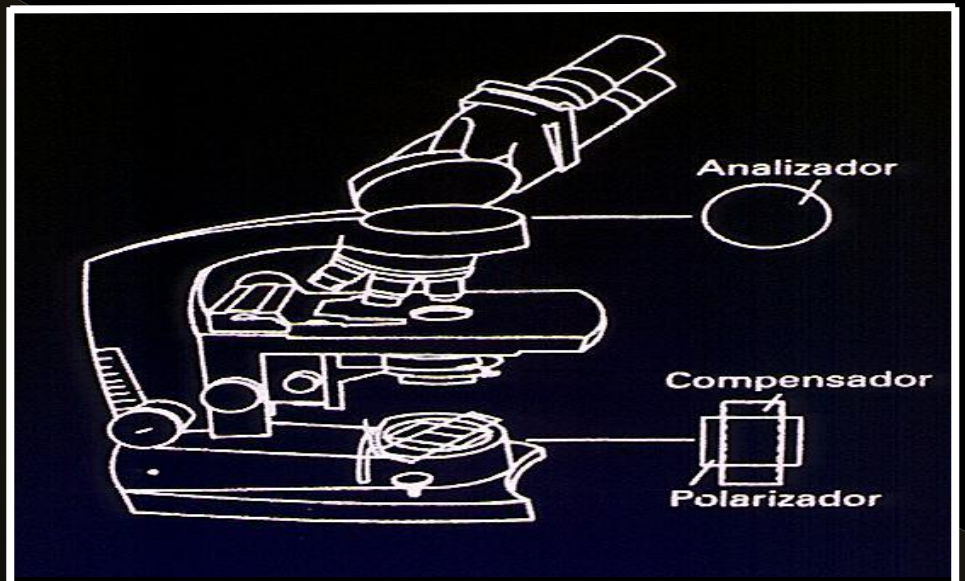
B



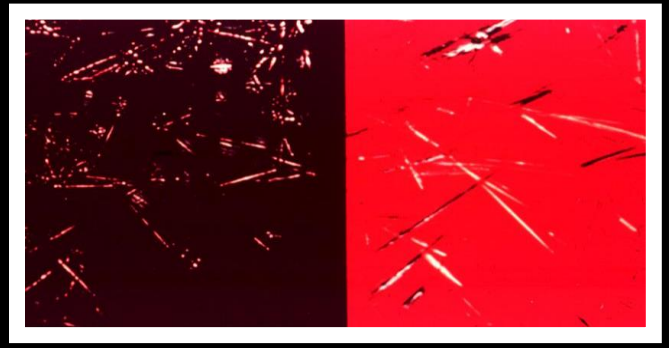
B. Sangre “tiñendo” el LS (artrocentesis traumática)

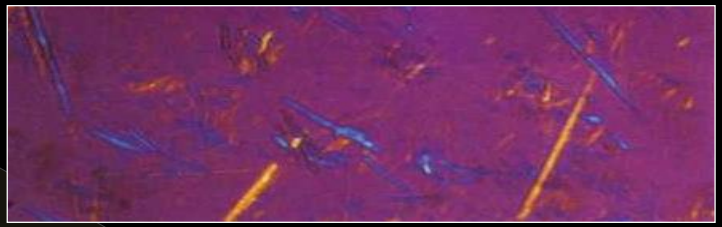
Identificación de cristales

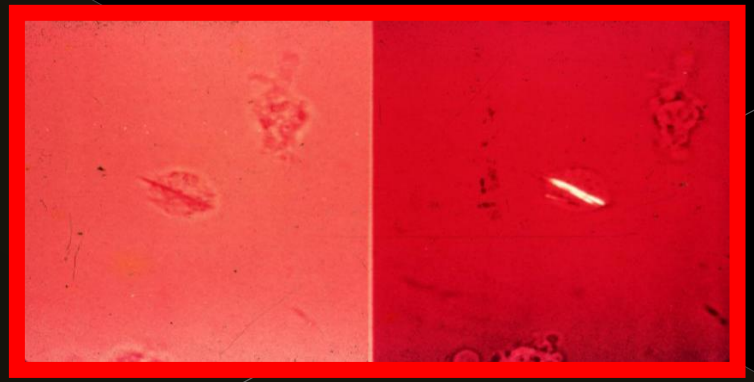
- Microscopía óptica de luz ordinaria.
- Microscopía óptica con luz polarizada y lente compensadora (permite evaluar birefringencia y conocer la elongación o signo óptico)
- Microscopía electrónica de barrido.
- Análisis de dispersión de energía de rayos X.



MICROSCOPÍA DE POLARIZACIÓN





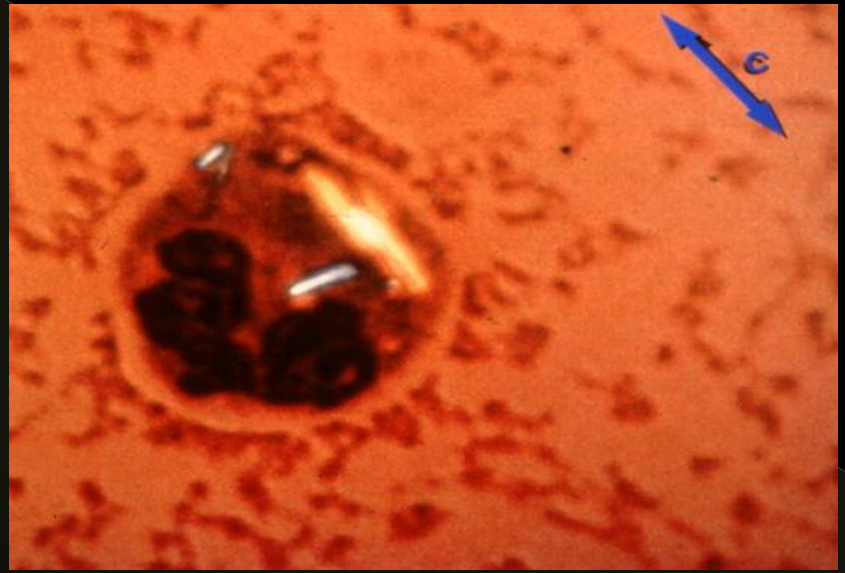


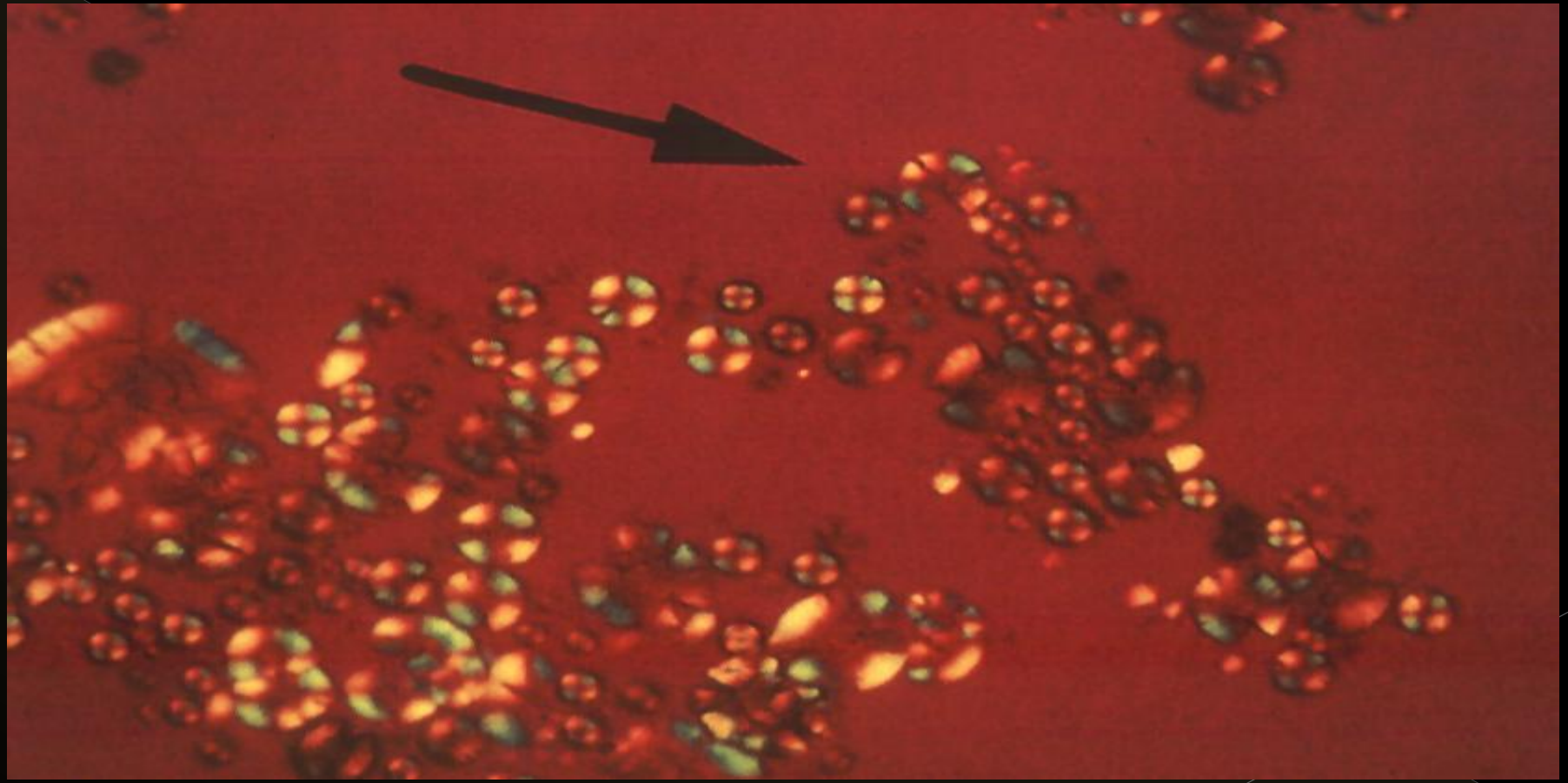
Propiedades de los cristales

- **Doble refracción o birrefringencia**
  - -Fuerte
  - -Débil
  - -Nula
- **Elongación (signo óptico)**
  - -Positivo
  - -Negativo
- **Ángulo de extinción**

CARACTERÍSTICAS DE LOS CRISTALES

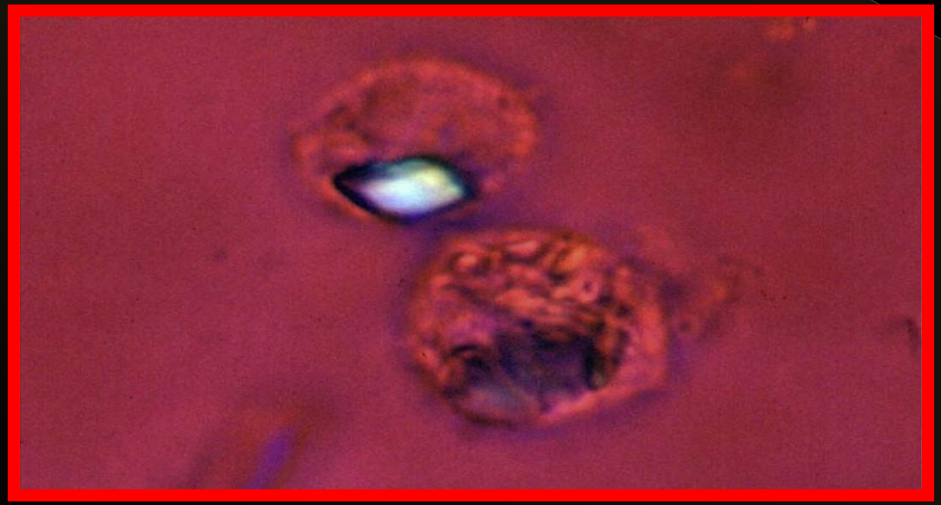
CRISTAL	MORFOLOGÍA	BIRREFRINGENCIA	SIGNO ÓPTICO	ENFERMEDAD
UMS	Muchos con forma de Aguja "Pelota de Playa"	Intensa	Negativo	Gota
CPPD	Bastón	Débil	Positivo	Depósito de CPPD
Hidroxiapatita	Masas amorfas	Ninguna	Ninguno	Periartritis OA
Oxalato de Ca	Bipiramidales Sobre	Intensa	Positivo	Oxalosis Primaria o Secundaria Insuficiencia renal crónica
Colesterol	Rectangulares	Intensa	Negativo	Artritis crónicas
Corticoides	Bastones Romboidales	Intensa	Positivo o Negativo	Iatrogenia

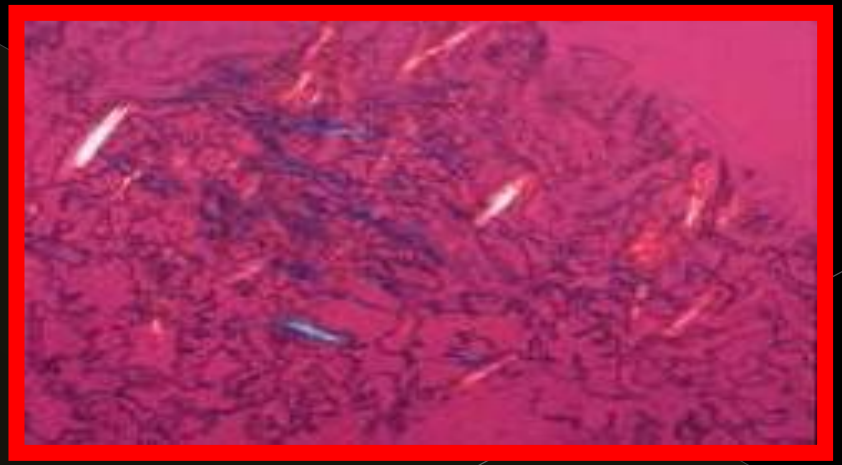

c



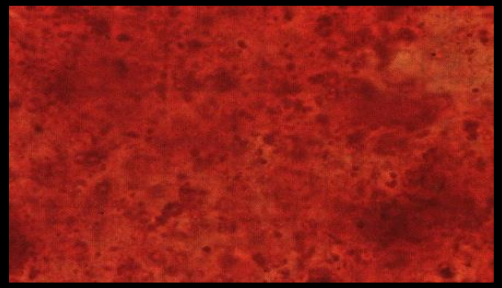
Cristales de Pirofosfato Cálcico

- Débil BR y signo óptico positivo (“color azul”).
- Generalmente con formas rectangulares (paralelepídedos), como bastón o “forma de aguja”.
- Intracelulares en la artritis aguda.



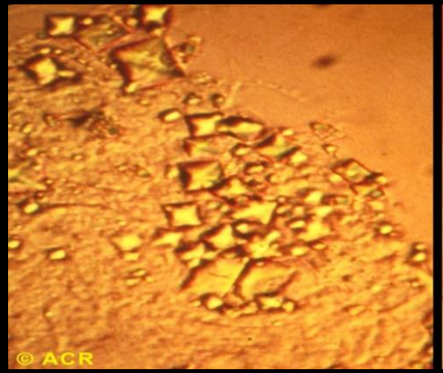


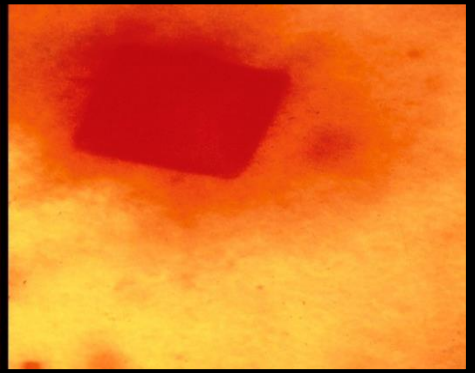
Cristales de Hidroxiapatita



- No tienen birefringencia ni signo óptico.
- Son masas amorfas irregulares, generalmente extracelulares.
- Se tiñen con “rojo de alizarina” de color rojizo anaranjado

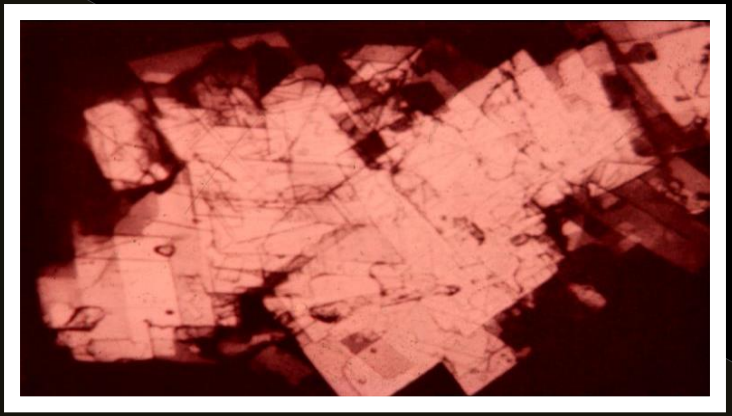
Cristales de oxalato de calcio

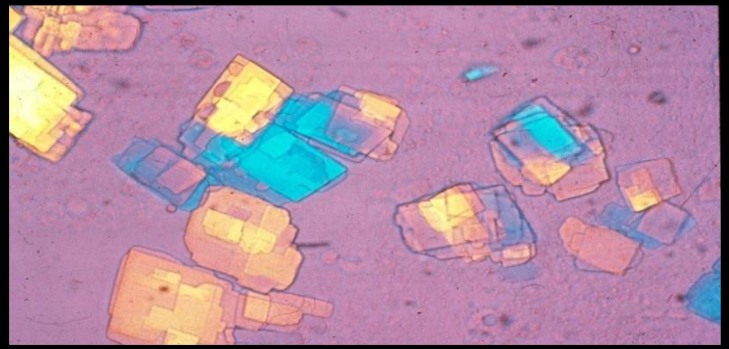




- Intensa BR y signo óptico positivo.
- En general son “bipiramidales o en “forma de sobre”.

CRISTALES DE COLESTEROL

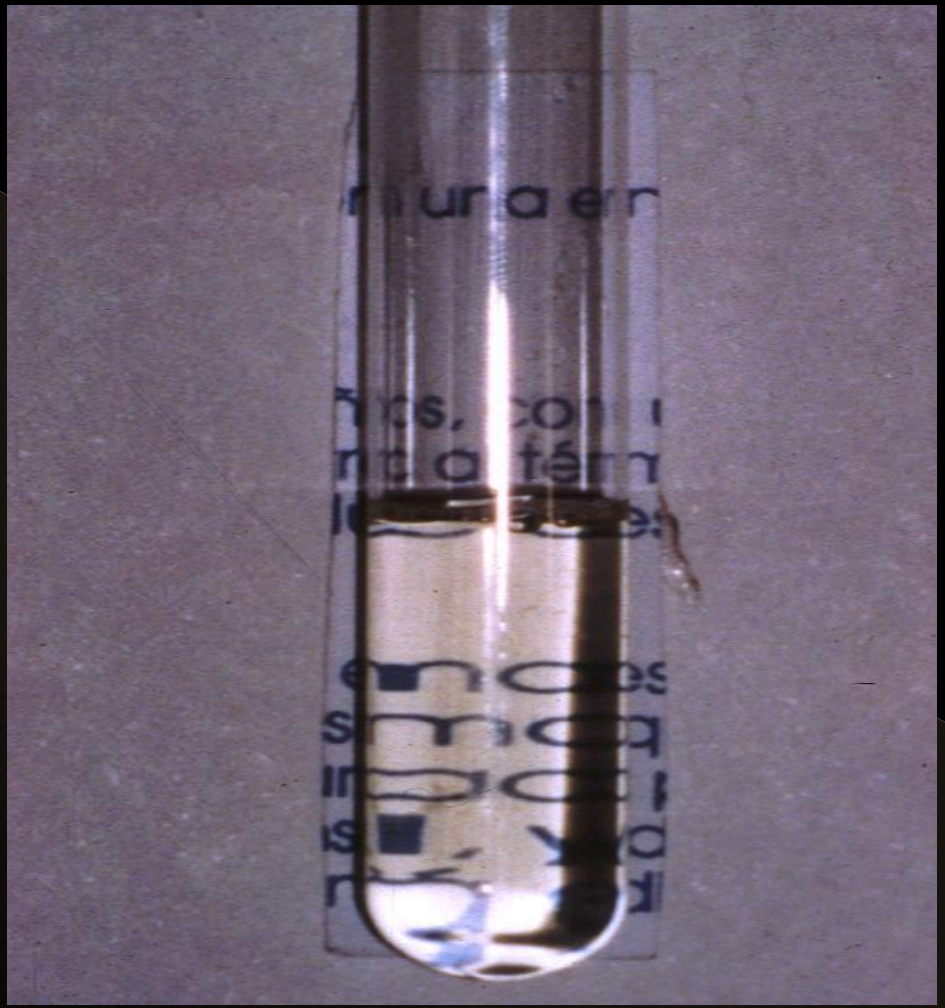




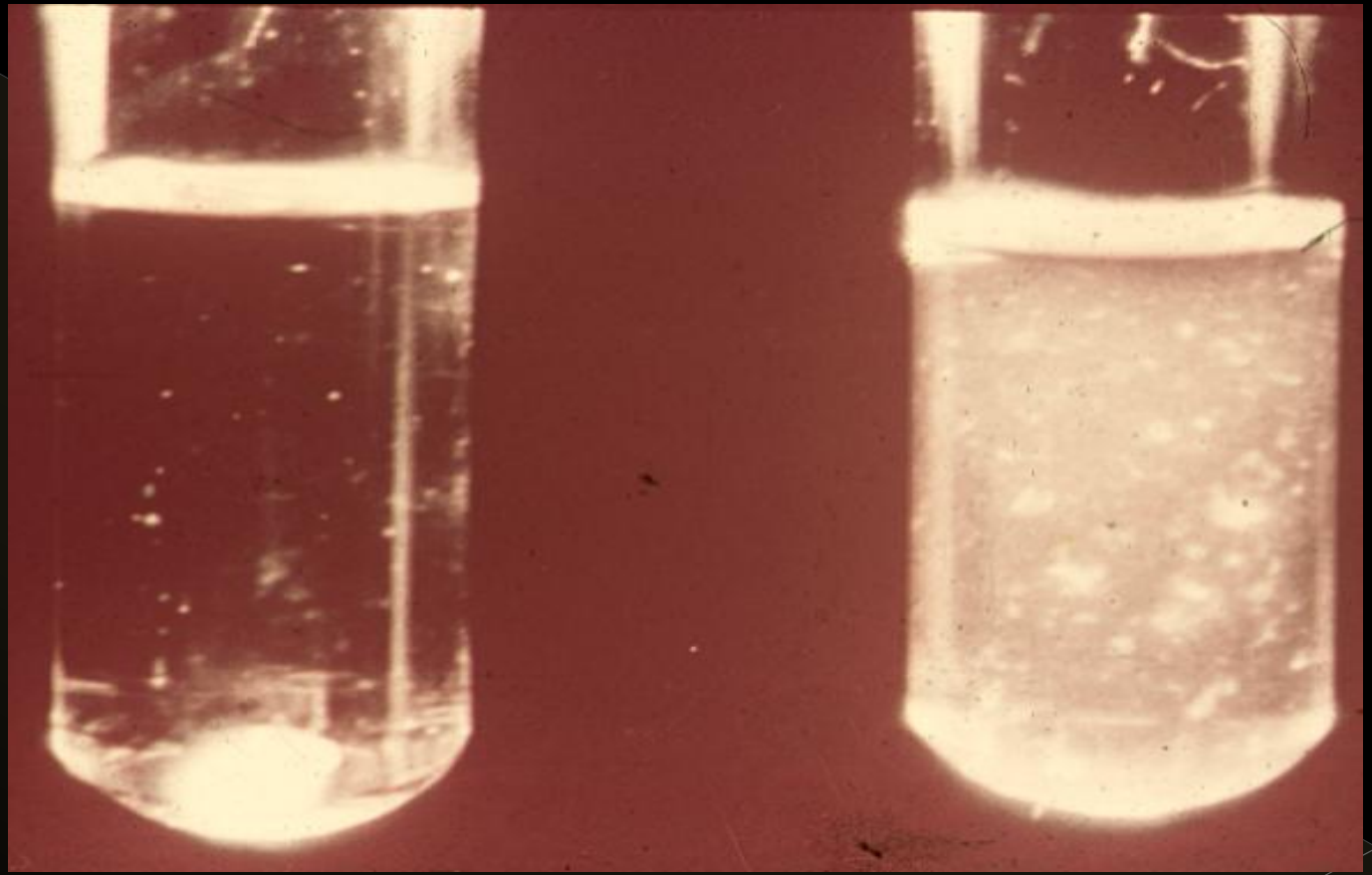
- Birrefringencia fuerte; rectangulares con muescas en las esquinas.
- *Por su gran tamaño (hasta 100 µm) son siempre extracelulares.*

PATOLOGÍAS RELACIONADAS CON LOS DIFERENTES TIPOS DE LÍQUIDO SINOVIAL

NO INFLAMATORIO	INFLAMATORIO	HEMORRÁGICO
OA	Artritis Séptica	Traumatismo
Traumatismos	Cuerpos extraños	Artritis Séptica
NOA	Artritis cristálicas	Discrasias sanguíneas
Síndrome de Hipermovilidad	Artritis reactivas	Tumores
Amiloidosis	Colagenopatías	Cristálicas
Ostocondromas	Vasculitis	Anticoagulación
Sinovitis Vellonodular Pigmentada	PMR	Artropatía neurogénica

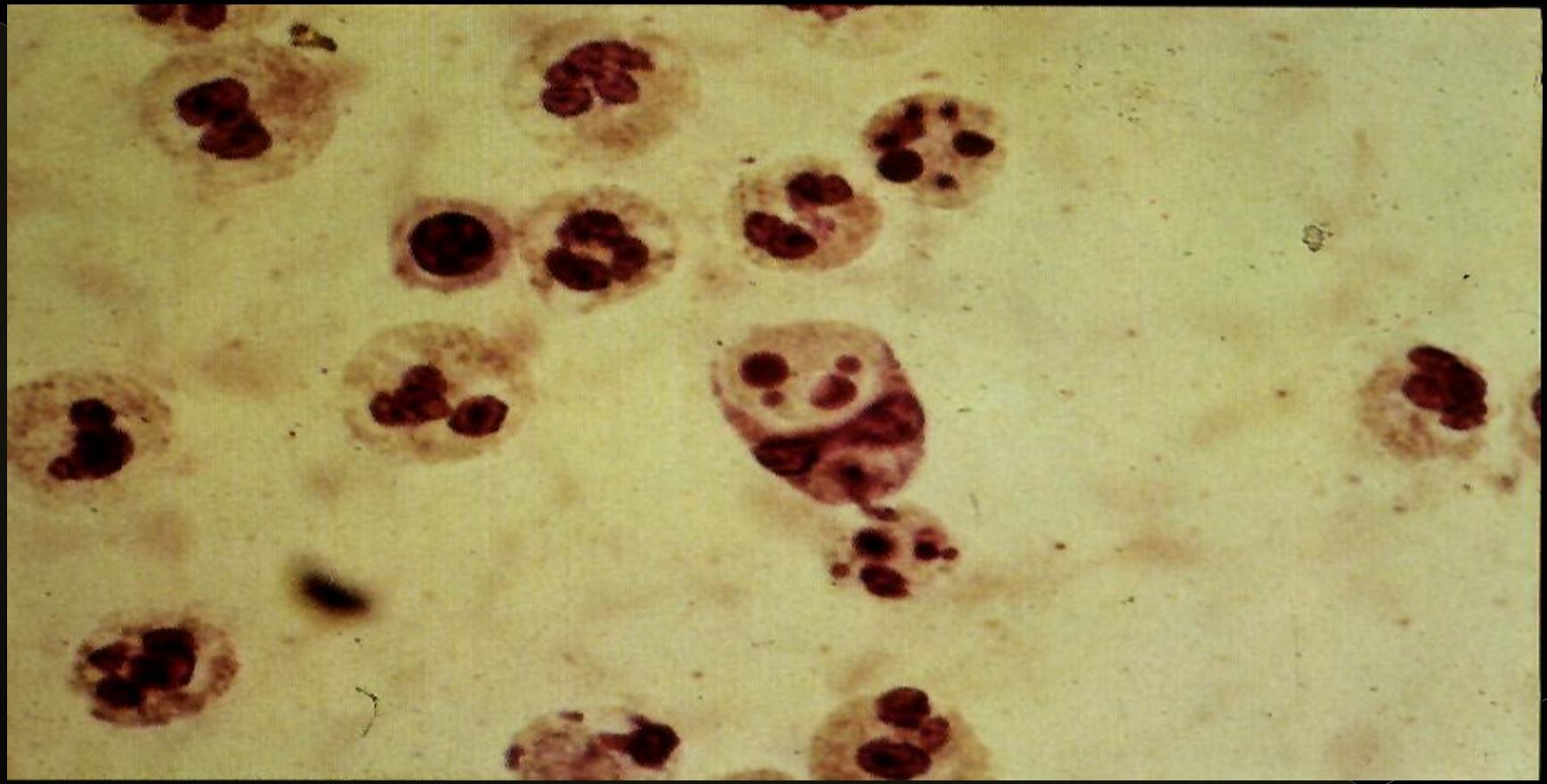


CÉLULAS SINOVIALES: “Células en raqueta”

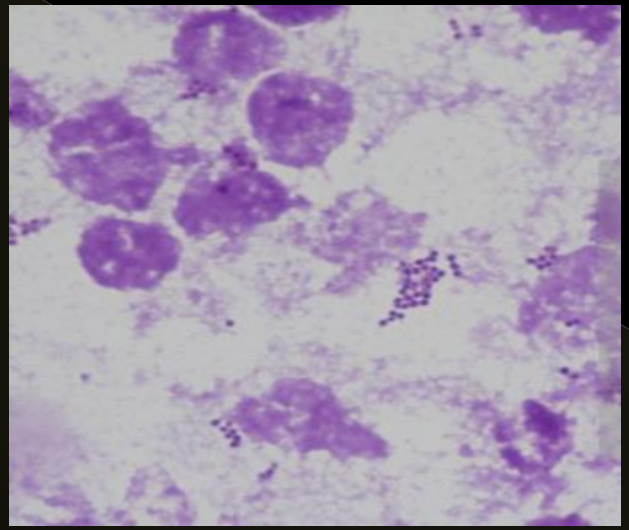


EXAMEN CITOLÓGICO

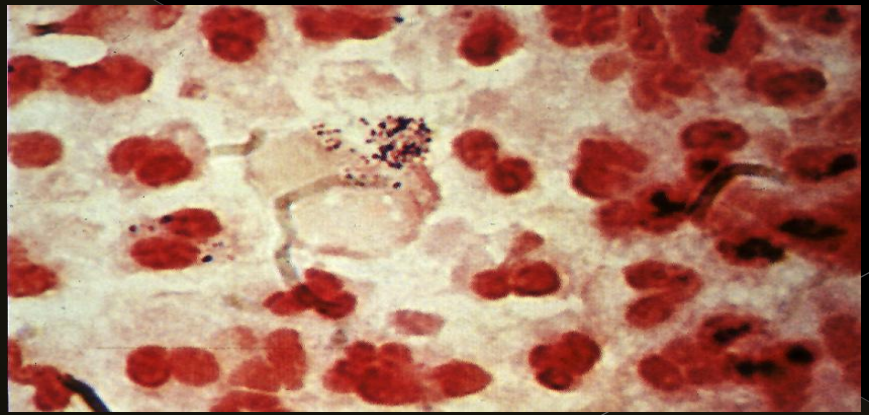
CÉLULAS LE: Mononucleares o PMN con material nuclear.

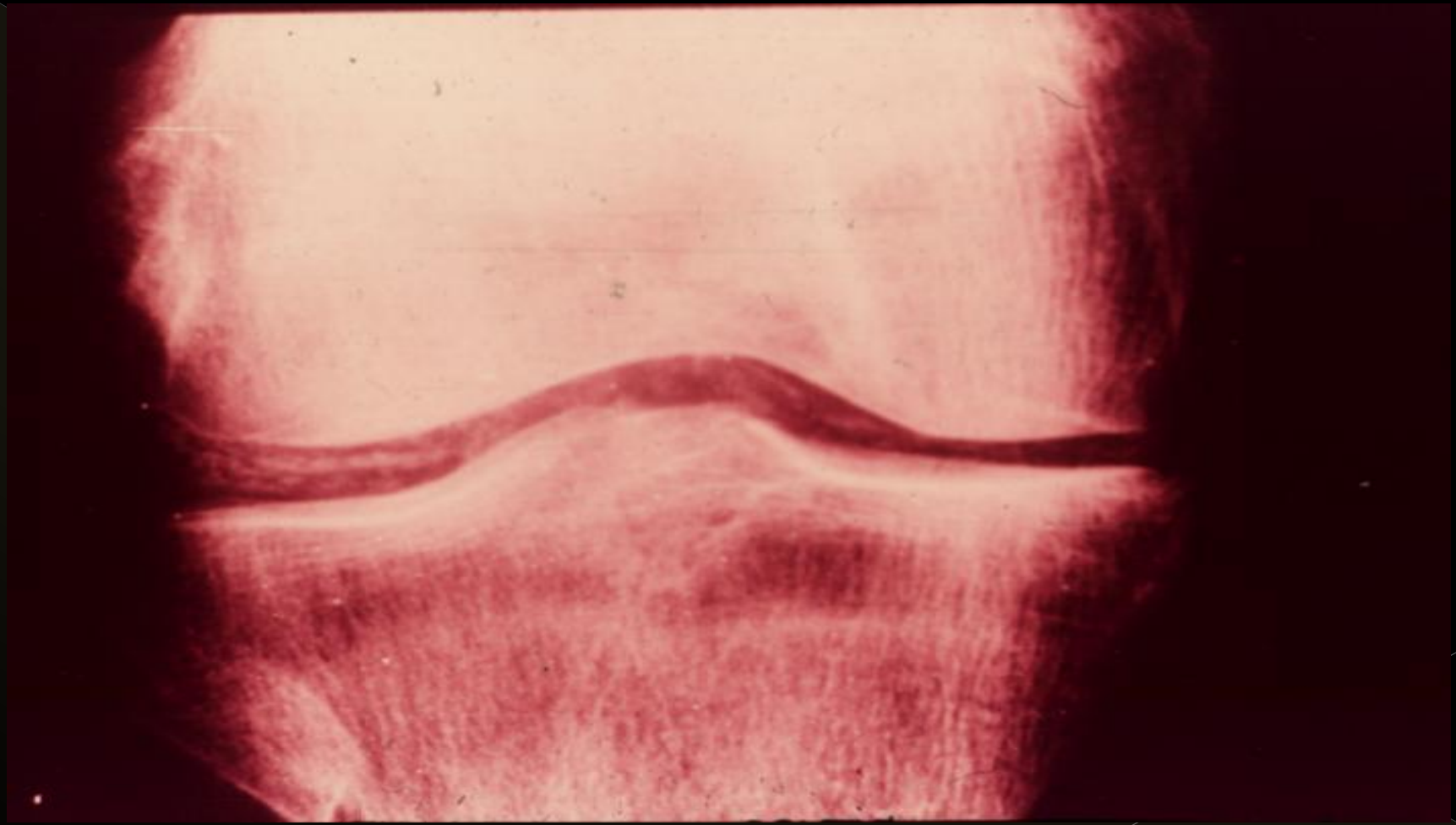


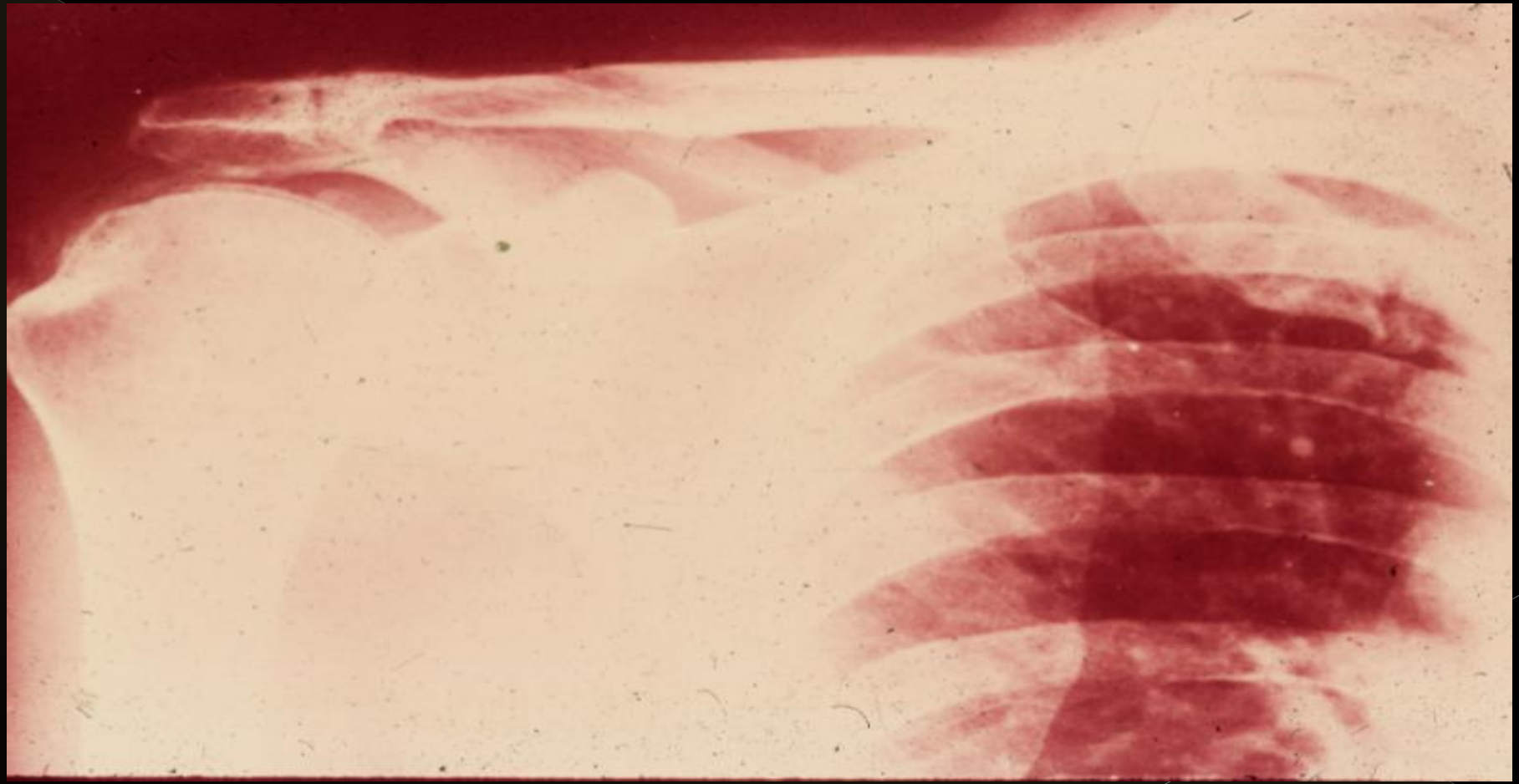
CÉLULAS DE ARTRITIS REACTIVA: monocitos que contienen PMN.

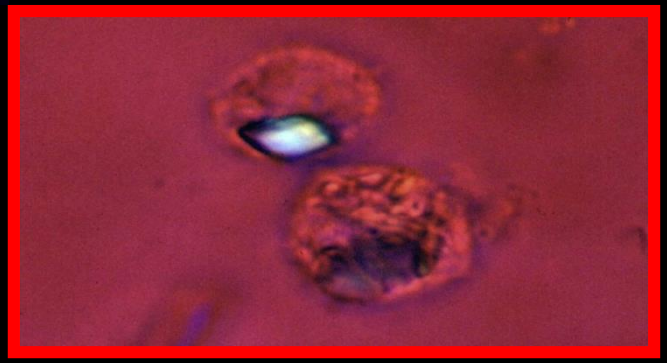


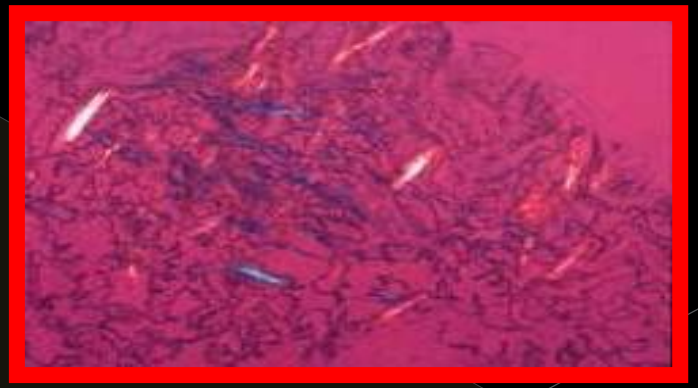
Bacterias Gram Positivas: Estafilococo

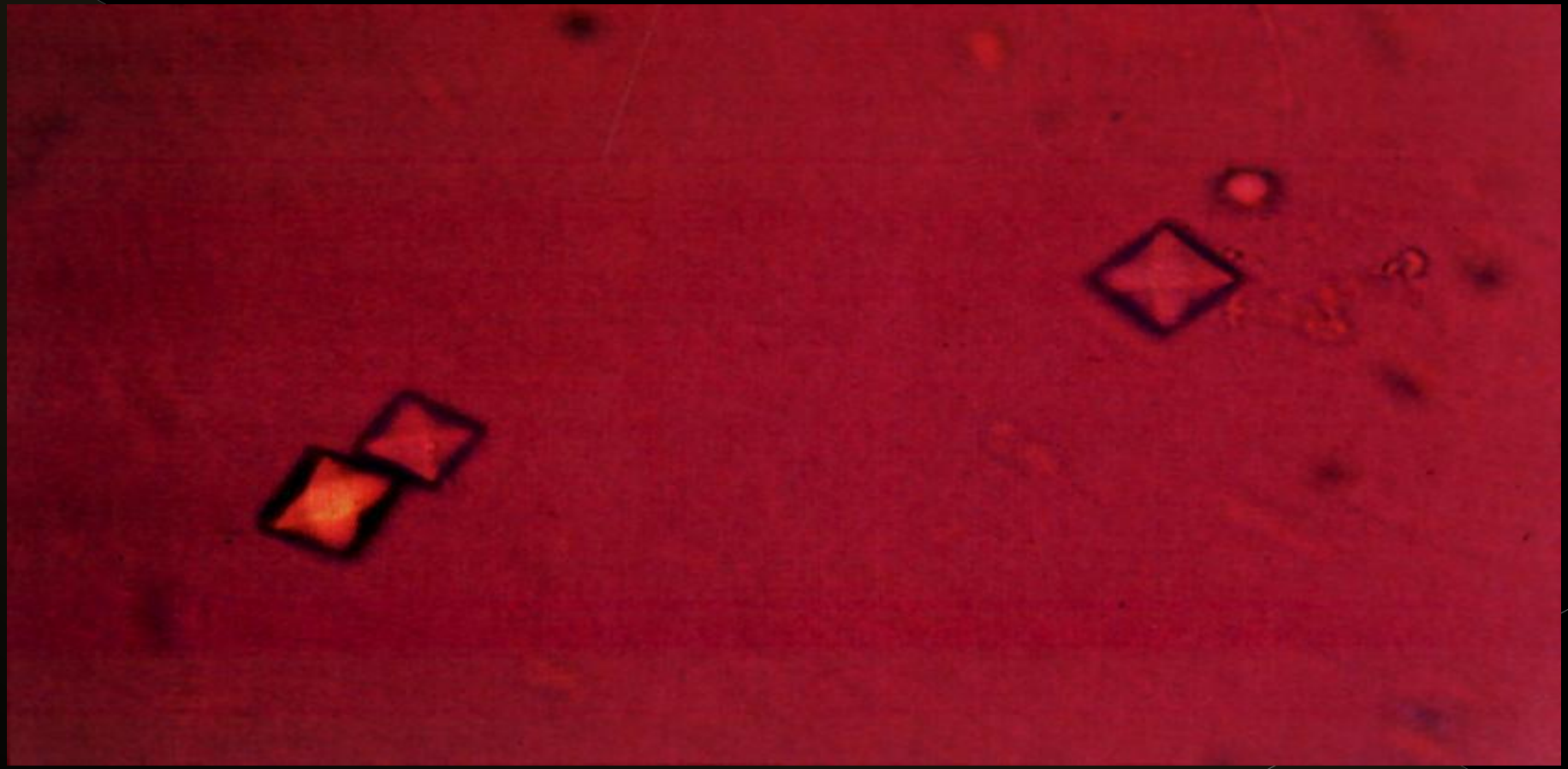












Synovial calprotectin: a potential biomarker to exclude a prosthetic joint infection.

Wouthuyzen-Bakker M, et al. Bone Joint J 2017;99-B:660–5.

Aims

Recently, several synovial biomarkers have been introduced into the algorithm for the diagnosis of a prosthetic joint infection (PJI). Alpha defensin is a promising biomarker, with a high sensitivity and specificity, but it is expensive. Calprotectin is a protein that is present in the cytoplasm of neutrophils, is released upon neutrophil activation and exhibits anti-microbial activity. Our aim, in this study, was to determine the diagnostic potential of synovial calprotectin in the diagnosis of a PJI.

Patients and Methods

In this pilot study, we prospectively collected synovial fluid from the hip, knee, shoulder and elbow of 19 patients with a proven PJI and from a control group of 42 patients who underwent revision surgery without a PJI.

PJI was diagnosed according to the current diagnostic criteria of the Musculoskeletal Infection Society. Synovial fluid was centrifuged and the supernatant was used to measure the level of calprotectin after applying a lateral flow immunoassay.

Results

The median synovial calprotectin level was 991 mg/L (interquartile range (IQR) 154 to 1787) in those with a PJI and 11 mg/L (IQR 3 to 29) in the control group ($p < 0.0001$). Using a cut-off value of 50 mg/L, this level showed an excellent diagnostic accuracy, with an area under the curve of 0.94. The overall sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) was 89%, 90%, 81% and 95% respectively. The NPV was 97% in the nine patients with a chronic PJI.

Conclusion

Synovial calprotectin may be a valuable biomarker in the diagnosis of a PJI, especially in the exclusion of an infection. With a lateral flow immunoassay, a relatively rapid quantitative diagnosis can be made. The measurement is cheap and is easy to use.

Synovial calprotectin: an inexpensive biomarker to exclude a chronic prosthetic joint infection

Wouthuyzen-Bakker M; et al. The Journal of Arthroplasty 2017, doi: 10.1016/ j.arth.2017.11.006.

ABSTRACT

Background: To diagnose or exclude a chronic prosthetic joint infection (PJI) can be a clinical challenge. Therefore, sensitive and specific biomarkers are needed in the diagnostic work-up. Calprotectin is a protein with antimicrobial properties and is released by activated neutrophils, making it a specific marker for infection. Because of its low costs and ability to obtain a quantitative value as a point of care test, it is an attractive marker to use in clinical practice. In addition, the test is already used in routine-care in most hospitals for other indications and therefore, easy to implement. *Methods:* Between June 2015 and June 2017 we collected synovial fluid of all consecutive patients who underwent revision surgery of a prosthetic joint because of chronic pain with or without prosthetic loosening. Synovial calprotectin was measured using a lateral flow immunoassay. A PJI was defined by the diagnostic criteria described by the Musculoskeletal Infection Society. *Results:* 52 patients with chronic pain were included. A PJI was diagnosed in 15/52 (29%) patients. The median calprotectin in the PJI group was 859 mg/L (IQR 86 – 1707) versus 7 mg/L (IQR 3 – 25) in the control group ($p < 0.001$). With a cut-off value of 50 mg/L, synovial calprotectin showed a sensitivity, specificity, positive predictive value and negative predictive value of 86.7%, 91.7%, 81.3% and 94.4%, respectively. *Conclusion:* Synovial calprotectin is a useful and cheap biomarker to use in the diagnostic work-up of patients with chronic pain, especially to exclude a PJI prior to revision surgery.

Calprotectin discriminates septic arthritis from pseudogout and rheumatoid arthritis.

Baillet A, et al. Rheumatology (Oxford) 2019 Mar 28. pii: kez098. doi: 10.1093/rheumatology/kez098

Abstract

Objective. We aimed to determine whether calprotectin and α-defensins could discriminate septic from other inflammatory arthritides.

Methods. Synovial fluids with a predominance of neutrophils from patients with septic arthritis, pseudogout and RA were prospectively collected. Neutrophil-related proteins calprotectin and human neutrophil α-defensins levels were assessed in synovial fluids. Demographic parameters and biomarkers with *P*-value ⩽0.05 for differentiating septic from non-septic arthritis were included in a multivariable model. Multivariable logistic regression with stepwise selection was performed to build the final combined model.

Results. A total of 74 patients were included: septic arthritis ($n = 26$), pseudogout ($n = 28$) and RA ($n = 20$). Patients with septic arthritis were more likely to be male and young, and to display higher synovial neutrophil count. Calprotectin was significantly increased in patients with septic arthritis. The multivariable model included calprotectin, synovial fluid neutrophil count and gender. Calprotectin was the only biomarker that discriminated septic arthritis from non-septic inflammatory arthritides, with 76% sensitivity, 94% specificity and a positive likelihood ratio = 12.2 at the threshold for calprotectin of 150 mg/l.

Conclusion. Synovial fluid calprotectin is a relevant biomarker to discriminate septic arthritis from other inflammatory arthritides. This biomarker should be tested in an independent cohort.

MUCHAS GRACIAS POR SU ATENCIÓN

HOSPITAL GENERAL DE AGUDOS
DR. IGNACIO PIROVANO

Secretaría de Salud - Gob. Ciudad Autónoma de Buenos Aires

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