

**OZONE SEMINAR
CONGRESS 2003**

MUNICH 2003

disc hernia.

Minimal invasive treatment:

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Ozone Discolisis *(0203)*



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Moldin Clinic Marbella

PERCUTANEOUS TECHNIQUES

ENDOSCOPY

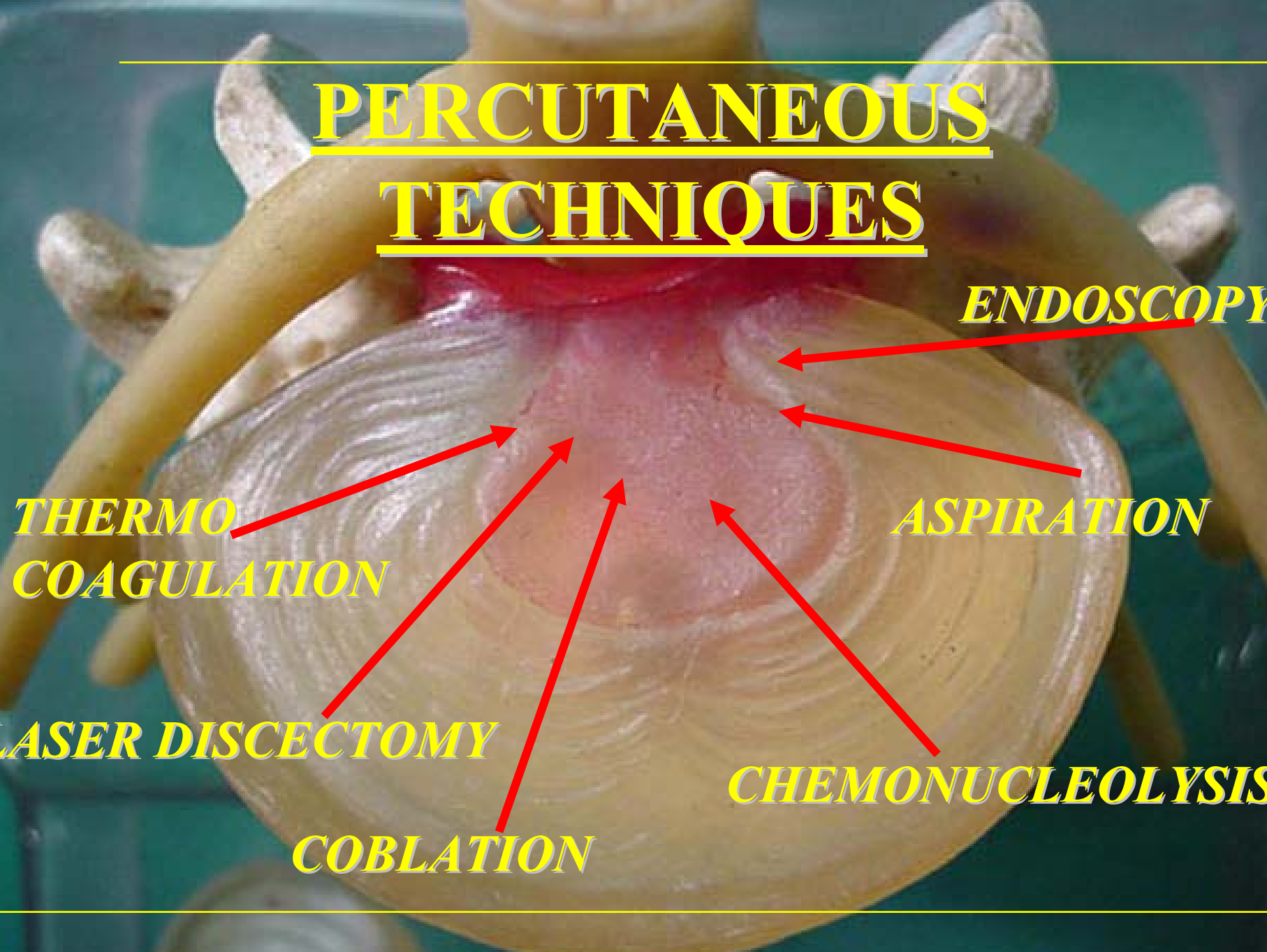
ASPIRATION

*THERMO
COAGULATION*

LASER DISCECTOMY

CHEMONUCLEOLYSIS

COBLATION



percutaneous techniques

do not modify

normal spinal anatomy

point directly to the disc

avoid bone demolition

minimize peridural scarring

the disc is composed by

type 2 and 3 collagen,
Elastine

proteo- glicanes
glicosammino-glicanes
carboidrato chains

Disc tissue:

macromolecular structure

including relevant water content

allowing amortization

DISCAL-RADICULAR CONFLICT

compression

An anatomical model of a vertebral disc and surrounding structures. The disc is shown in a cross-section, with a red, gelatinous nucleus pulposus. A yellowish, fibrous structure, likely a nerve root, is shown being compressed by the disc. The word "compression" is written in large, green, italicized letters across the disc. The background is a dark green, textured surface.

An anatomical model of a vertebral disc, viewed from a superior perspective. The disc is shown in a cross-section, revealing the internal structure of the annulus fibrosus and the nucleus pulposus. A red, irregular mass is visible within the disc, representing a discal-radicular conflict. The surrounding vertebral bodies and intervertebral foramina are also visible.

DISCAL-RADICULAR CONFLICT

MECHANICAL COMPRESSION

OF THE NERVE ROOT

DOES NOT

PROVOKE THE IRRADIATED

PAIN

DISCAL-RADICULAR CONFLICT

compression

edema

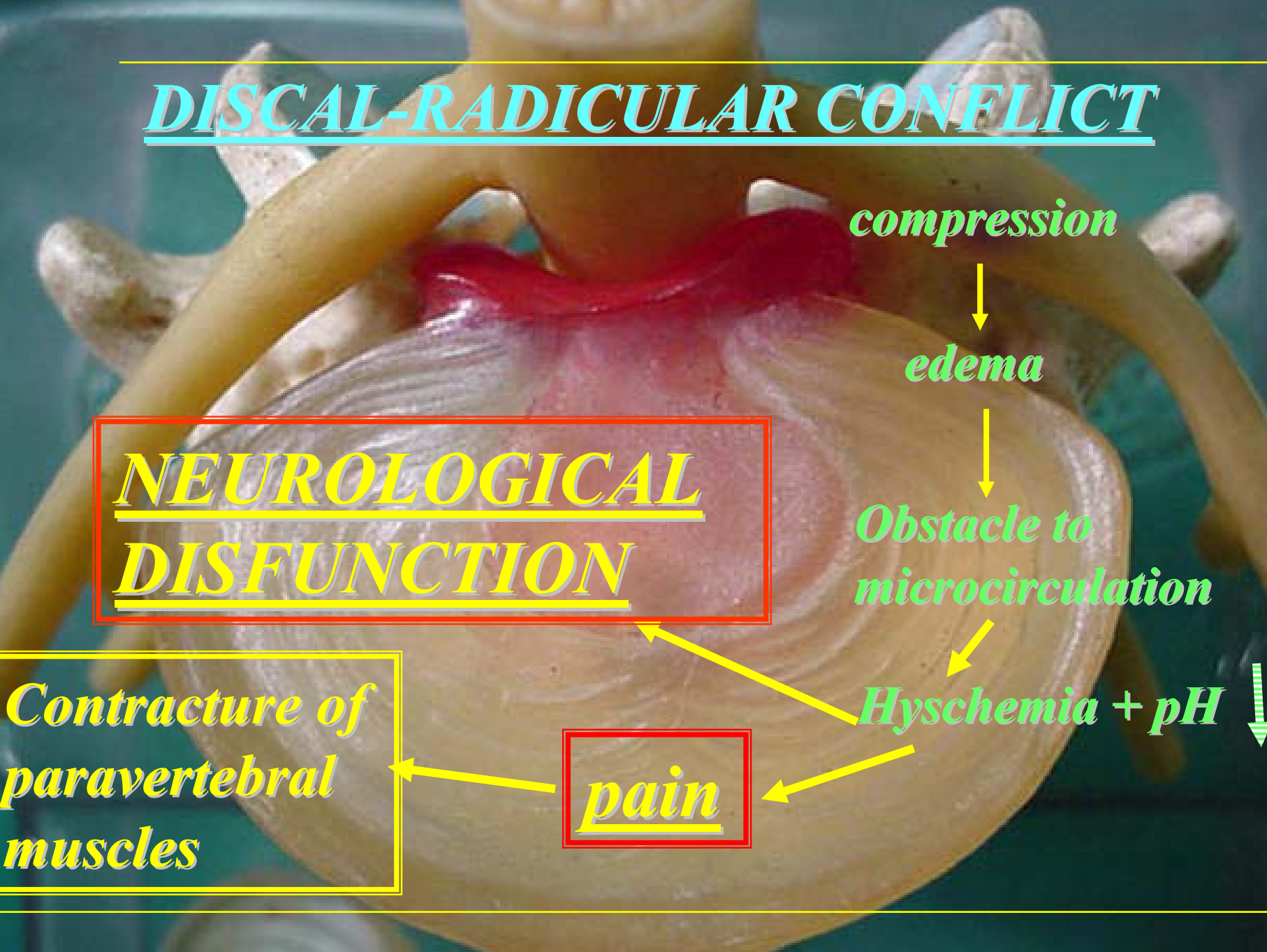
*Obstacle to
microcirculation*

Hyschemia + pH

*NEUROLOGICAL
DISFUNCTION*

pain

*Contracture of
paravertebral
muscles*



DISCAL RUPTURE

NEUROTOXICITY DUE TO
METABOLIC PRODUCTS
OF DISC DEGENERATION

DISCAL RUPTURE

Epidural application

of nucleus pulposus

*can induce morphologic
and functional modifications
in the nerve roots*

DISCAL RUPTURE



DISCAL RUPTURE

Proteoglycans

*are the immunogenic power of the
nucleus pulposus, with production of
clinical picture also without heriation,
even only by rupture of the anulus*

An anatomical model of a vertebral disc showing a herniation. The disc is a yellowish, oval-shaped structure with concentric rings. A red, gelatinous material is shown protruding from the center of the disc, representing the herniated nucleus pulposus. The surrounding vertebrae and ligaments are also visible in a light tan color.

the enzymes Phospholipase A2

prostaglandine E2 & interleukine 6

are elevated in herniated discs

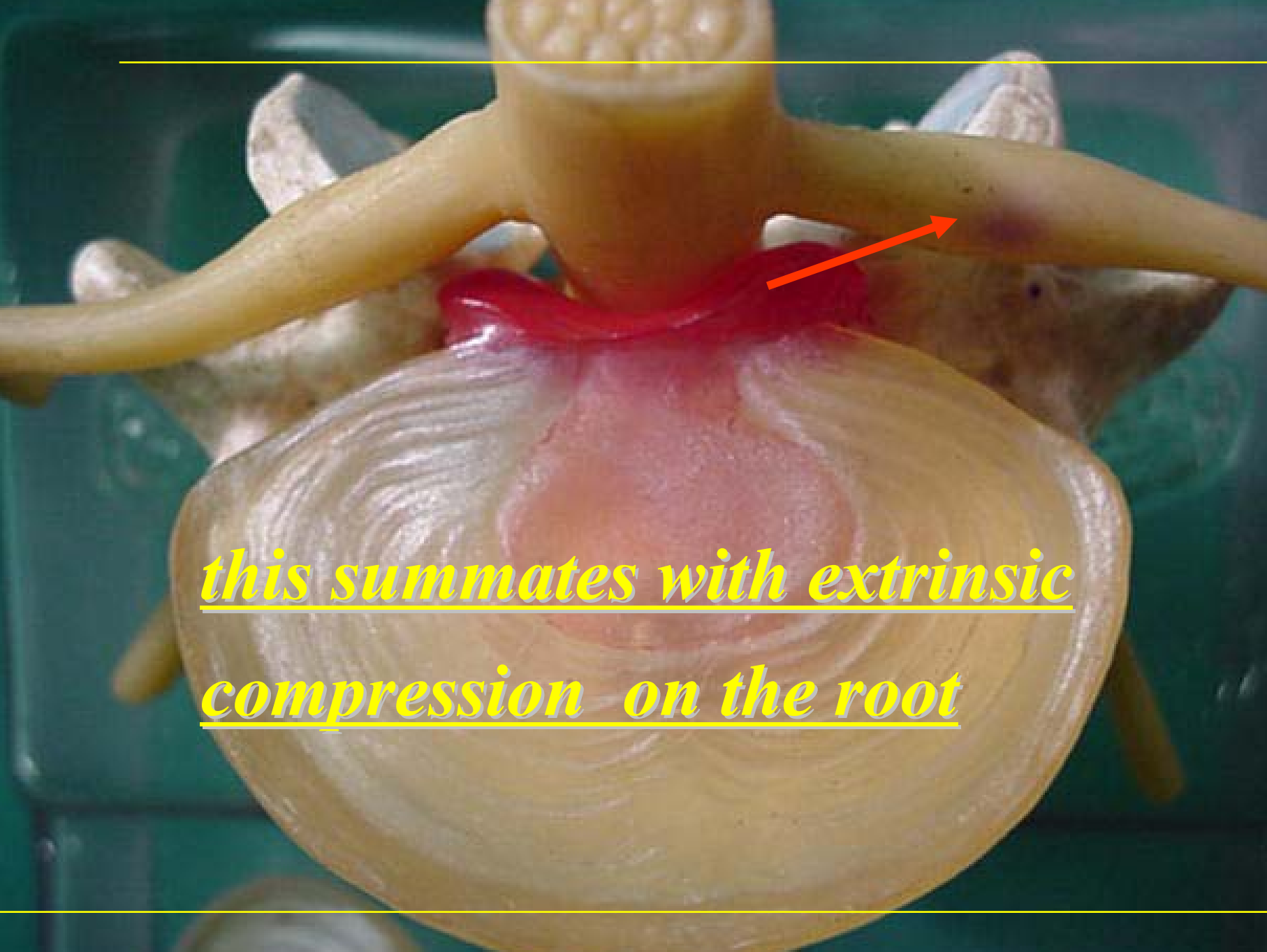
and generate inflammation and pain



compartmental syndrome

in the nerve root

and in the ganglion



*this summates with extrinsic
compression on the root*

mechanical injury



The diagram illustrates the path from mechanical injury to fibrosis. It features a central anatomical image of a heart cross-section with a red area representing an infarct. Three yellow arrows originate from the text 'mechanical injury' at the top. One arrow points left to 'edema', one points down to 'fibrinolytic deficit', and one points right to 'venous stasis'. From 'edema', a pink arrow points down to 'FIBROSIS'. From 'fibrinolytic deficit', a pink arrow points down to 'FIBROSIS'. From 'venous stasis', a red arrow points down to 'FIBROSIS'. The word 'FIBROSIS' is underlined and in red, bold, italicized font at the bottom center.

edema

venous stasis

fibrinolytic deficit

FIBROSIS

Hypoxia →→ *anaerobic glycolysis*

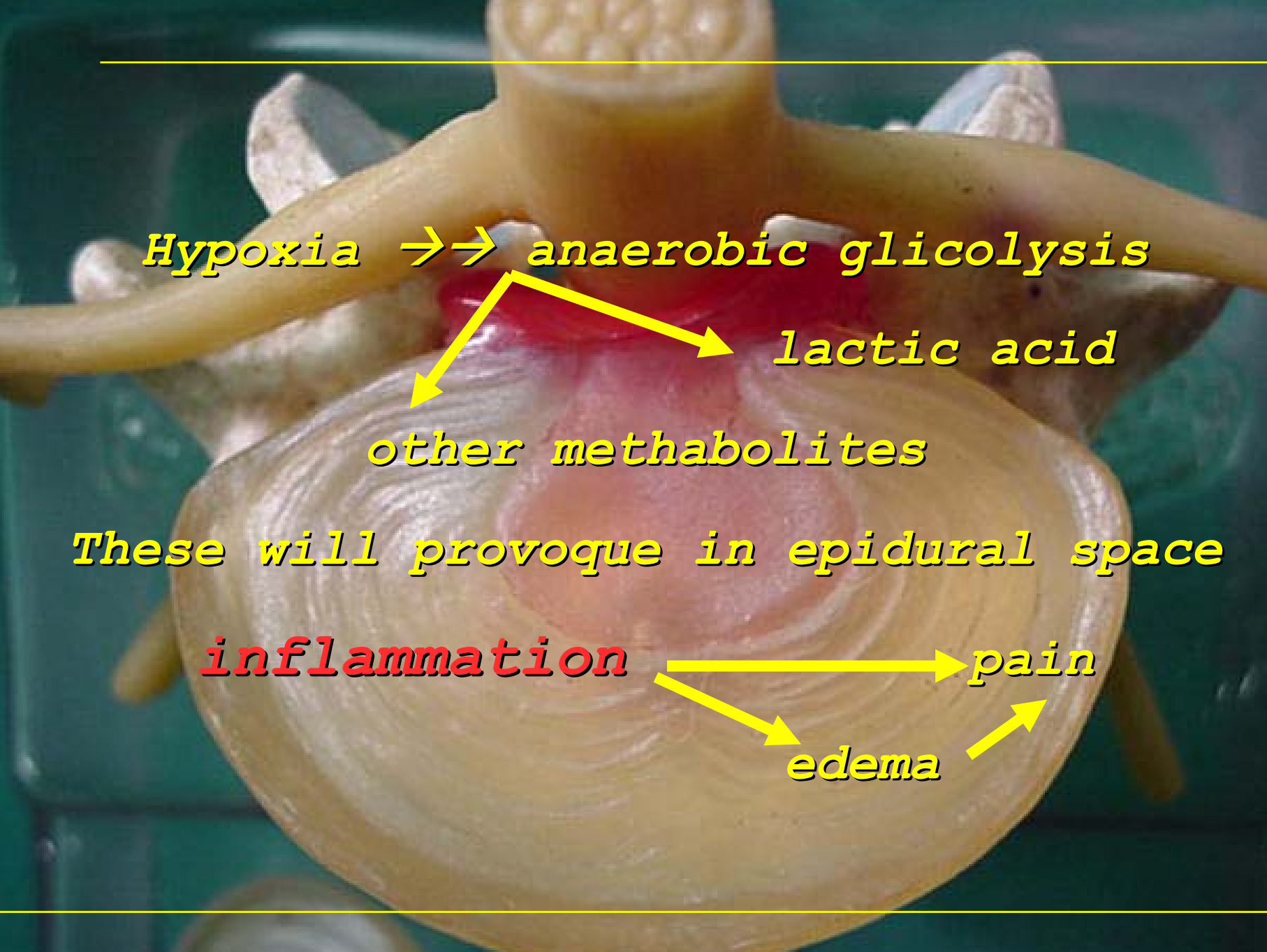
lactic acid

other metabolites

These will provoke in epidural space

inflammation → *pain*

edema → *pain*

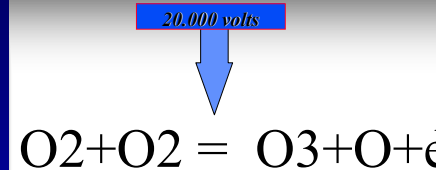


An anatomical model of a vertebra and intervertebral disc. The vertebra is shown in a light tan color, and the intervertebral disc is shown in a pinkish-red color. The disc is compressed, and the surrounding ligaments and structures are visible. The text is overlaid on the image in a yellow, italicized font.

disc degeneration entails

redox balance alteration

Ozone *inhibits*

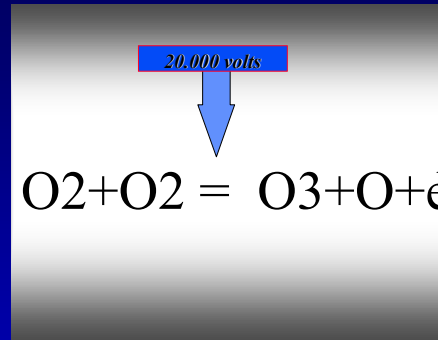


- *synthesis of prostaglandines*
- *liberation of bradikinines and*
of pain inducing products
- *secretion of proteinases from*
macrophags and polimorph.neutrophiles

Ozone

*Strongly stimulating the local
production of antioxidant enzymes*

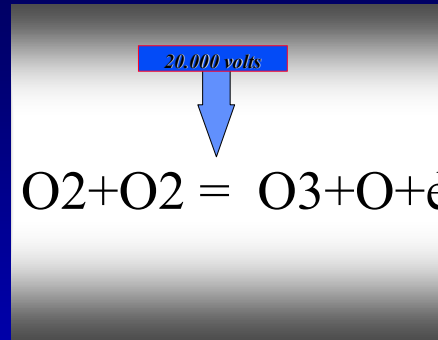
neutralizes endogenous ROS



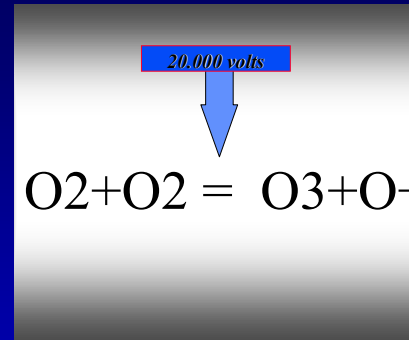
Increases

the release of

immunosoppressive citochines



Entails disruption



of intra/inter-molecular valencies
and collapse of the
three-dimensional structure
(Hawkins e Davies, 1996)

An anatomical model of a vertebra is shown against a dark green background. The vertebra is light-colored and has a central body with a red disc in the middle. Two red arrows point from the disc towards the top of the vertebra. The text 'OZONE INJECTION' is written in blue, underlined, and italicized font across the middle of the image.

OZONE INJECTION

Through all these effects

our aim is to obtain

- disc dehydration

- nerve metabolism correction

***PERCUTANEOUS
DISCOLISIS BY***

02 03

Indications



percutaneous O2O3 discolysis
former indications

- *INTACT ANULUS*
- *NOT DISLOCATED H.*
- *NOT CALCIFIED H.*
- *NOT STENOTIC CANAL*

INDICATIONS CHANGE !!

- CERVICAL DISC HERNIA
 - LUMBAR HERNIA
 - *PROTUSIONS (DEGREE II & III)*
 - *EXTRUDED*
 - *SEQUESTERATED*
-

SOME CASES OF

EPIDURAL FIBROSIS

**LUMBOSCIATICA IN
STENOTIC CANAL**

Relative contraindications:

(not optimal results)

1) disc bulging

2) intraforaminal herniation

CONTRAINDICATIONS TO

0203

• ***ABSOLUTE***

– ***FAVISM***

• ***POSSIBLE***

– ***SEVERE ARTERIAL HYPERTENSION***

**Special attention is to be payed
to patients affected by the following
problems:**

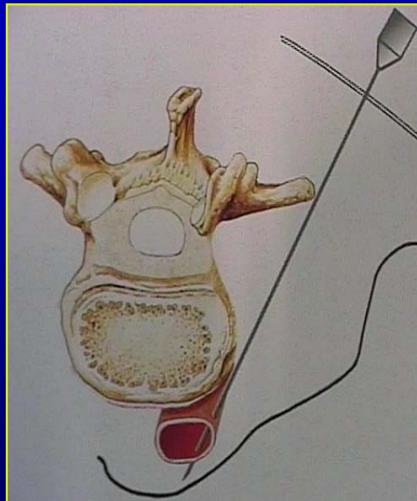
- 1) hyperthyroidism**
 - 2) hypertension**
 - 3) patients who refer severe general hypersensitivity**
-

The complications:

Short term: (0.5%)

(immediately after the infiltration)

- perspiration
- hypotension
- bradycardia
- collapse



Long term: (0,2%)

(over a period of months or years)

- fibrotization at the site of infiltration (paravertebral muscles)

The therapy is contraindicated in the pregnant females as there are no conclusive studies on the effect of 03 on fetus

Relative contraindications:

(not optimal results)

- ***CERVICAL***
 - ***DISCOARTROSIS***
 - ***UNCOARTROSIS***
 - ***FORAMINAL STENOSIS***
- ***CALCIFIED LUMBAR DISC HERNIA***

The 0203 therapy protocol:

1) Paravertebral infiltration :12 sessions at the affected level, done bilaterally twice a week

During this treatment

2) Discolysis : injection of the gas inside the nucleus

The oxygen-ozone concentration range is:

- for paravertebral injections: 2- μ 10 λ g O_3 /ml O_2
 - for discolysis: 50 μ g O_3 /ml O_2
-

We use:

- **Cervical and dorsal area.**
 - **Paravertebral.**
 - **5 cc. O2O3 in each side.**
 - **Intradiscal 6 to 10 cc. O2O3.**
 - **Lumbar area. 20 cc. in each side.**
 - **Intradiscal up to 40 cc. O2O3.**
-

*PERCUTANEOUS
DISCOLISIS BY*

02 03

Technique

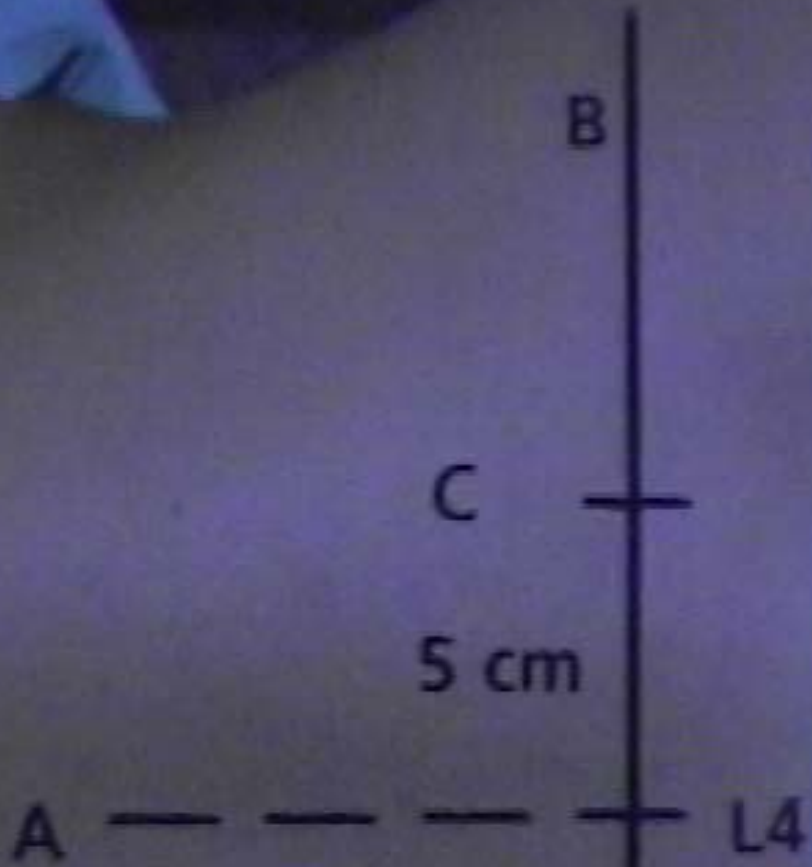




The treatment implies an infiltration of a mixture of oxygen (O₂) and ozone (O₃) to perform at two distinct sites:

1) Intradiscal

2) Paravertebral



paravertebral

The background of the slide is a photograph of a human back, overlaid with a semi-transparent blue filter. A vertical black line runs down the center of the back. To the left of this line, there is a horizontal dashed line labeled 'A' at its left end. To the right of the vertical line, there is a horizontal dashed line labeled 'L4' at its right end. Above the vertical line, the letter 'B' is positioned. Between the horizontal lines 'A' and 'L4', a horizontal scale bar is shown with the text '5 cm' centered above it.

antalgic
miorelaxant
antiflogistic
hyperoxigenating

Intradiscal

0203



The surgical procedure is simple:

The ozone generators

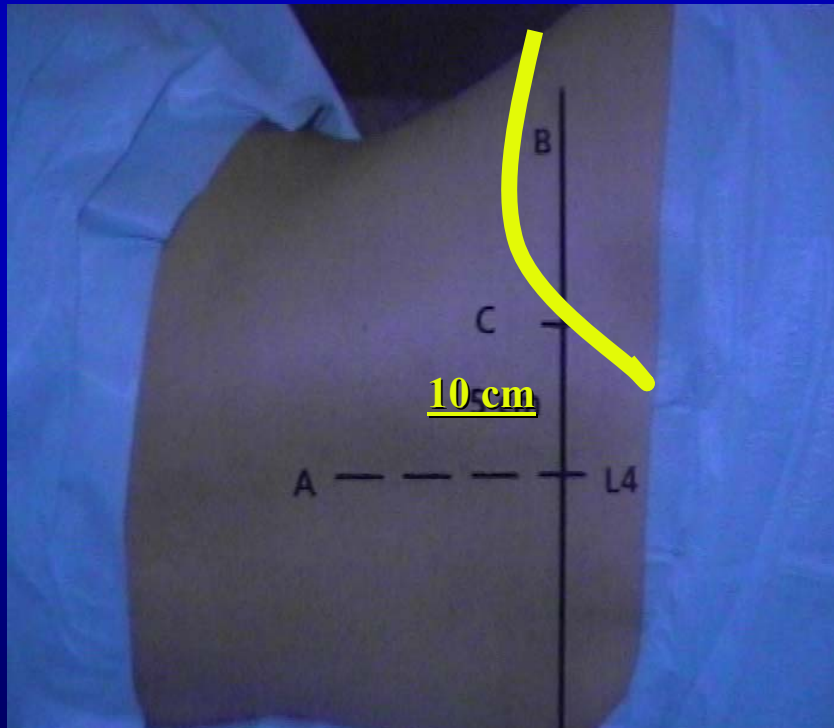


The disposable material

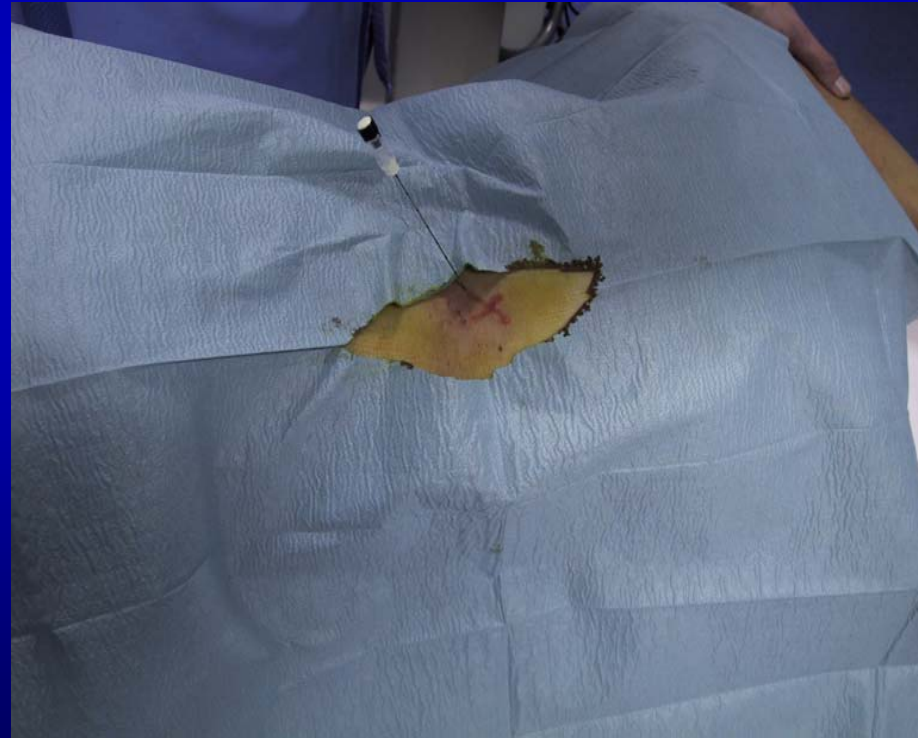


Patient position

Iliac bone



Needle introduction



*percutaneous 0203
discolysis*

Technique:

*posterolateral extrarticular
approach*





Paralleling the vertebral plates



puncture



Ozone discography



Epidural ozone diffusion



before ↗

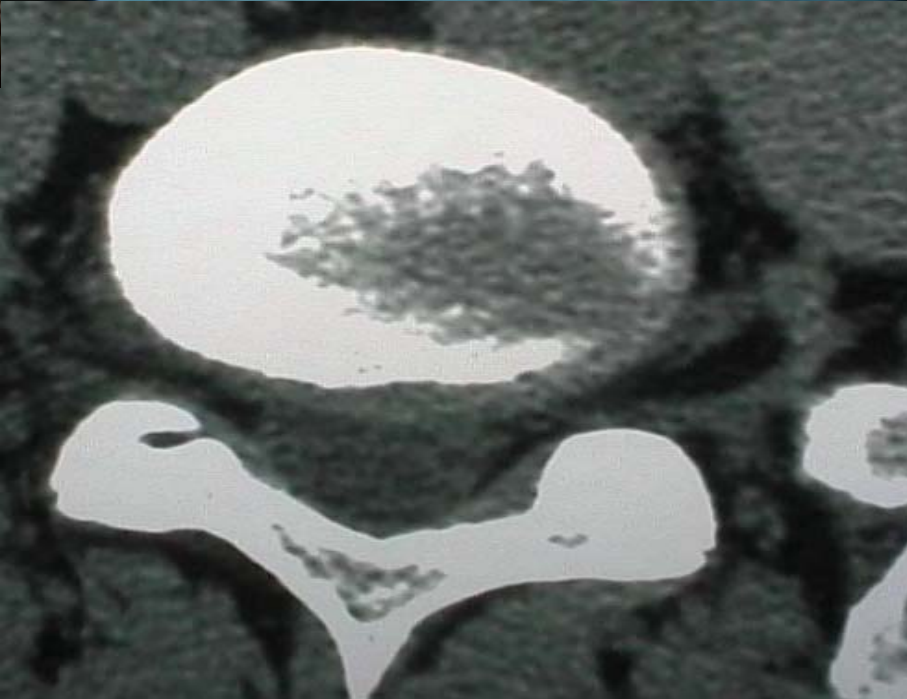
60 days later →





before →

50 days later →





BEFORE DISCOLYSIS



45 days later

Pre Discolisis



40 Days later



percutaneous O2O3 discolysis

PATIENT ADVANTAGES

- *LOCAL ANESTHESIA*
 - *EXTRASPINAL APPROACH*
 - *NO GENEGAL CONTRAINDICATIONS*
 - *ABSENT POSTOP FIBROSIS*
-

percutaneous O2O3 discolysis

PATIENT ADVANTAGES

ininterrupted FT

reduced need of drugs

reduced morbidity

reduced absence from work

**THE TECHNIQUE ALLOWS
A RAPID RETURN TO WORK**

***THE BENEFIT OF THIS TECHNIQUE
WAS RECOGNIZED
BY THE SOCIAL MEDICINE IN SPAIN***

percutaneous O2O3 discolysis

advantages for the service

Reduced hospitalisation time

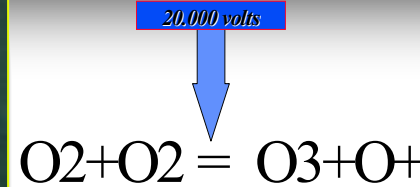
Reduced time waisting in op.

percutaneous O2O3 discolysis

advantages for the service

Reduced expense for each patient

- nursing
- drugs
- instruments and op.



***Terapia electiva del
conflicto discoradicular
(Ministerio de la Salud italiano)***

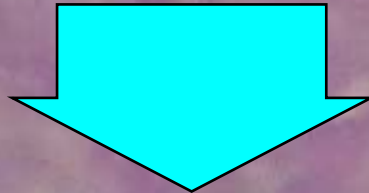
*PERCUTANEOUS
DISCOLISIS BY*

02 03

histology



*Break-down of
mucopolysaccharidic
structure*



dehydration



tissue of subligamentous hernia



tissue of subligamentous hernia

The image shows a microscopic view of tissue, likely a histological section of a hernia after treatment. The tissue is stained with hematoxylin and eosin (H&E), showing a dense, fibrous structure with numerous small, dark-stained nuclei and some larger, lighter-stained areas. The overall appearance is that of a complex, cellular tissue structure.

herniation tissue after 0203 treatment

A histological micrograph showing a cluster of cells, identified as a condrocyte island, after 0203 treatment. The cells are arranged in a somewhat circular or irregular cluster, with some cells showing prominent nuclei. The background is a light, textured matrix.

*condrocyte island after
0203 treatment*

Normal chondrocyte islands

Hyperhydrated amorphous matrix

A histological micrograph showing a cross-section of tissue. The central feature is a large, irregularly shaped mass of tissue with a dense, cellular appearance, stained pink. This mass is surrounded by a layer of more organized, fibrous-looking tissue. The overall structure suggests a complex biological process, likely related to tissue repair or healing after a specific treatment. The text 'herniation tissue after 0203 treatment' is overlaid in green, italicized font across the center of the image.

herniation tissue after 0203 treatment

A microscopic image showing a cross-section of tissue. The central feature is a circular structure with a dense, granular interior, possibly representing a cell or a small vessel. Surrounding this are various other cellular structures, including elongated, spindle-shaped cells and clusters of smaller, darker-staining cells. The overall appearance is that of a complex, multi-layered tissue structure.

herniation tissue after 0203 treatment

*percutaneous 0203
discolysis*



Results

of the treatment

6665 patients

pain symptomatology

<i>abolished</i>	<i>80.9 %</i>	<i>(5392 patients)</i>
<i>amelioration</i>	<i>12.4 %</i>	<i>(827 p)</i>
<i>Poor</i>	<i>6.7 %</i>	<i>(446 p)</i>

sensory dysfunction

abolished 79.35% (5289p)

improved 15.8% (1053 p)

unchanged 4.85% (323 p)

total 95.15%

motor dysfunction

4639 cases, 69.6% of our 6665 p,

mean pre-existence 10.2 days

*Out of these, in 297 p marked defect
(4.45% of 6665)
(6.4% of 4639 motor deficit group)*

motor dysfunction

4639 cases, 69.6% of our 6665 p,

<i>complete regression</i>	<i>66 % (3061 patients)</i>
<i>partial</i>	<i>20.7% (960 patients)</i>
<i>insufficient</i>	<i>13.3% (617 patients)</i>

total positive results in 86.7%.

motor dysfunction

297 p. marked defect

(4.45% of 6665)

(6.4% of 4639 motor deficit group)

<i>total recuperation</i>	<i>18.18% (54 patients)</i>
<i>partial improvement</i>	<i>32.65% (97 cases)</i>
<i>irrelevant</i>	<i>49.15% (146 cases)</i>

These last patients underwent open surgery

multiple level disc pathology

in 2972 patients (44.59%)

Treatment simultaneously performed
in all the pathological discs

extruded and migrated herniation

933 patients (14%)

complete resolution 234 cases

good result 545 cases

total positive outcomes 83.5% (779 cases)

insufficient result in 154 (16.5%)

CT/MRI control

7 months after the treatment

3317 patients randomly choosed by an external person

volumen of the hernia

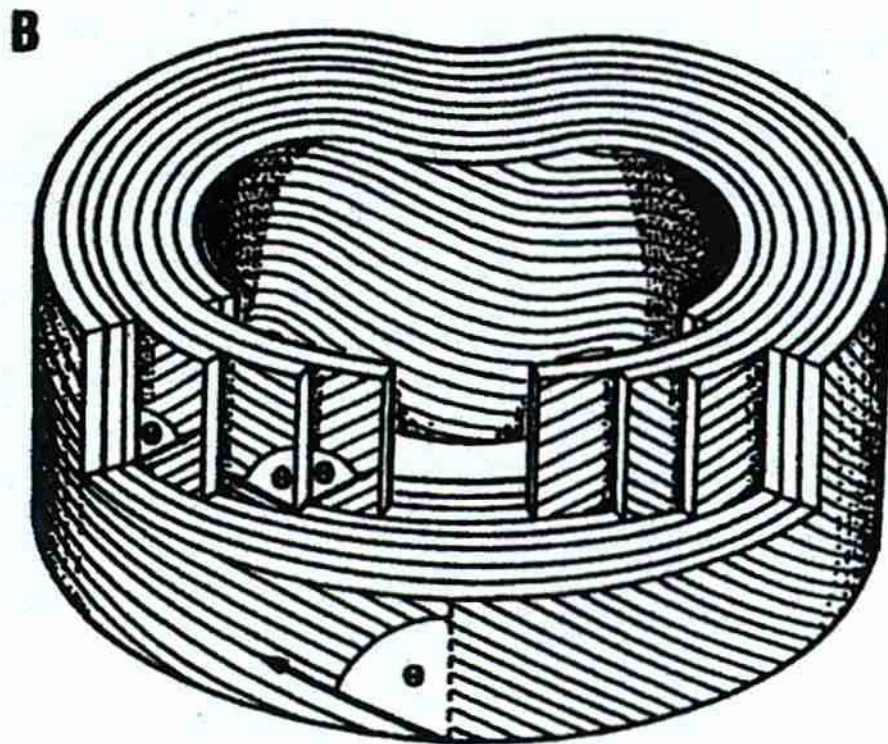
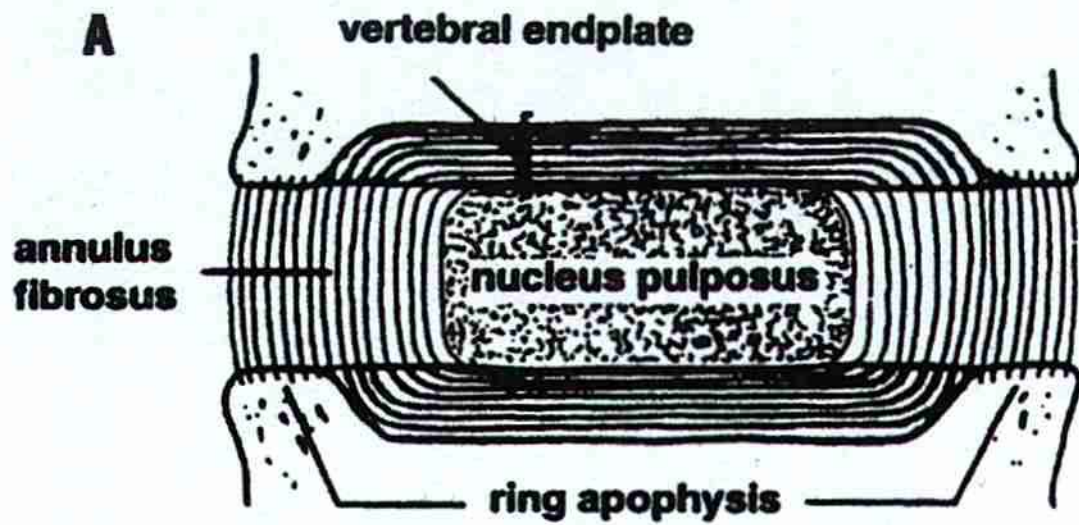
significant reduction 41% (1360 p)

completely eliminated 37% (1227 p)

730 cases morphology was inmodified.

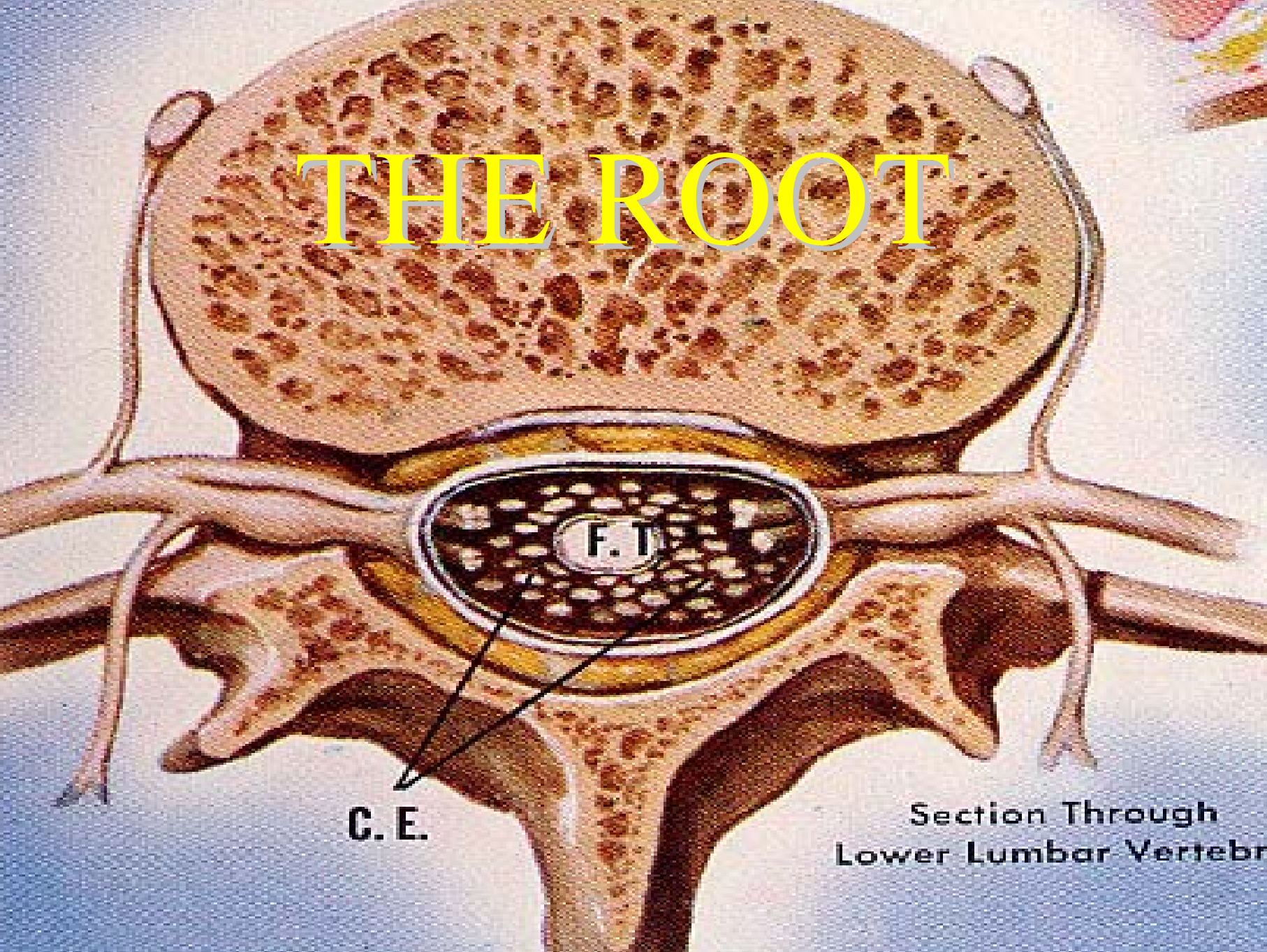
**OTHER CONSIDERATIONS
FOR A TREATMENT.**

**ANY ALTERATION IN THE
INTEGRITY OF ONE OF THE
THREE COMPONENTS
(ENDPLATE CARTILAGE, ANULUS
FIBROSUS, AND NUCLEUS
PULPOSUS) AND ANY
DISTURBANCE OF THEIR
INTERPLAY RESULTS IN A
COMPROMISED FUNCTION OF
THE INTERVERTEBRAL DISC
AND MAY LEAD TO LOW BACK
PAIN AND SCIATICA**





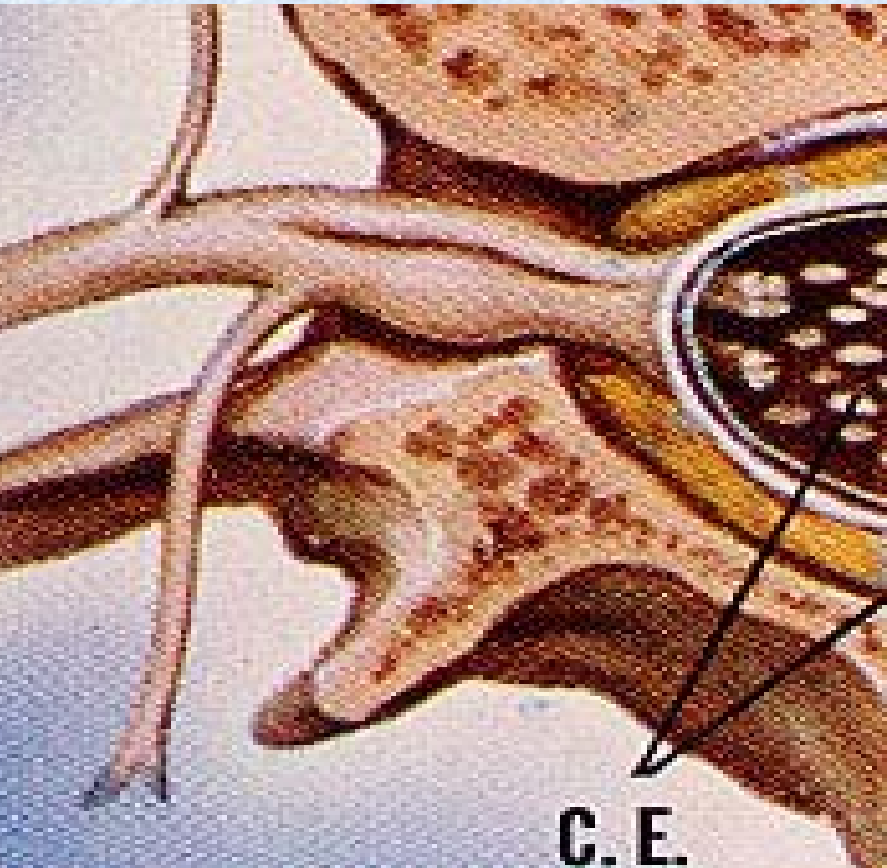
THE ROOT



C. E.

Section Through
Lower Lumbar Vertebra

- **Deficient protection of the root**

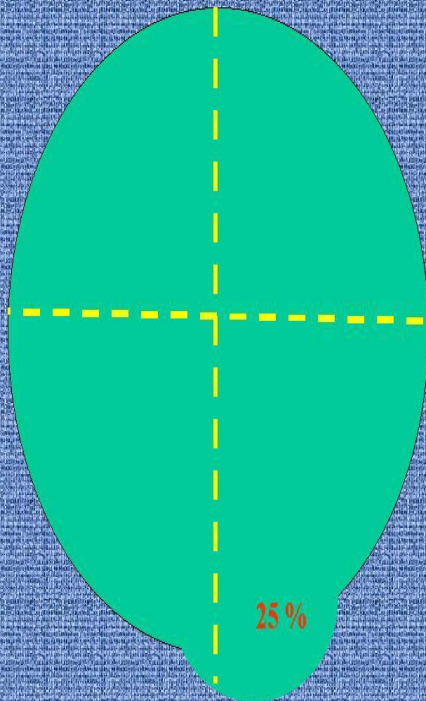


- **Mixed nutrition : blood/CSF**

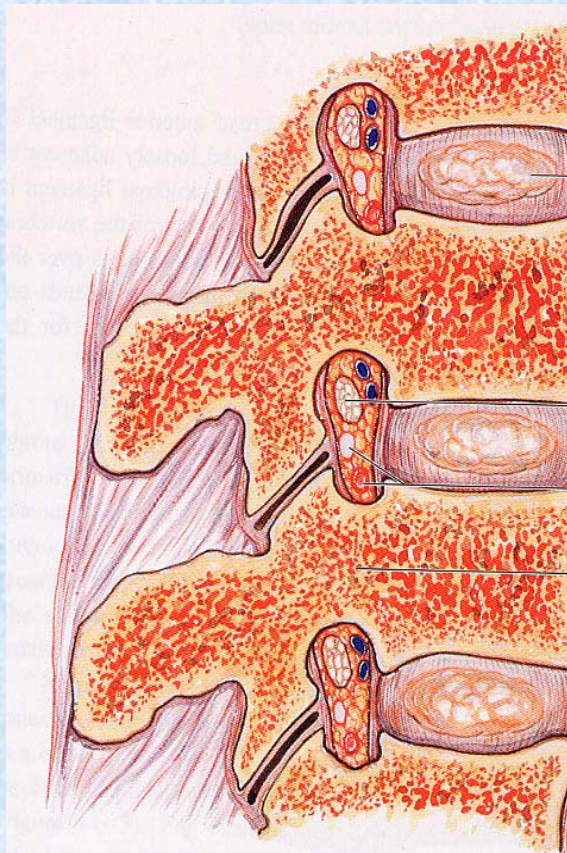
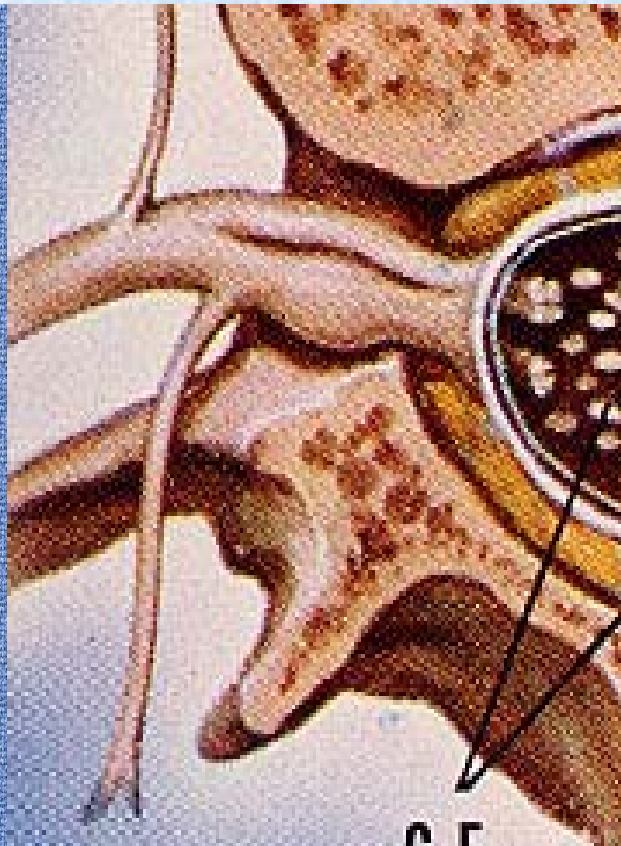
- **Vulnerability of the capilar barrier**

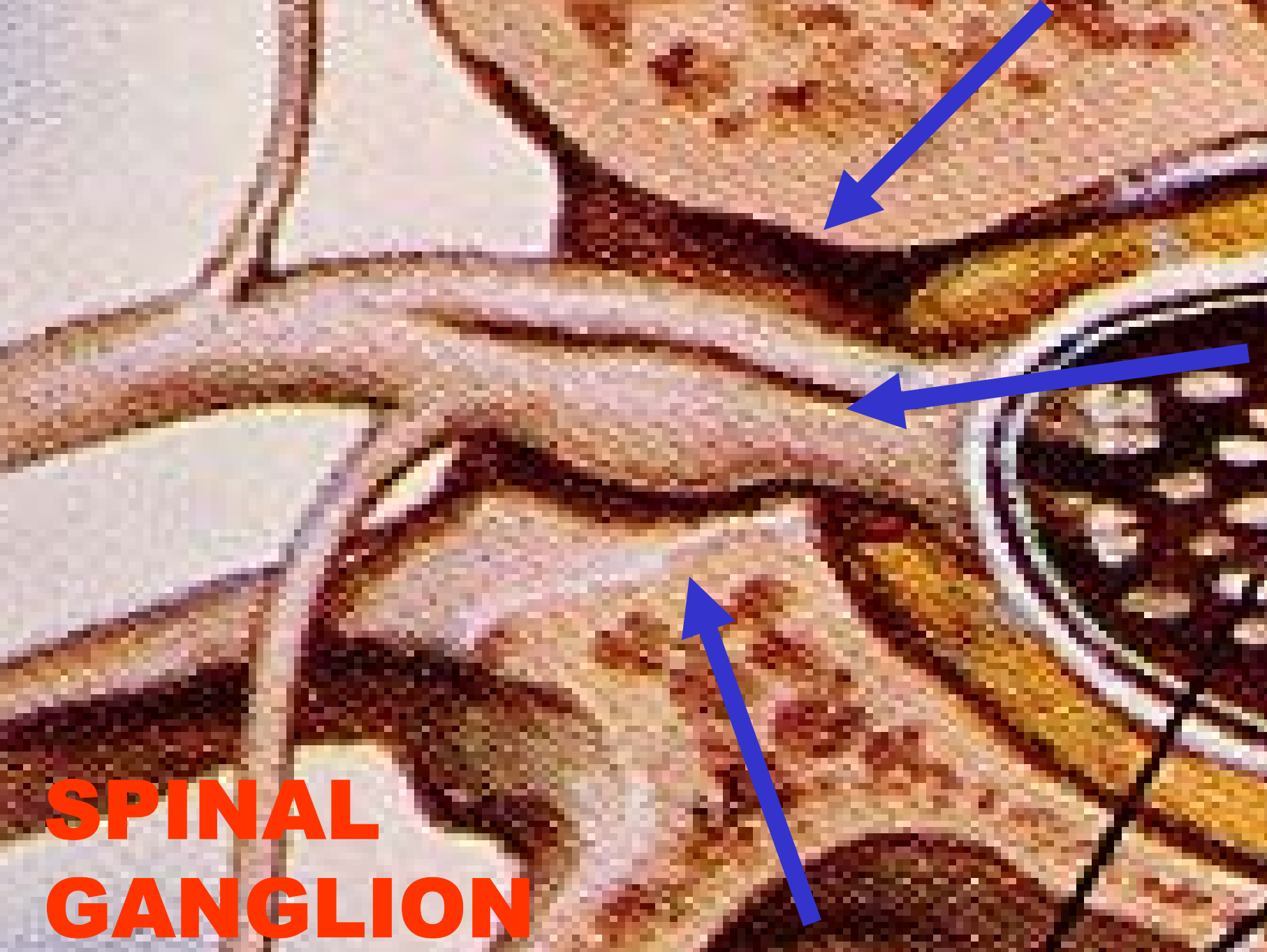
DOUBLE COMPARTIMENTAL FACTOR

- **Root compression - Ischaemia - Edema - Internal swelling**
- **Undistensible osseus pathway**

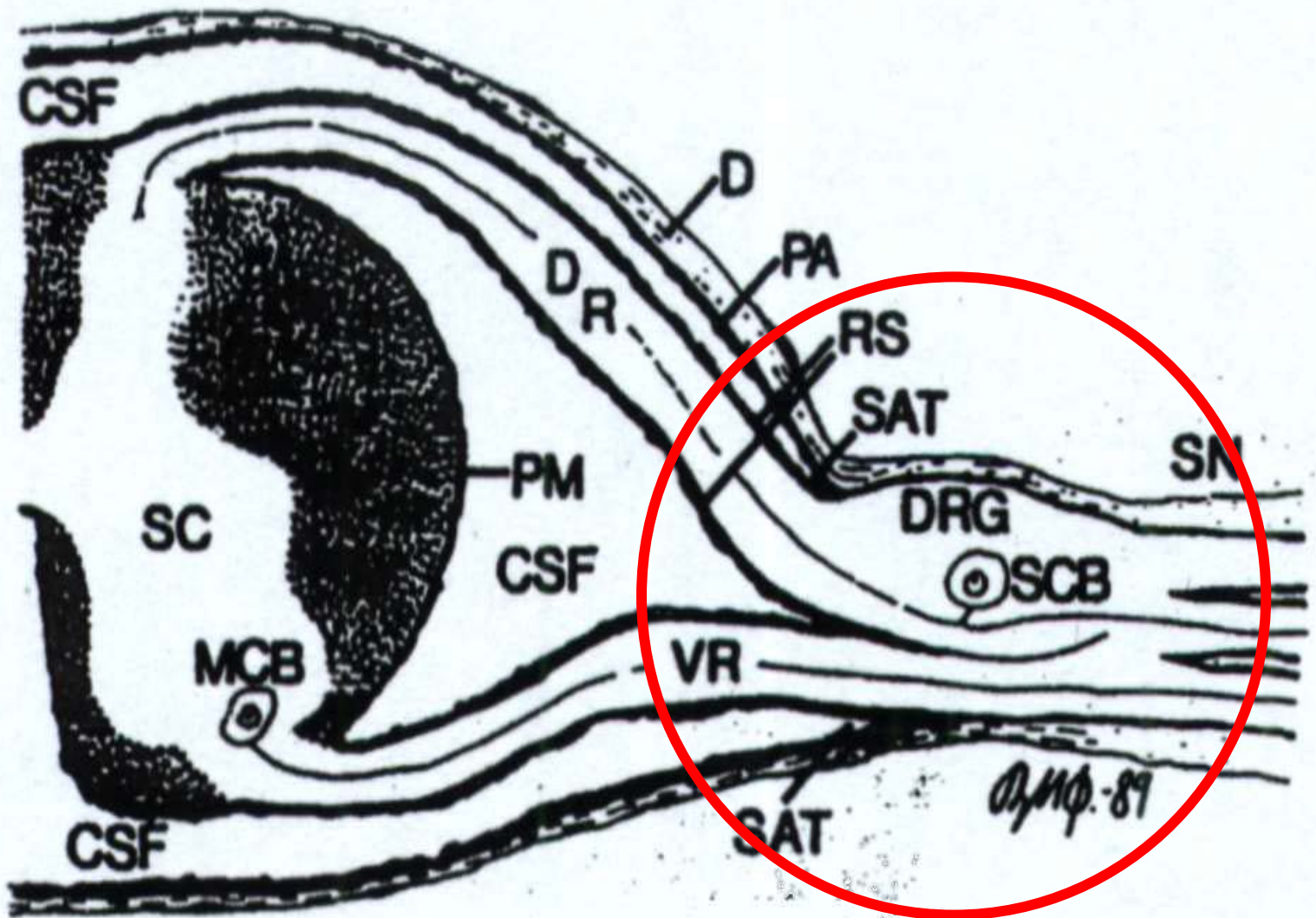


FOCAL HERNIATION

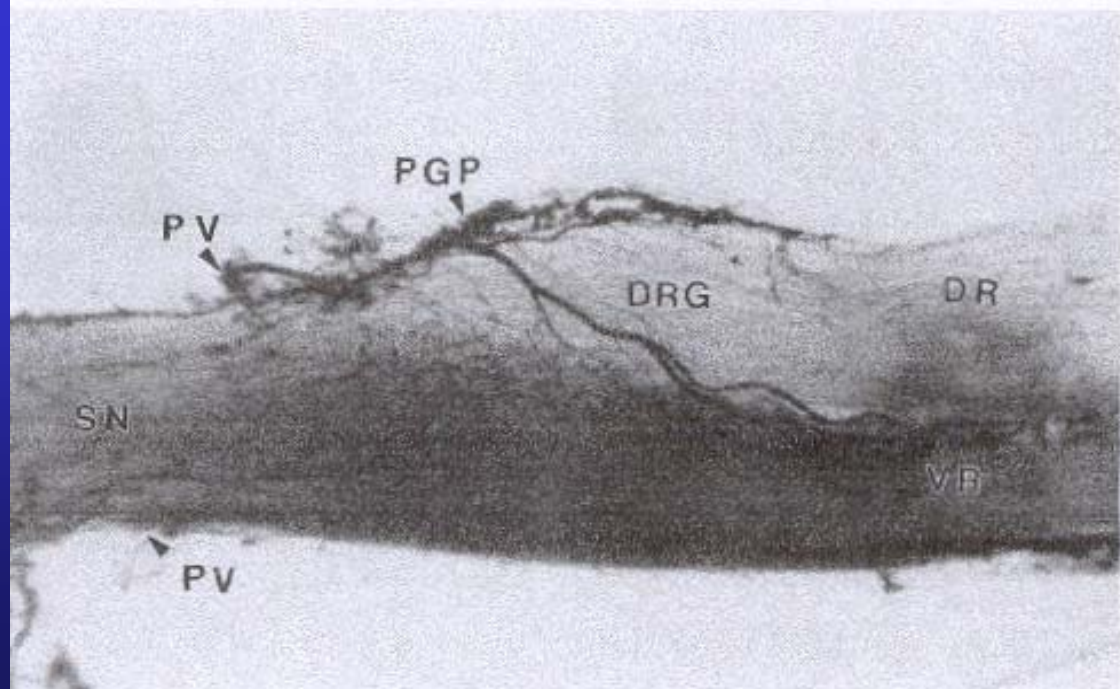
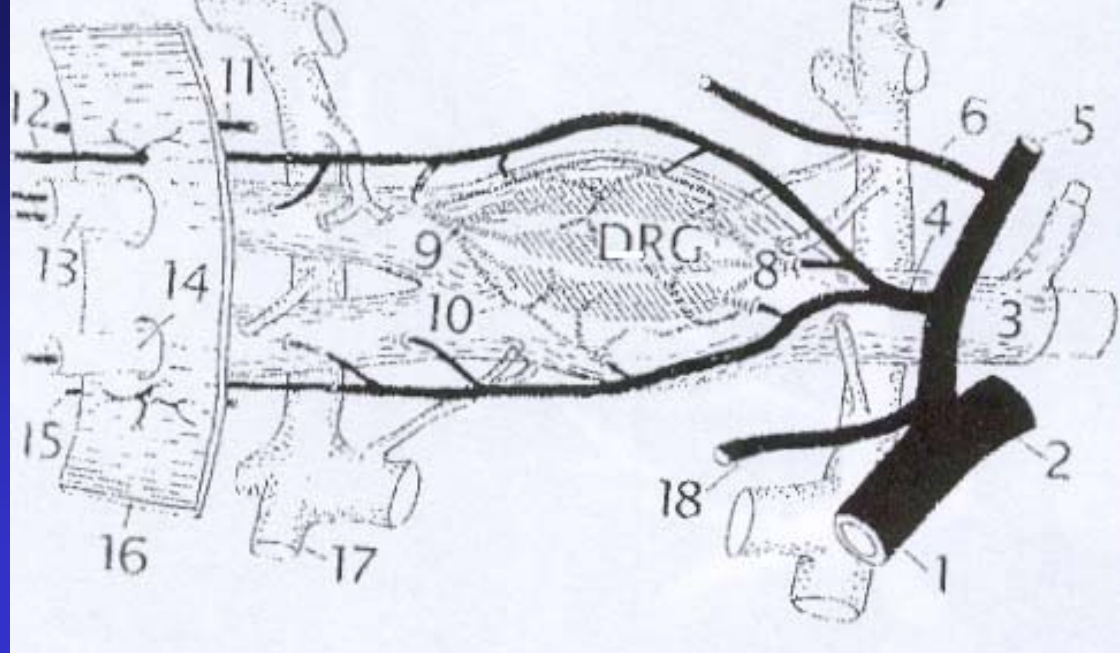


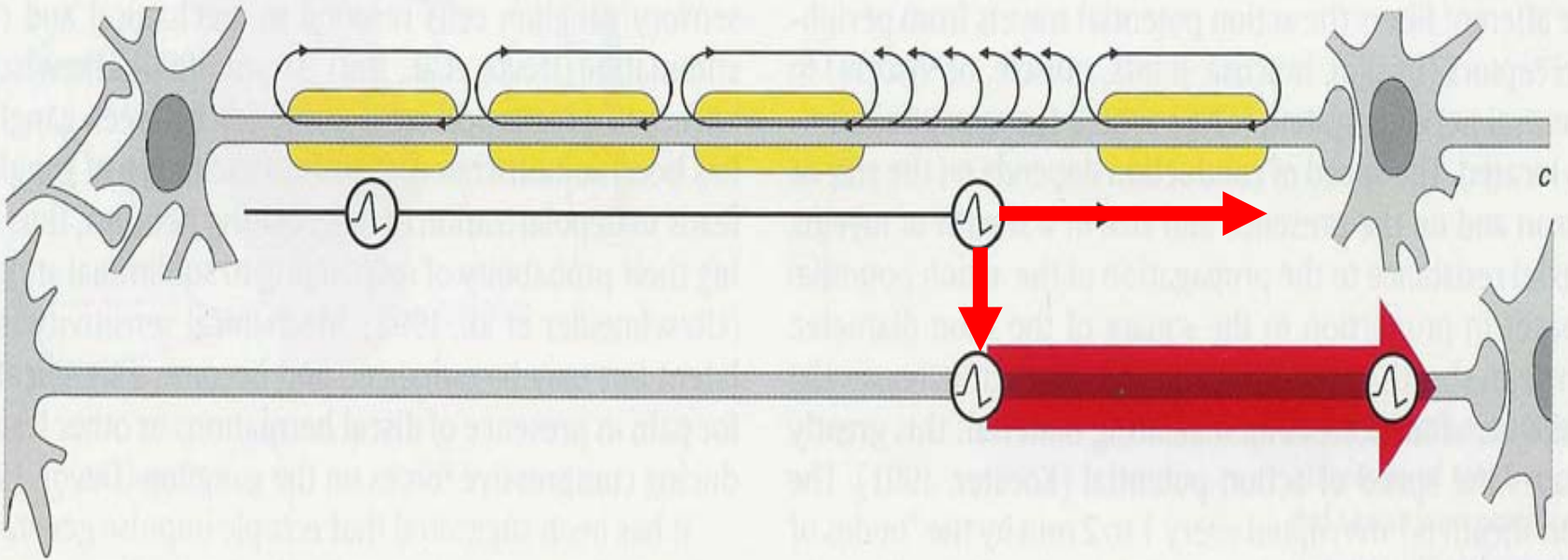
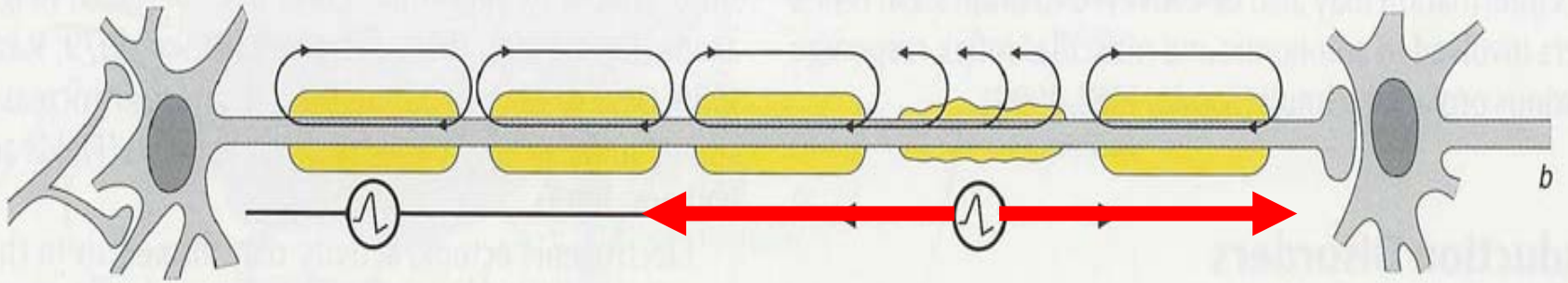
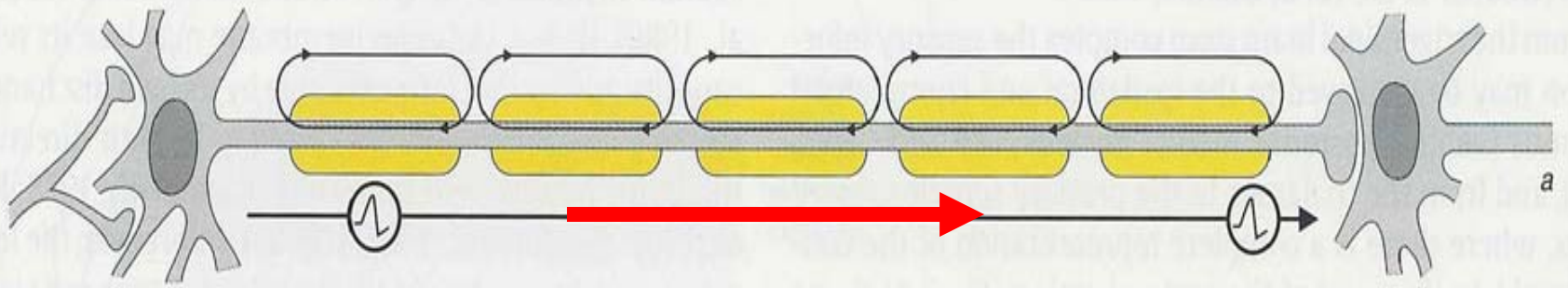


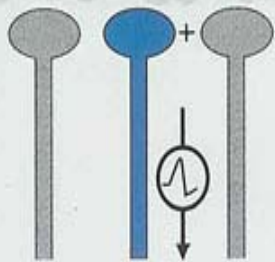
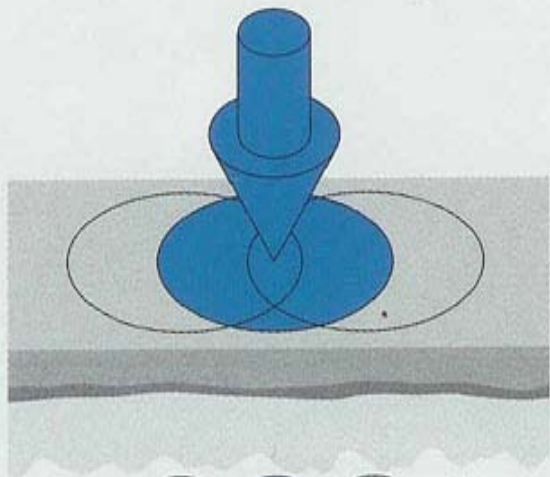
**SPINAL
GANGLION**



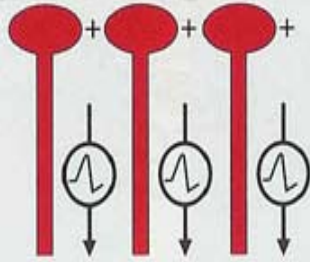
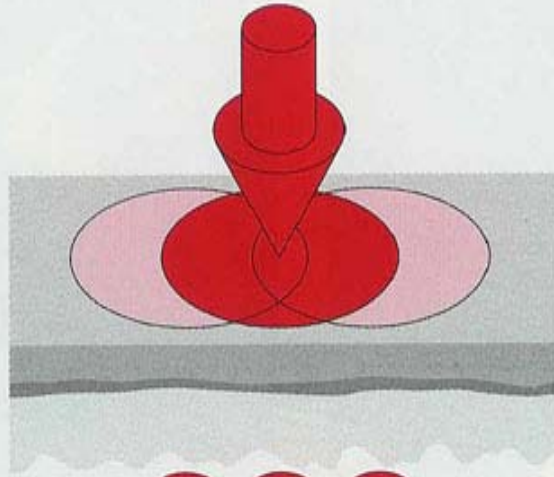
Anterior and posterior roots exiting the spinal cord to form the spinal nerve.



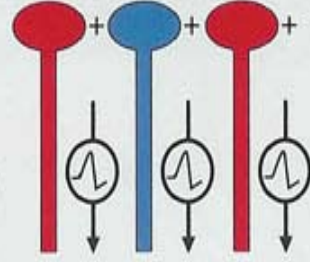
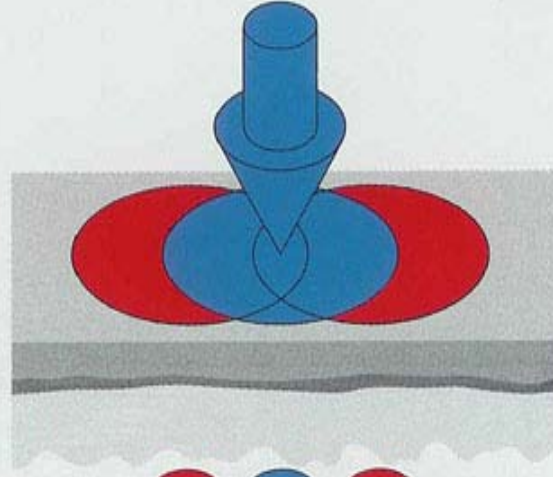




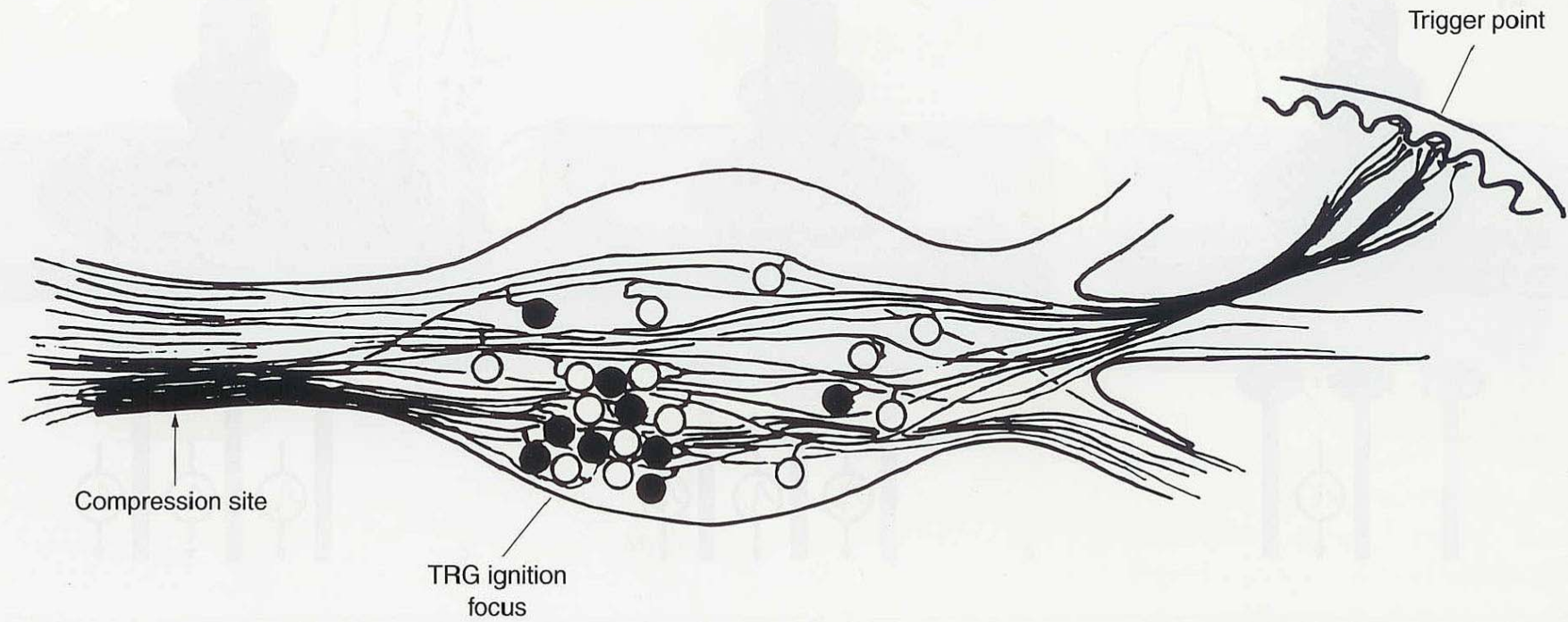
a



b



c



SHORT-LIVED

(PLASTICITY)

**CENTRAL
SENSITATION**

TIMING

ØYSTEIN P et al

SPINE2000

SICK-LEAVE

28weeks

NOCIOSEPTIVE MEMORY

(DORSAL HORN)

CHRONIC PAIN

CRONIC PAIN



**NEUROPATHIC
PAIN**

SYSTEM BREAKDOWN

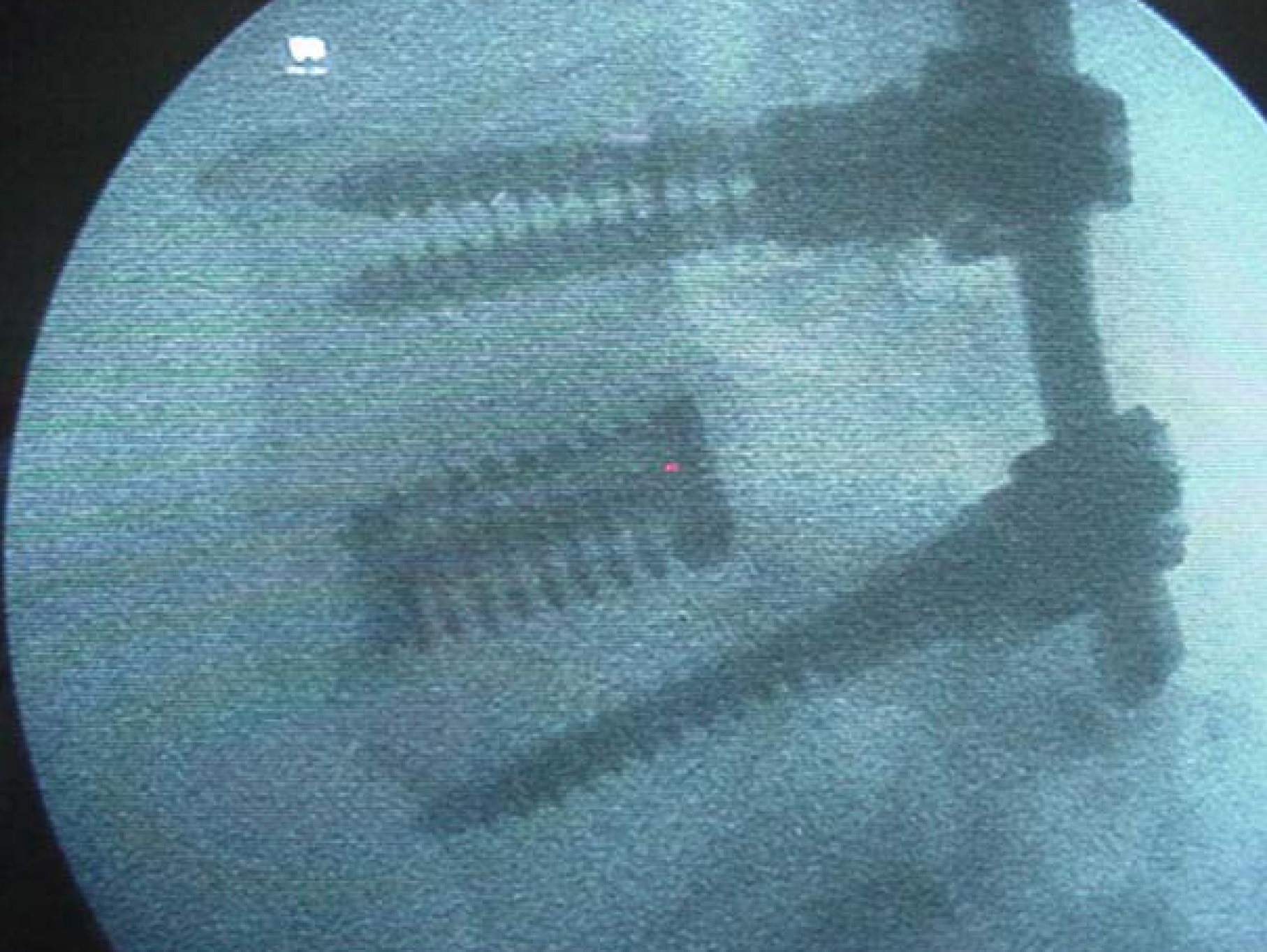
CLINICAL CASE

- MALE 45 YEARS
- DISC HERNIA OPERATED TWICE 1996
- FIBROSIS P.L.
- SEVERAL TREATMENTS
- NEUROSTIMULATOR
- NEW DISC HERNIA L5S1 2001

FL04
340
12/Fr
1/1 12.5kHz

bar CTL
1/20 00

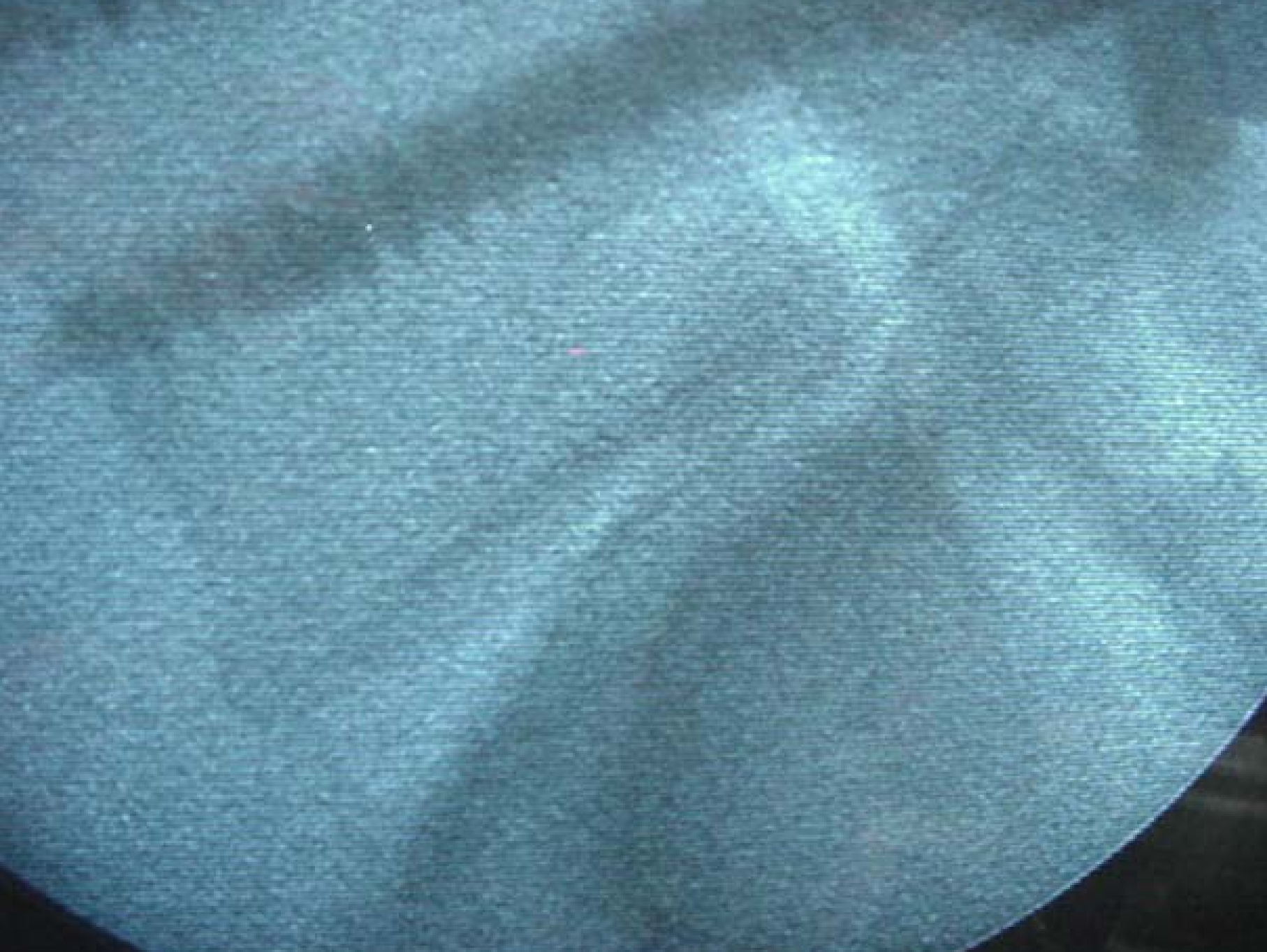




















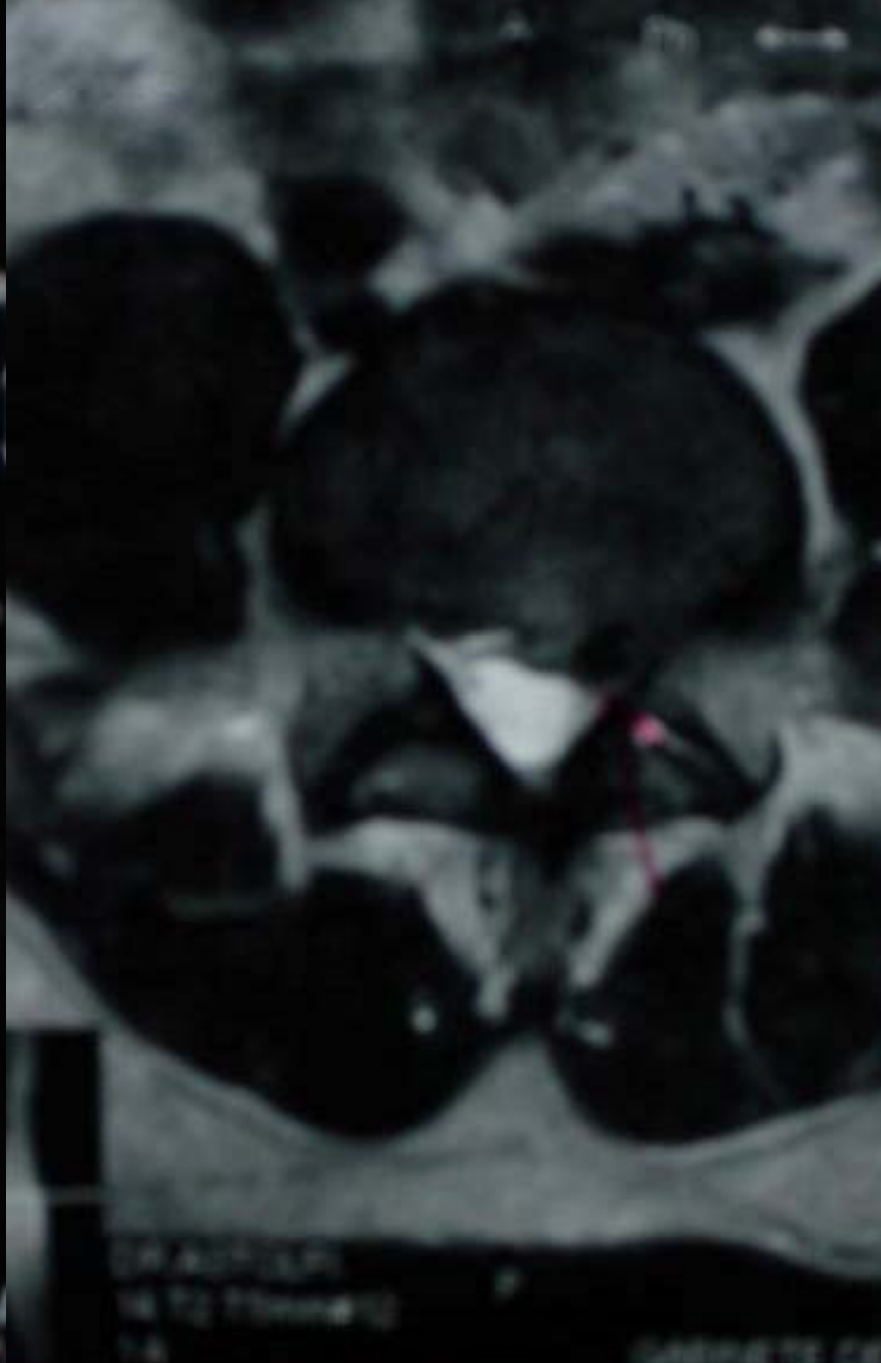
**WOULD HAVE THE OZONE
A NEUROMODULATOR
EFFECT?**

CONCLUSIONS

- **INICIATE THE TREATEMENT AS SOON AS POSSIBLE.**
- **THE PATIENT SHOULD CONTINUE WHITH NORMAL LIFE.(IF POSSIBLE).**
- **THE DISCOLISIS SHOULD INCLUDE ALL THE PROTRUDED DISKS IN THE LUMBAR AREA.**

CONCLUSIONS.

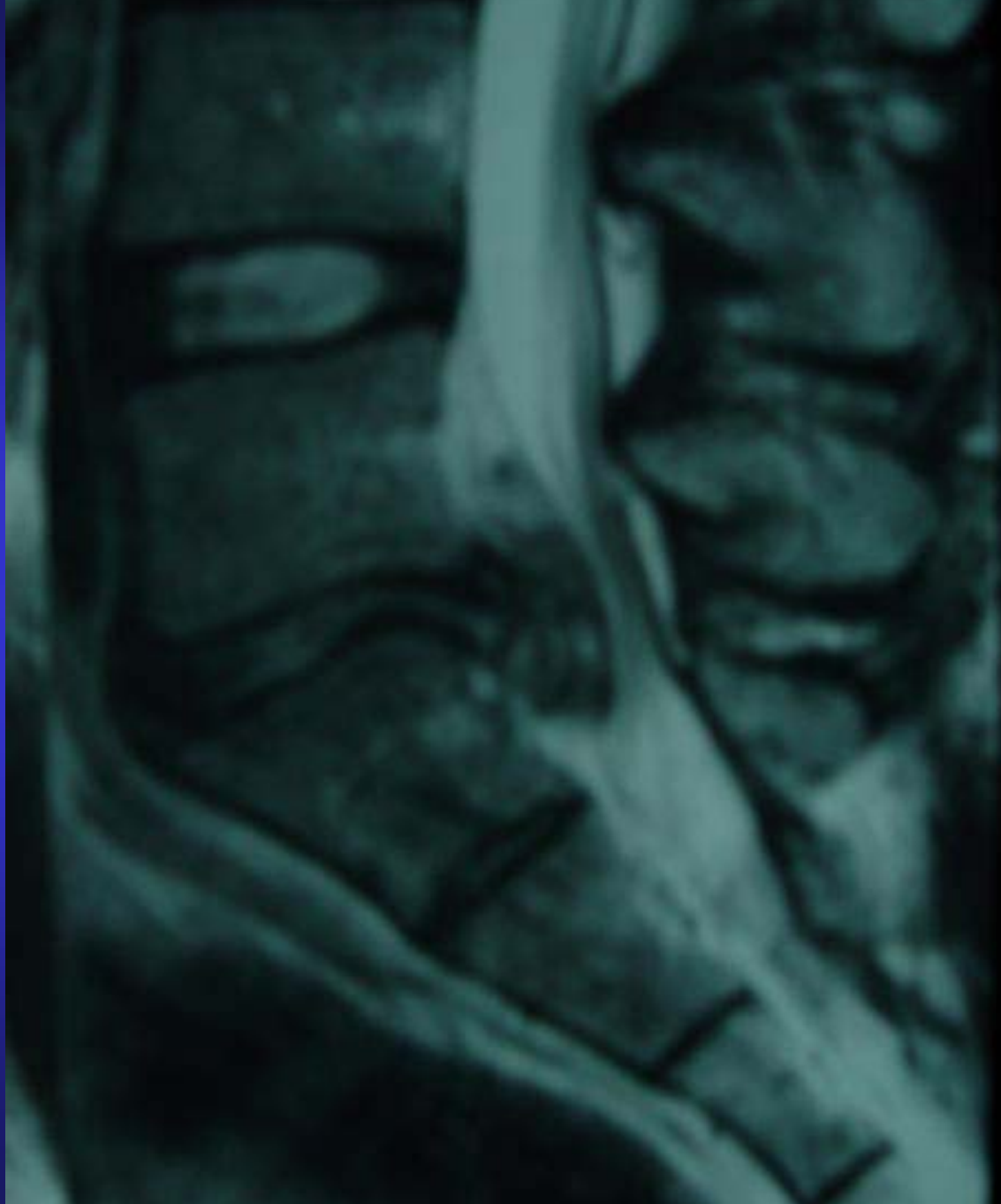
- **IN CASES OF EPIDURAL FIBROSIS IS POSSIBLE TO OBTAIN A GOOD DEGREE OF RECOVERY.**



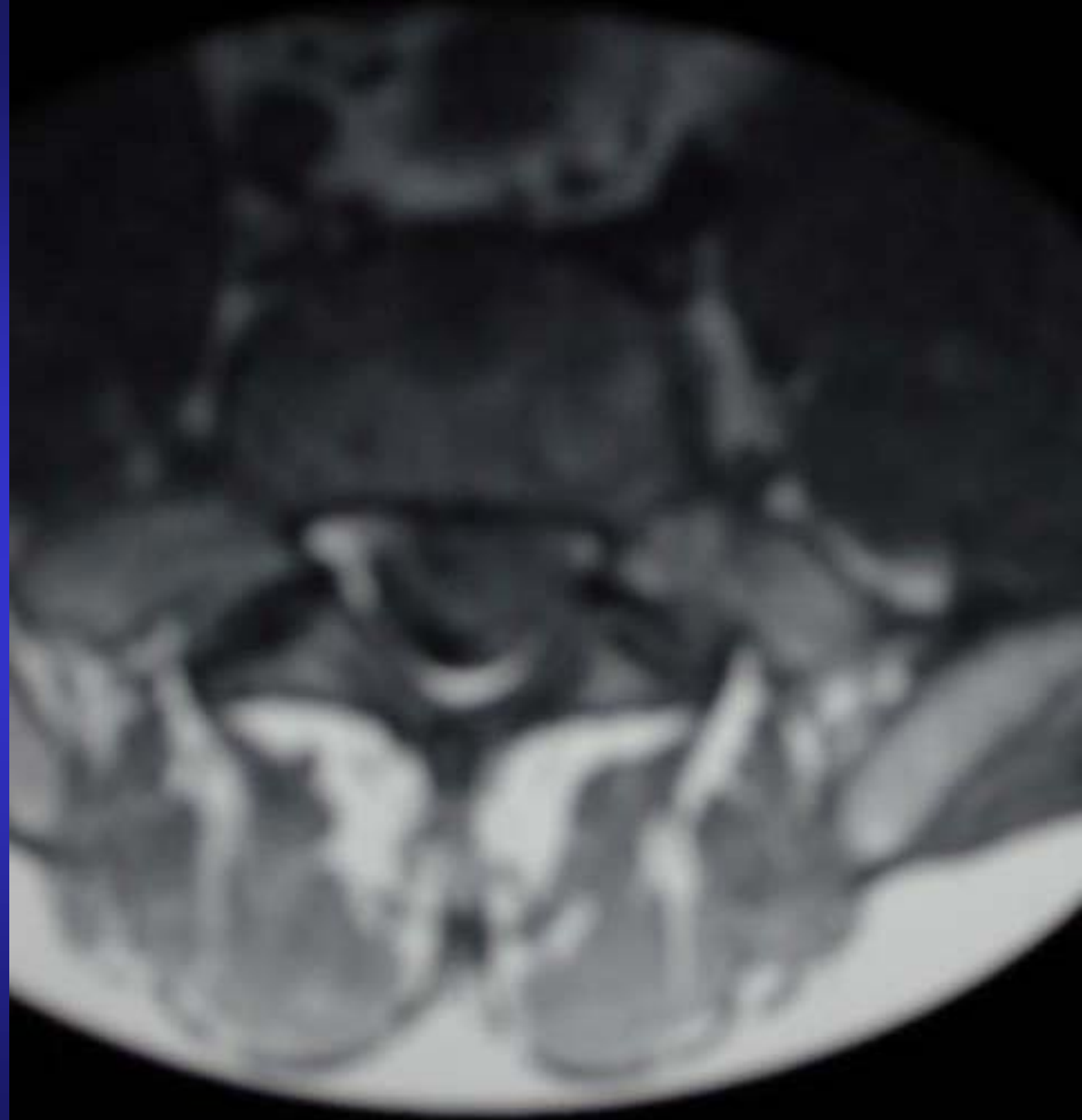


CONCLUSIONS.

- **IN SECUESTERED DISKS OR MIGRATED ONES THE DISCOLISIS SHOULD BE DONNE IMMEDIATELY WHITH THE EXEMPTION OF SERIOUS NEUROLOGICAL DAMAGE (C.E.S.)**







MR - 2.0
L1
DT1

ET216

ET216

u c A

u c A

fsr-x1/90
TR:2600
TE:199.1/Ef
EC:11/1 20.0kHz

USL0456
FOV:25x25
4.0tkk/1.0sp
12/43:25

fsr-x1/90
TR:2600
TE:199.1/Ef
EC:11/1 20.0kHz

USL0456
FOV:25x25
4.0tkk/1.0sp

**IN STENOTIC CANAL
THERE ARE SOME GOOD
RESULTS**

**(OZONE INTRADISCAL, EPIDURAL
AND INTRAFORAMINAL)**



Figure 1.07

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PROPOSALS

- **A NEW OUTCOME SCALE FOR OZONE THERAPY**
- **THE SEVILLE-TREVISO OUTCOME SCALE (ST SCALE)**
- **DATABASE FOR OUTCOME**

EVOLUCION DEL PACIENTE

Paciente

Fecha

Diagnostico

FECHA Resumen

Dolor Sensibilidad Fuerza

FECHA Resumen

Dolor Sensibilidad Fuerza

FECHA Resumen

Dolor Sensibilidad Fuerza

FECHA Resumen

Dolor Sensibilidad Fuerza

Exploracion Dr.

[Imprime Evolucion](#)

ALTA

PROTOCOLO DE OZONOTERAPIA VERTEBRAL

Paciente	Rosa Ayuso Guzman	Fecha	17/04/00
Dirección	Avda Arcangel 11-3º D	Intervención Prevista	
Compañía	ASEPEYO		DISCOLISIS O3

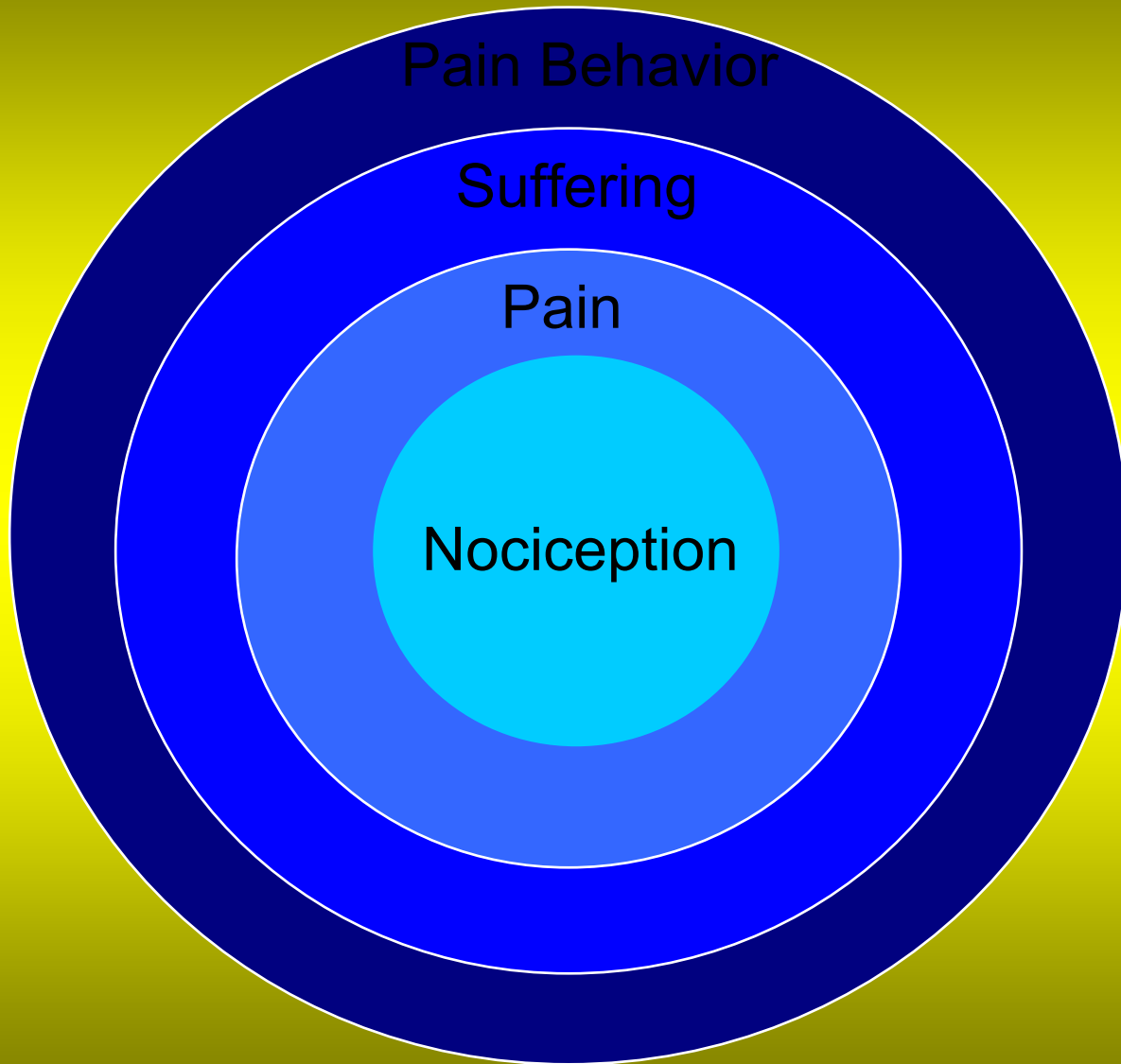
INFILTRACIONES PREVIAS

Infiltador	17/04/00	1ª Dosis	20 cc Conc 1 x 4	1ª Incidencia	Ninguna
Infiltador	24/04/00	2ª Dosis	20 cc Conc 2 x 4	2ª Incidencia	Mejoria
Infiltador	27/04/00	3ª Dosis	20 cc Conc 2 x 4	3ª Incidencia	Dias mejores alternativos
Infiltador	01/05/00	4ª Dosis	20 cc Conc 2 x 4	4ª Incidencia	Normal

DISCOLISIS

Pag 1
Av Poo

Fecha:	13/05/00	Técnica	P Intradiscal L4-L5 y L5-S1	Dosis	100 cc Conc 4
Incidencia	Gran dolor al despertar				
Anestesia	INTRAVENOSA			AR	<input type="checkbox"/>
Farmacos	Diprivan + Limifen		Anestesiologo	Baena	



Pain Behavior

Suffering

Pain

Nociception

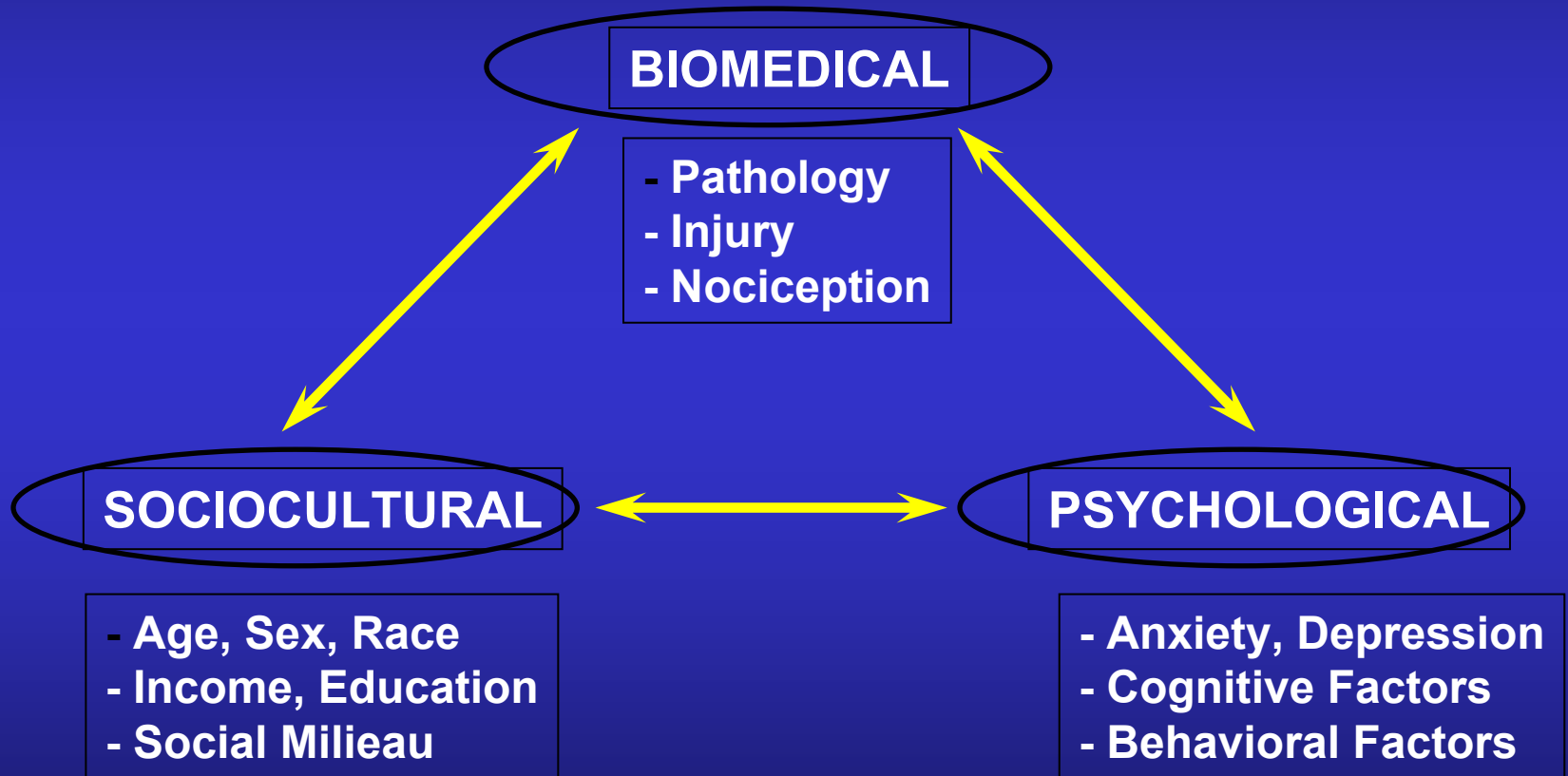
Assessment of Pain: Modalities

- **Observation of Pain Behavior**
- **Patient Report**
 - **Numerical Scales**
 - **Visual Analog Scales**
 - **Verbal Descriptor Scales**
 - **Multiple Item Scales**

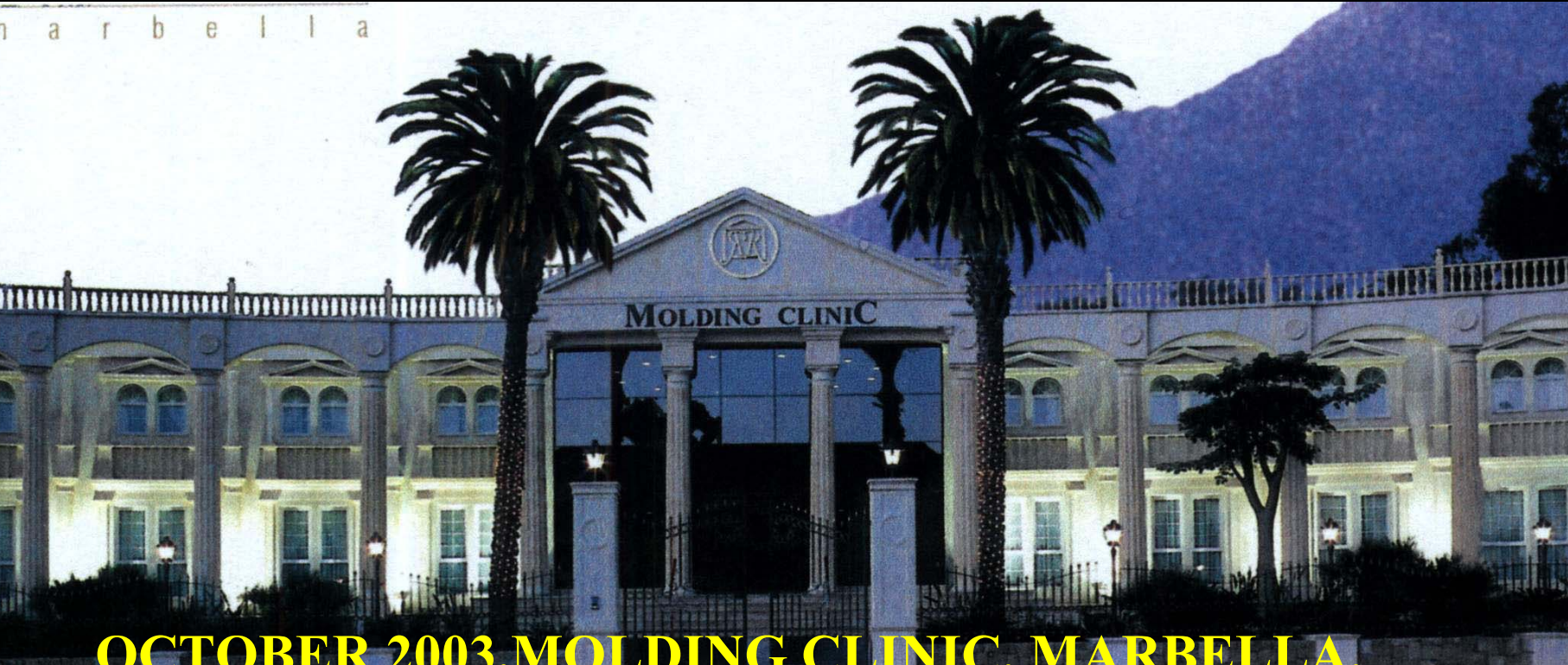
Approaches to Defining the Outcome of a Condition

- **bio-medical**
- **symptom focused**
- **multidimensional
syndrome**

BIOPSYCHOSOCIAL MODEL OF PAIN (and symptoms)



m a r b e l l a



OCTOBER 2003.MOLDING CLINIC. MARBELLA.

DR. SALGADO. NEUROSURGICAL DEPARTMENT.

OZONOTHERAPY , DR. J. SOLER.

EUROPEAN INSTITUTE OF NEUROSURGERY.

(EUNI) DR. ALEXANDRE

THANK YOU