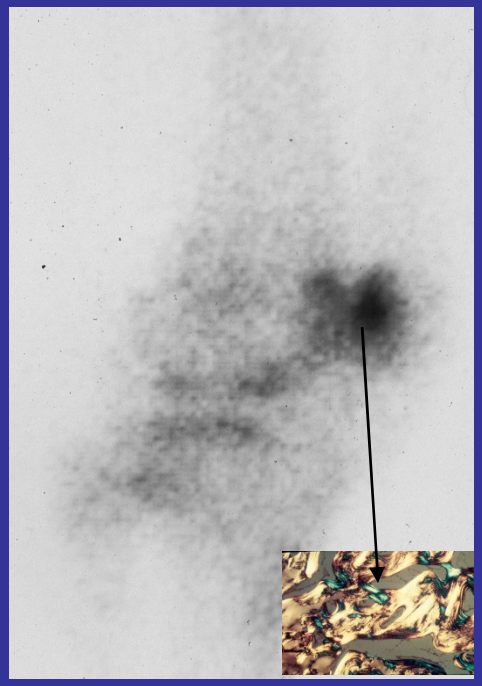
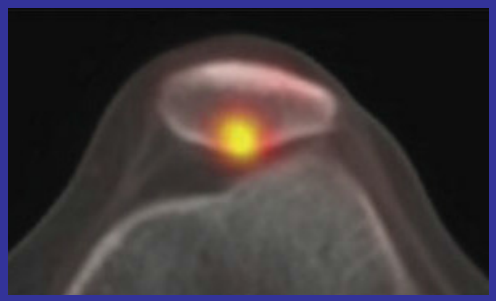
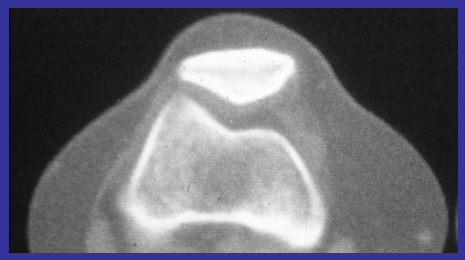
WORKSHOP
The Patellofemoral Pain Enigma

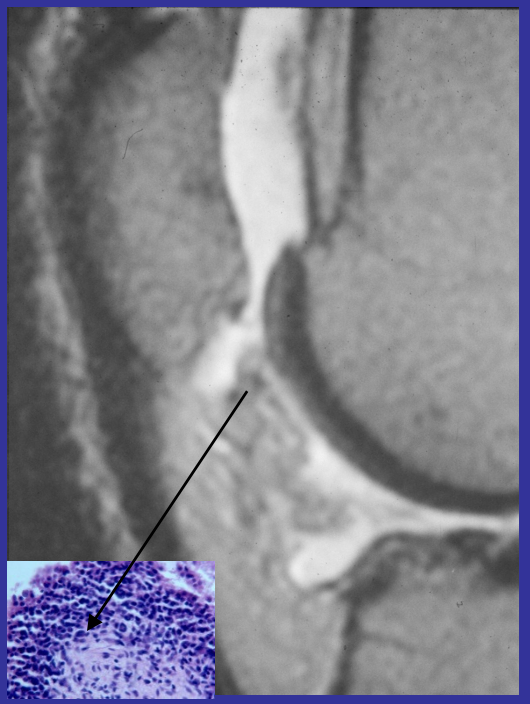
The Etiology and Safe Treatment from
A Tissue Homeostasis Perspective

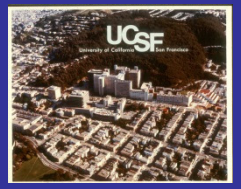






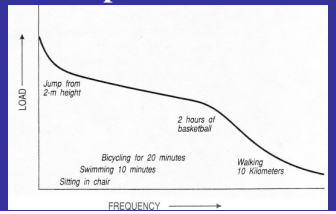






Scott F. Dye M.D.
Associate Clin. Prof.
University of California
San Francisco

Envelope of Function



Anterior Knee Pain

Numbers are VAST!

"The Most Common Condition of the Knee"

Yet the Etiology and Treatment of AKP remain A Source of Debate

WHY?



“Study Principles not Methods. A Mind that grasps Principles will devise its own Methods”

A. Bruce Gill:

Anterior Knee Pain

Has Resisted All Attempts

At Explanation by the Standard

Structural/Biomechanical Paradigm

Whose Explanation Has Been:

"AKP is Caused By Chondromalacia Patella or Malalignment/ Maltracking"

Why is Treatment of the Painful PF Joint So Difficult?

The Symptoms are by definition,
Based ultimately on SUBJECTIVE
Report Of CNS Events
The PF Joint Withstands the highest
Loads of ANY M/S Component
Therefore The P/F Joint Is an Extremely
Harsh Biomechanical in which to expect
Clinical Improvement and is UNFORGIVING
Of any Treatment esp. Surgery or PT which
Does not Respect its unique Biologic Characteristics

The Symptomatic PatelloFemoral Joint

Two Main Problems:

Instability

Pain

PatelloFemoral Pain

"Curiously, despite the widespread Use of MRI and arthroscopy the genesis of patellofemoral pain still remains An Orthopaedic Enigma"

John Insall
1995

Reflects Inadequacy of the current Biomechanical/Structural Paradigm

ORTHOPAEDIC IMAGING

Structural

X-ray

CT

MRI

Ultra-sound

Metabolic

Tc Bone Scan

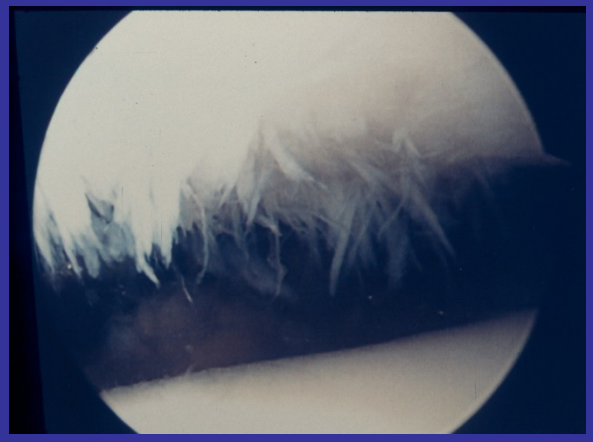
PET

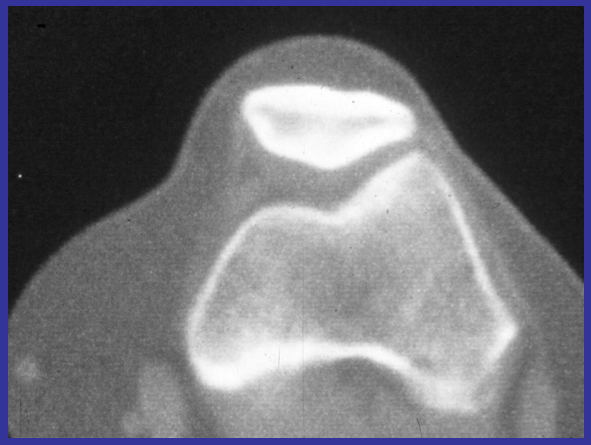
Combination

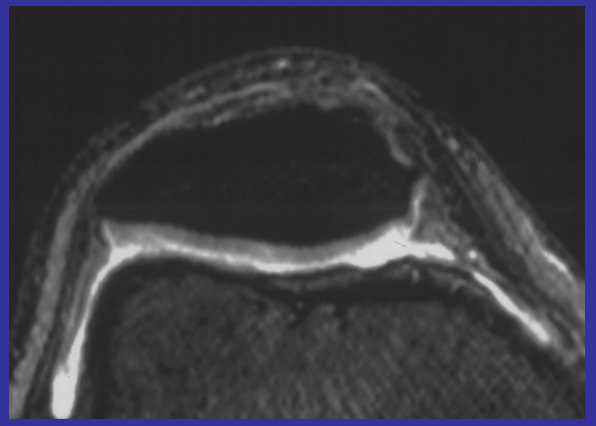
PET-CT

The Problem:

Belief in a Pure Biomechanical/Structural Paradigm of Knee Function







The Entire Orthopaedic Surgical Profession
Has been based on a
Structural/Biomechanical Paradigm
Since its Inception

Our Entire Lexicon Reflects This Bias:

Fractured Bone – Stabilize It
Herniated Disc - Remove Herniation
Ruptured ACL – Reconstruct It
Ruptured Tendon – Repair It
Dislocation – Reduce It
Chondromalacia – Create New Cartilage (ICRS)

ASSUMPTION:

- Address the observable Structural/ Biomechanical factors
  i.e. Chondroplasties.
  Lateral releases
  Proximal and Distal realignments

- The Pre-Injury Knee Function Has been Restored
  Therefore: Return to Sport is Safe
  DJD of the Knee will be Prevented

The Worst Cases
Of PF PAIN
Iatrogenic!



5 Operations



7 Operations



9 Operations

How Best to Achieve Restoration of Joint Function?

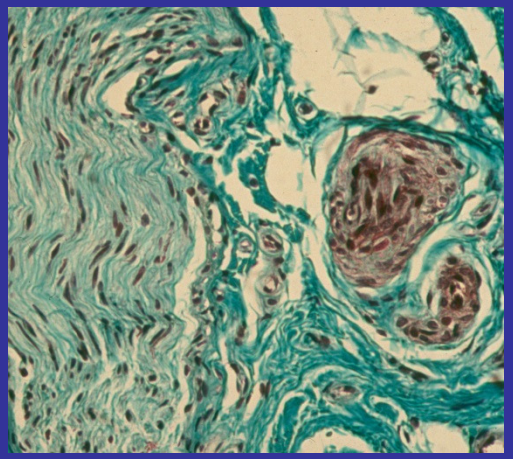
By Restoration Of Normal Structural/Biomechanical Characteristics?
(Conceptually Limited- Ignores Important often Occult,Biological Factors)

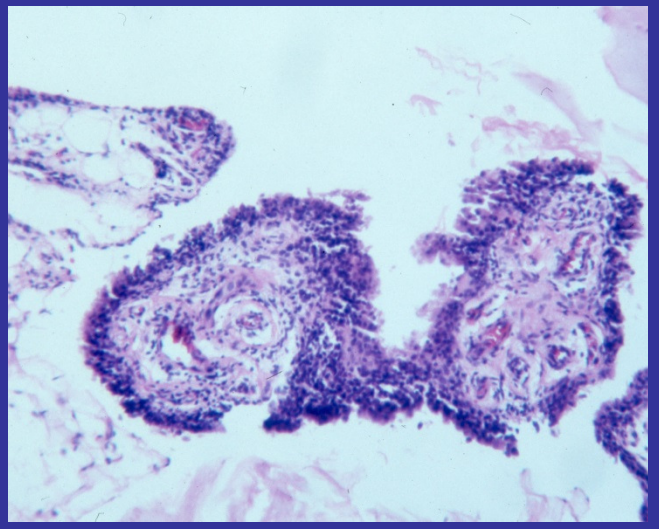
By Restoration of Tissue Homeostasis (An Emerging Orthopedic Paradigm)
Discovered In Response to The Enigma of PFPS

What is The Pathophysiology?

Of Patellofemoral Pain







The Etiology of
PatelloFemoral Pain

Structural/Biomechanical Paradigm

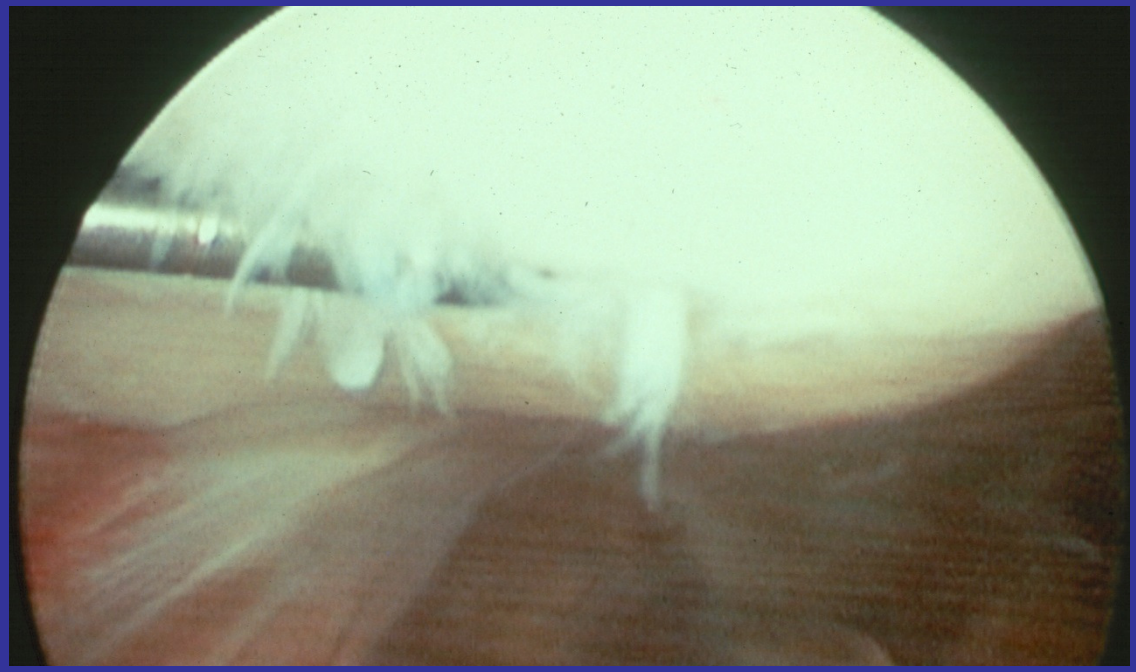
Chondromalacia

Malalignment

Metabolic/Physiologic Paradigm

Tissue Homeostasis

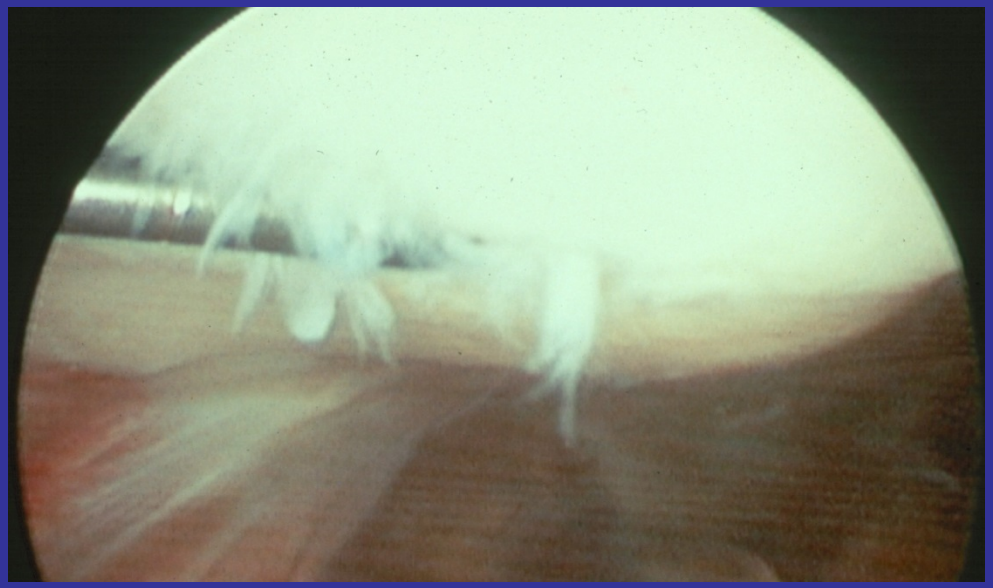
Chondromalacia Patella



MAYO Clinic: "Damage to the cartilage under your kneecap. A more accurate term for chondromalacia patella is *Patellofemoral Pain Syndrome*" !

Internet search July 29th 2014

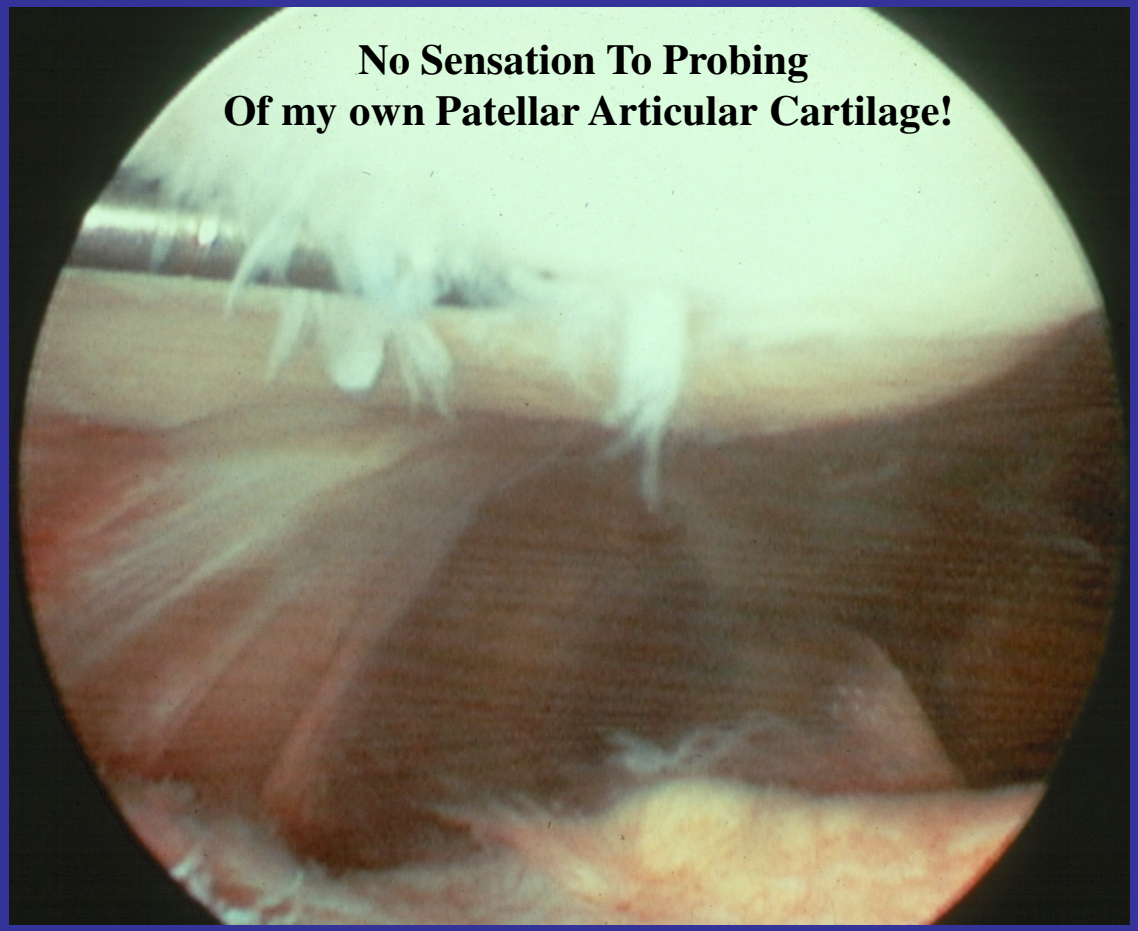
Chondromalacia Patella

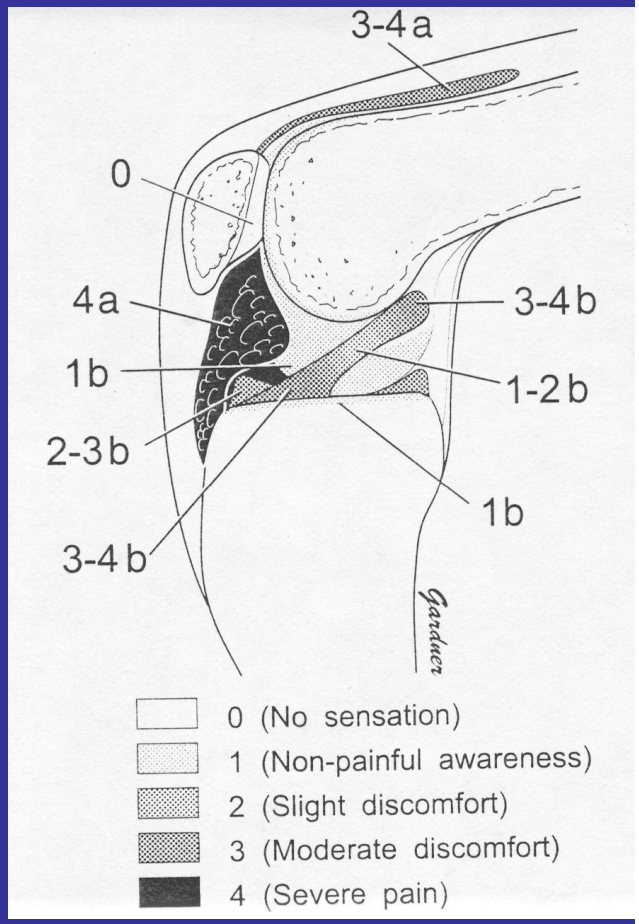


Wikipedia: "Inflammation of the underside of the patella, softening the cartilage. More accurately referred to as patellofemoral pain syndrome. The cartilage is no longer smooth and therefore use and movement is painful" !

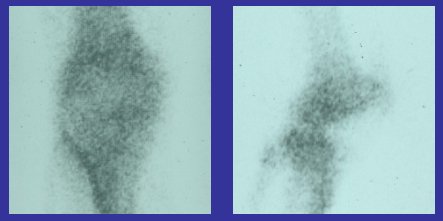
Internet search July 29th 2014

Chondromalacia

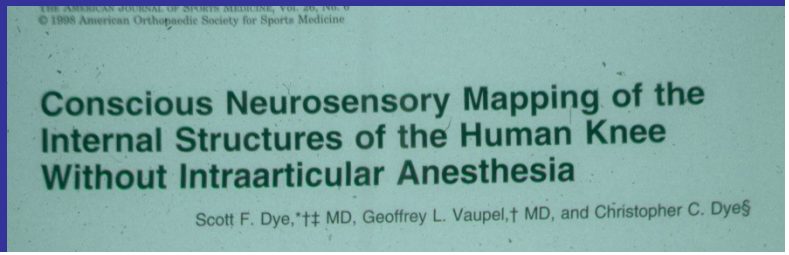




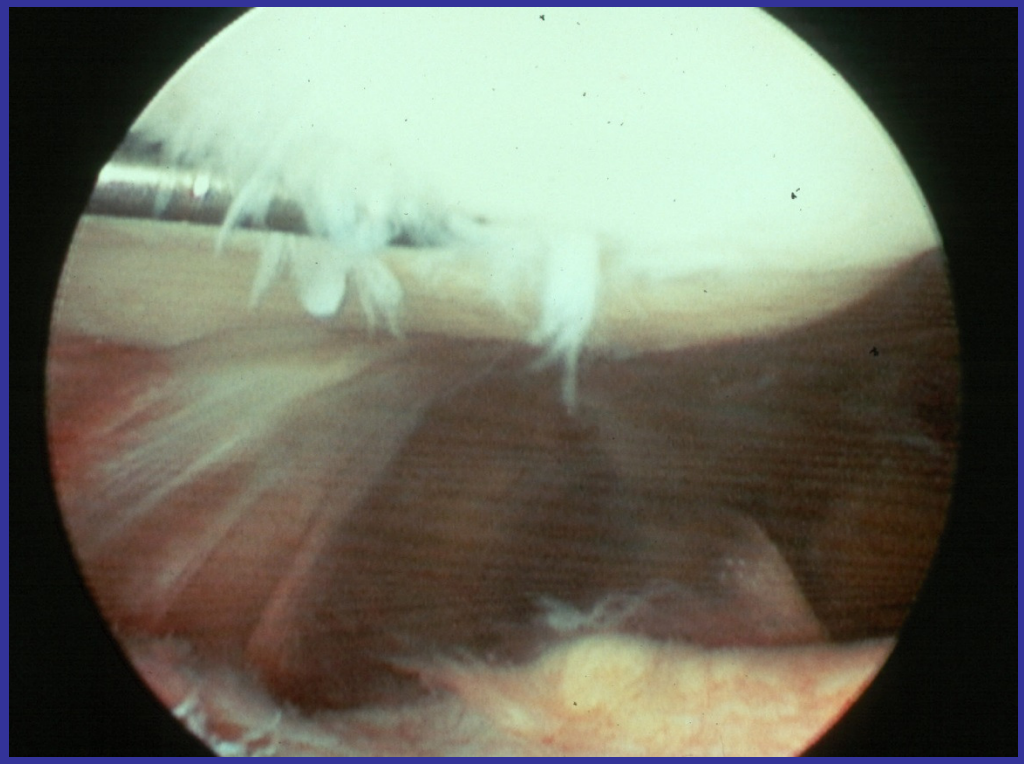
Articular Cartilage
Has no Neural Fibers



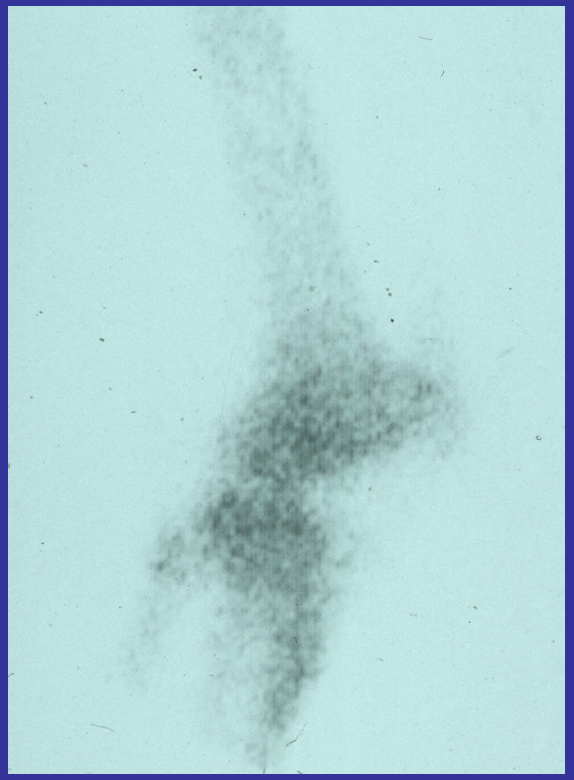
Normal Bone Scan



Palpation of my right Patella = NO PAIN

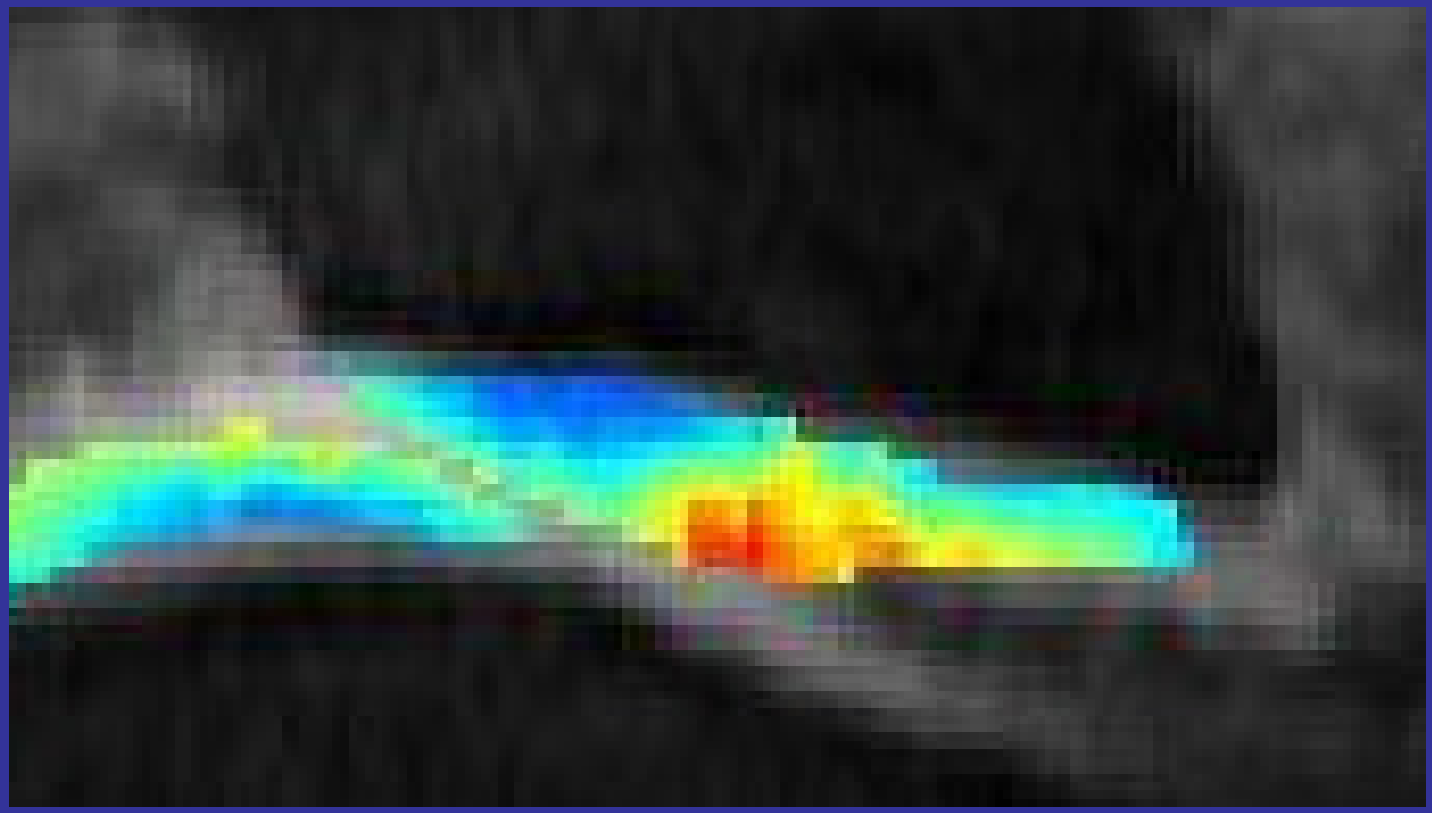


Advanced Structural Damage of Articular Cartilage (CMP)



Osseous Homeostasis

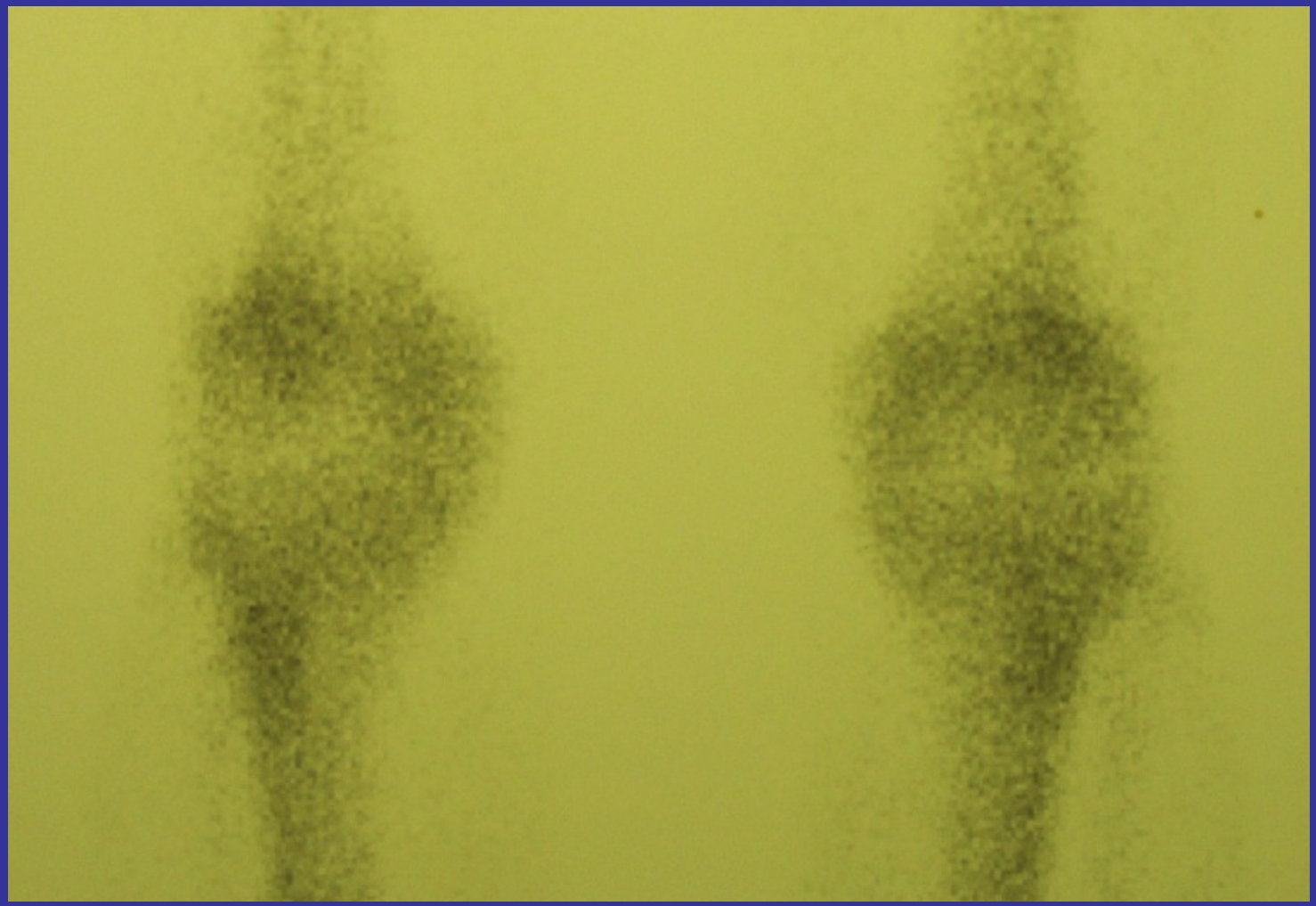
T1 rho Sagittal MRI
Same Knee 13 years Later



(Courtesy of Ben Ma UCSF)

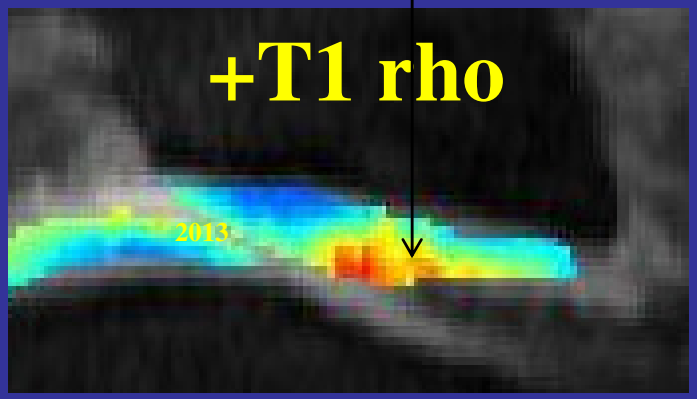
BLUE=Normal PG Content RED= Diminished PG Conten

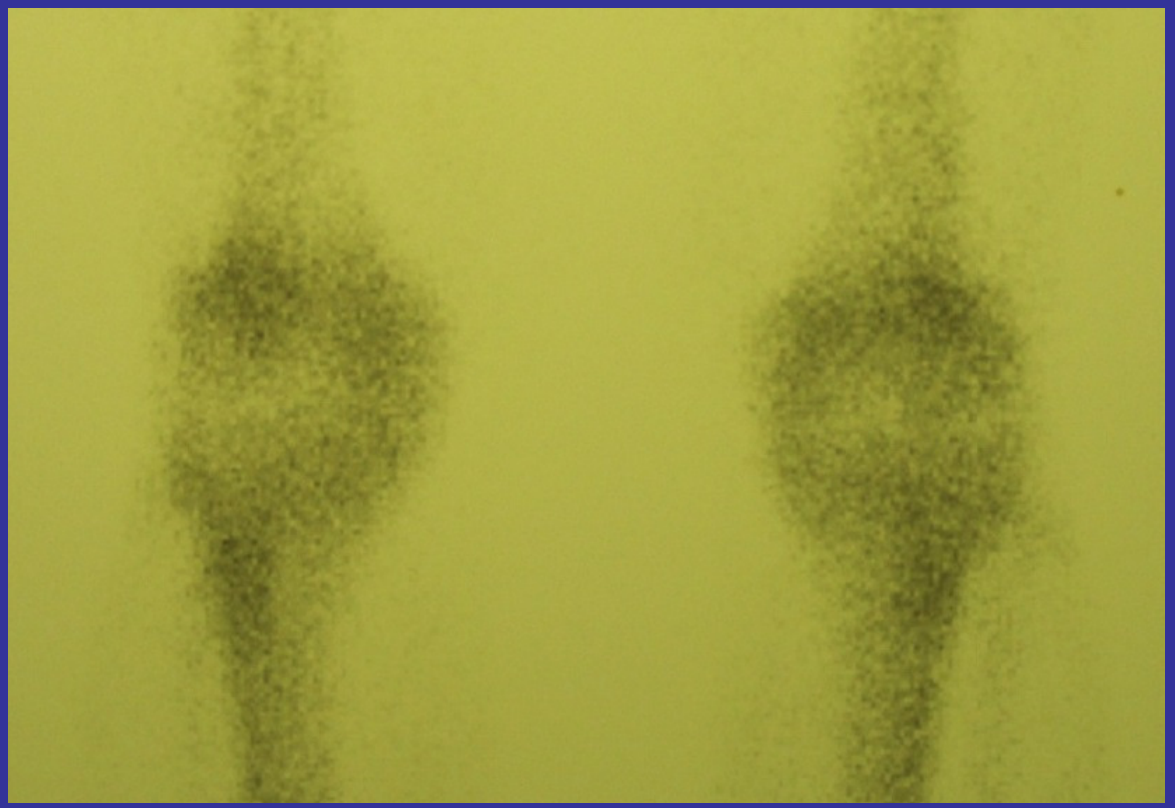
MY Concurrent Tc99m-MDP Bone Scan



Tissue Homeostasis of Bone

TRUMPS Structural
Damage of Articular Cartilage

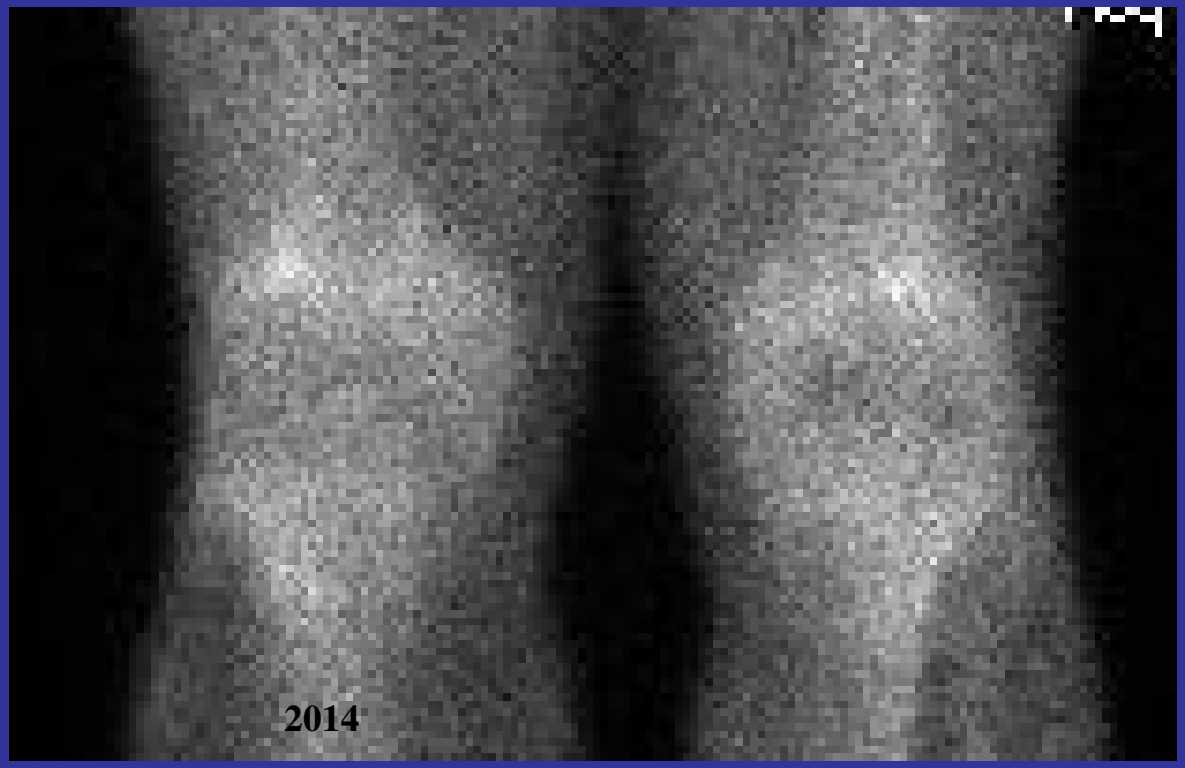




Grade 3 CMP
Asymptomatic
X 13 Years, in Face of
Normal Tc Bone Scan

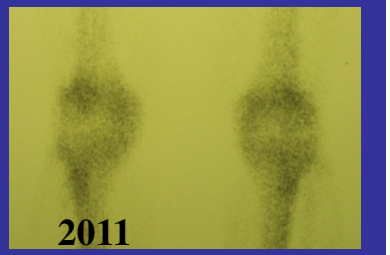
My Current Bone Scan
(May 2014)

Maintenance/ Persistance
Of Joint Homeostasis X 14 Years





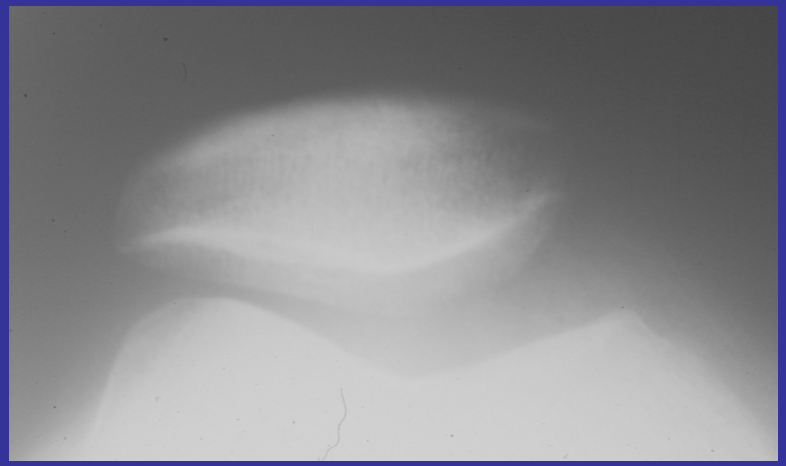


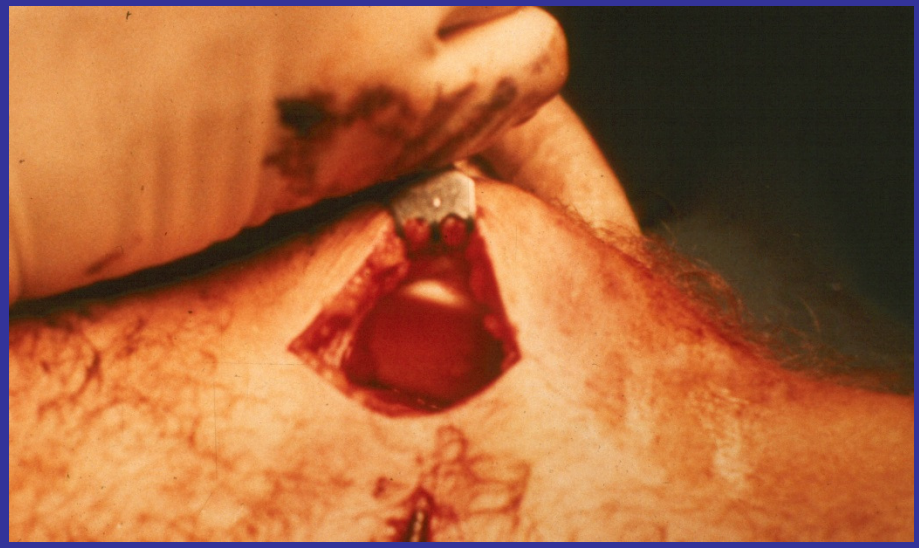


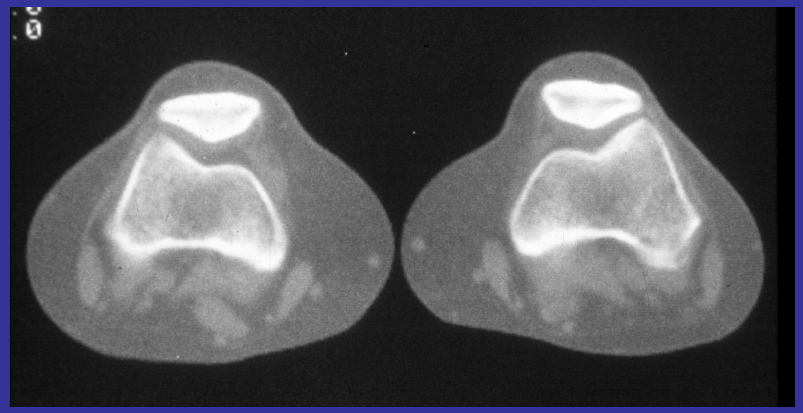
CMP Does NOT Cause PF PAIN!



Malalignment







Patellofemoral Pain does NOT Correlate with Malalignment

BiedertRM,et al. Correlation between The Q angle and Patellar Position Arch Orthop Trauma Surg 121 2001

DyeSF, BollDH, DuniganPE: An AnalysisOf objective measurements in young patientswith patellofemoral pain Am J Sports Med 13 1985

PostW: Current assessment of the value of clincal indicators of Malalignment. Spots Med Arth Rev 2001

SandowMJ, GoodfellowJW: The natural history of anterior knee pain in adolescents JBJS 67B 1985

ThomeeR,et al. Patellofemoral pain syndrome in young women : A clinical analysis of alignment,pain parameters Scand J Med Sci Sports 5 1995

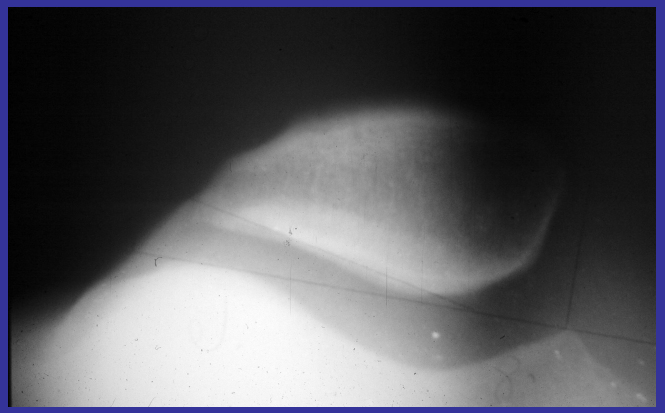
LETTERMAN ARMY MEDICAL CENTER

Presidio of San Francisco

104 patients with AKP 79 Controls

No Statistical difference:

- Q Angle
- Insall-Salvati Index
- Merchant View
  - Congruence Angle
  - Sulcus Angle
- Laurin View
  - Lat P/F Angle
  - P/F Index
  - Lat Patellar Displacement

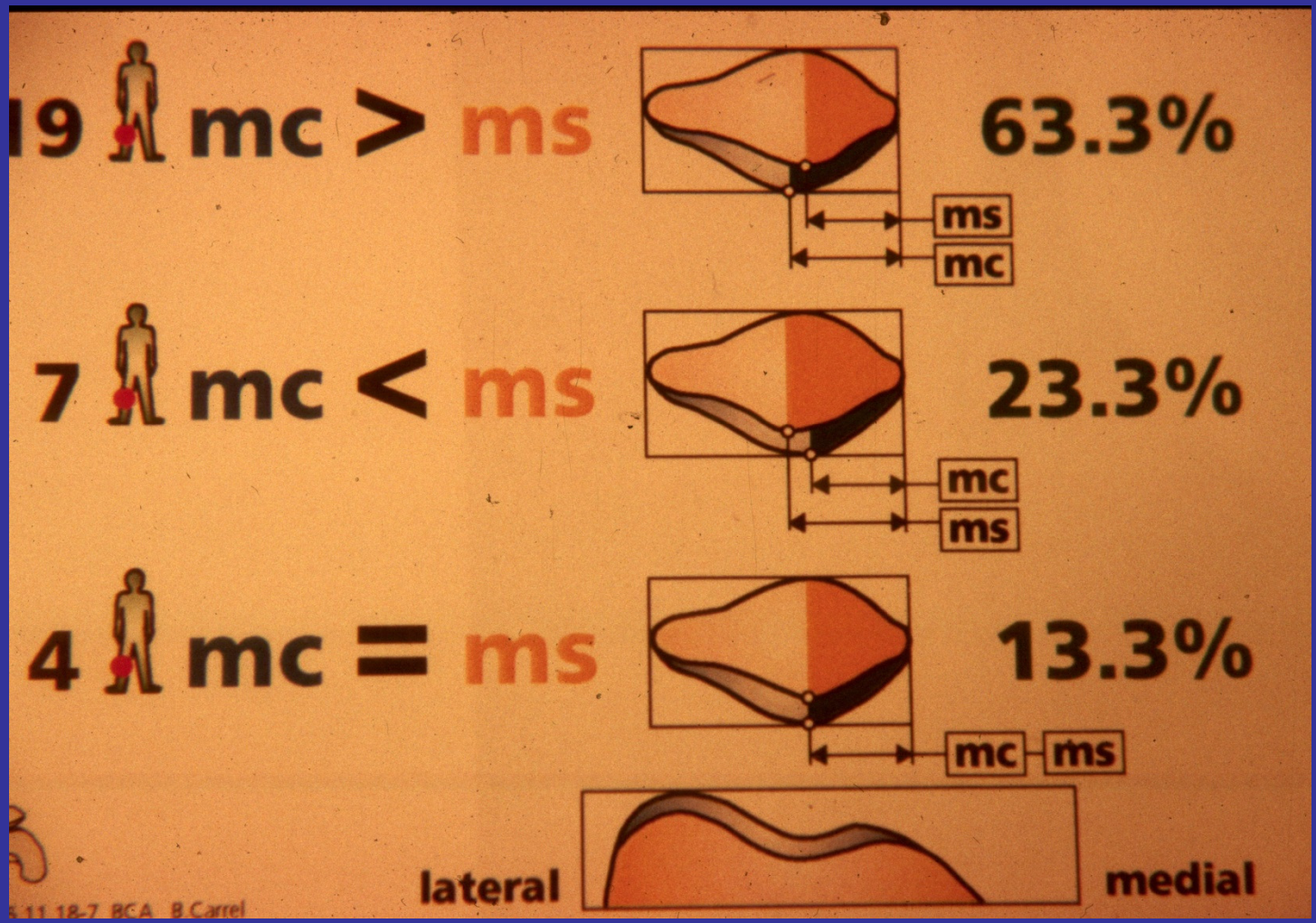


Meniscus of Sclerosis—Lat pat Facet

Perpendicularization of Trabeculae—Lat Pat Facet

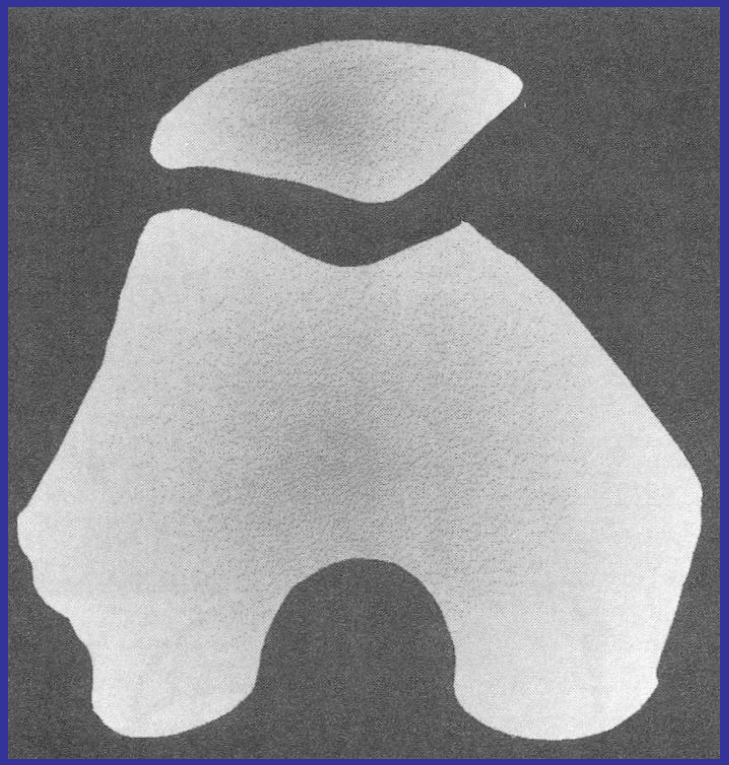
Dye, Boll, Dunigan,et al. Am JSM 1985

Articular Cartilage Morphology
Does not often match Osseous Morphology



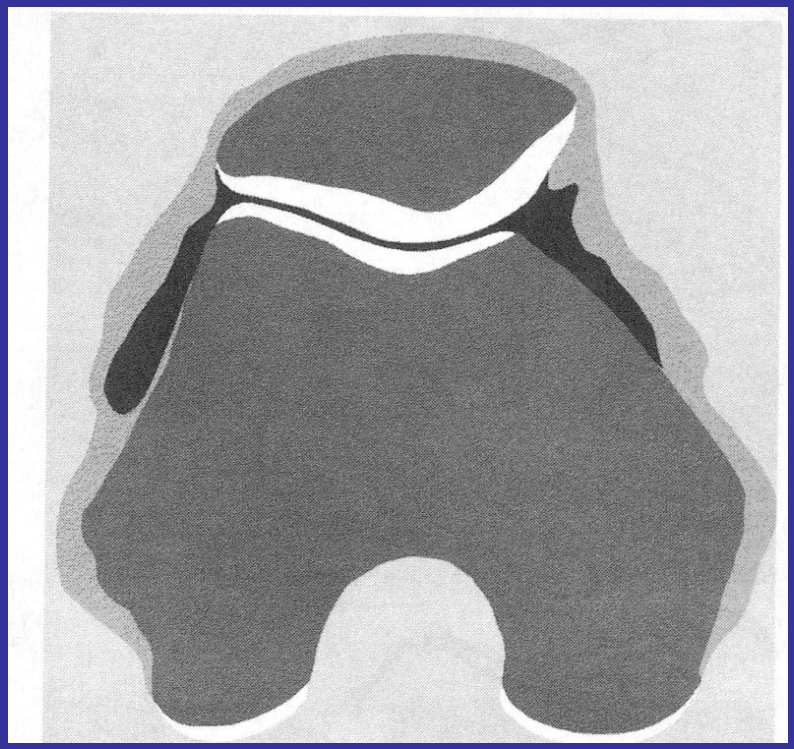
H.U. Staeubli et al. JBJS Br 1999

Plain CT



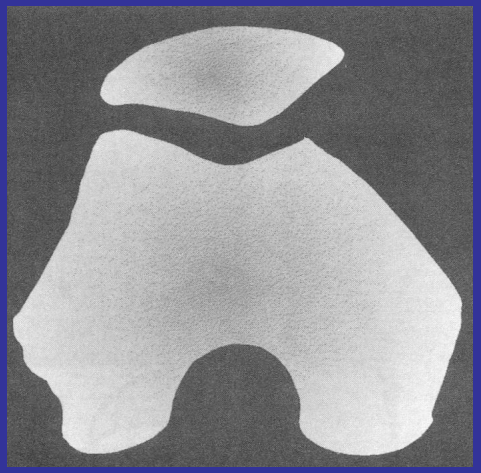
Osseous Landmarks Indicate Malalignment

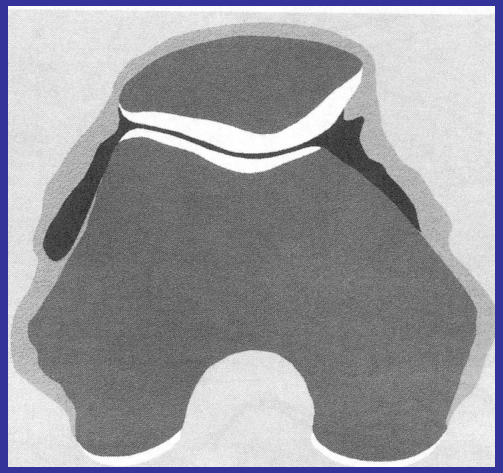
CT Arthrogram

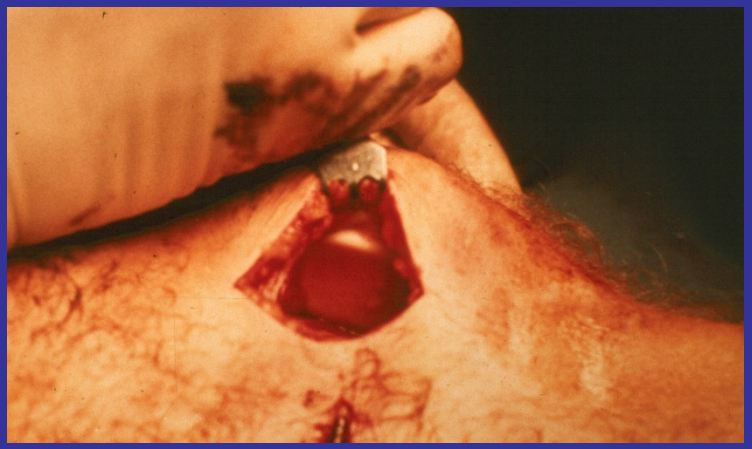


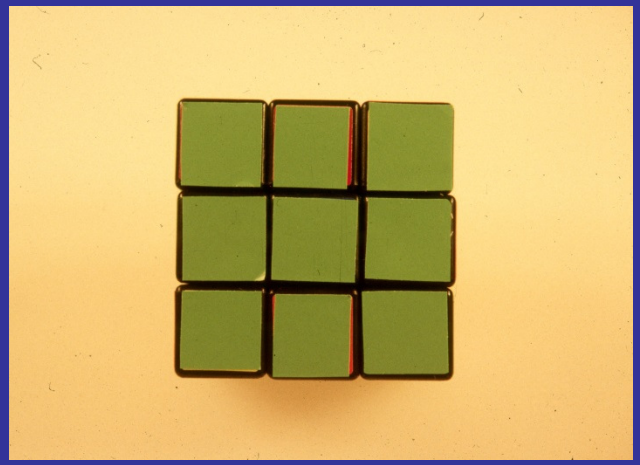
However The Cartilage Surfaces Mate Perfectly

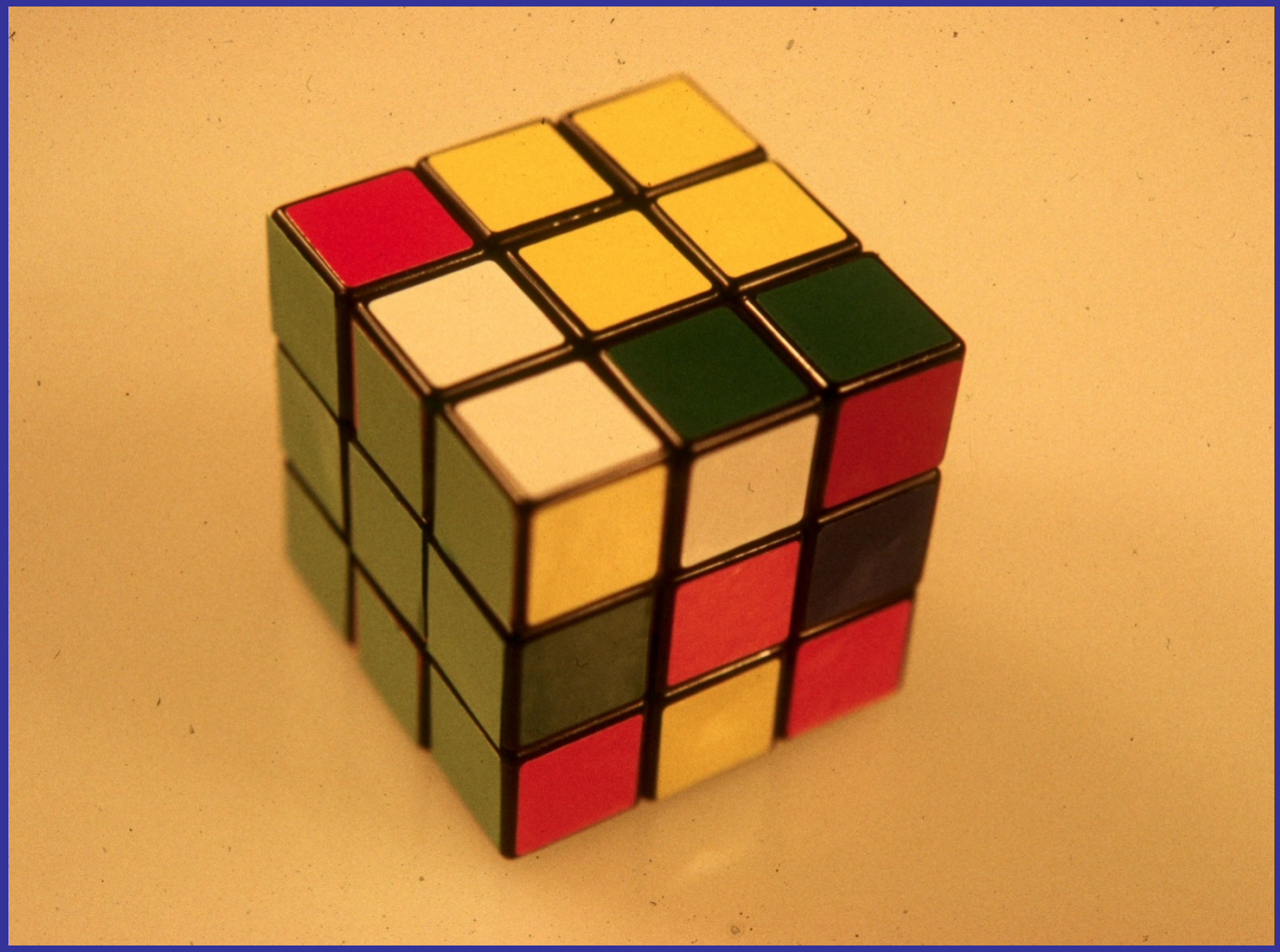
Staeubli et al., JBJS Br 1999





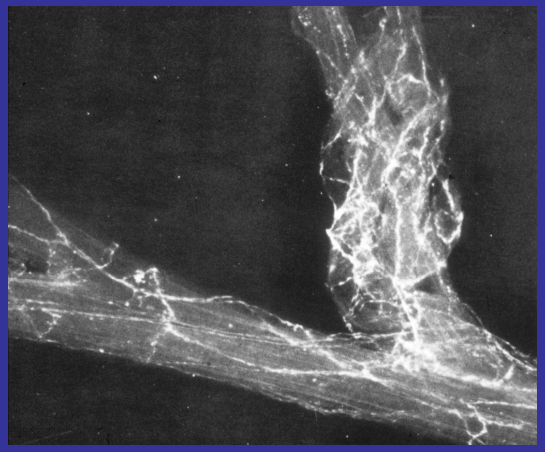




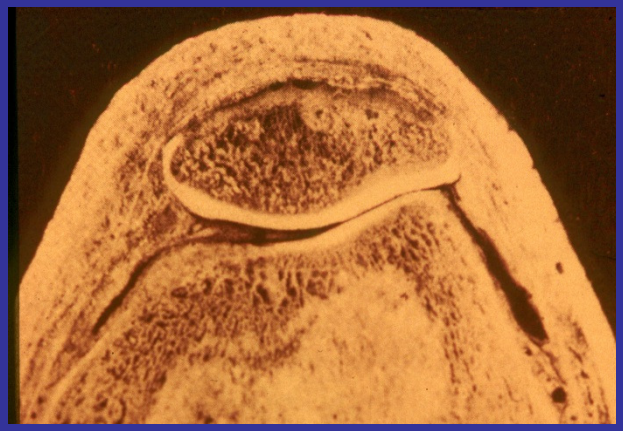


J.Y. DuPont

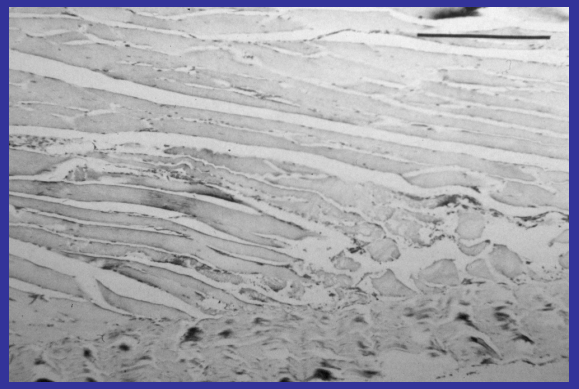
Pain arises from Innervated Structures



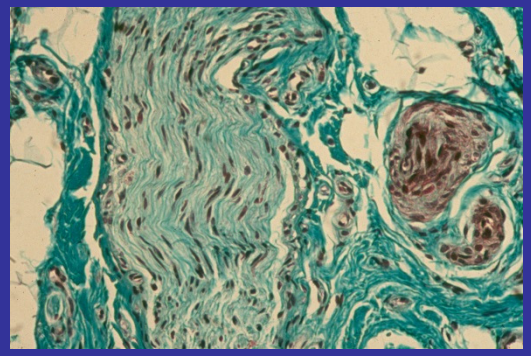
VESSELS



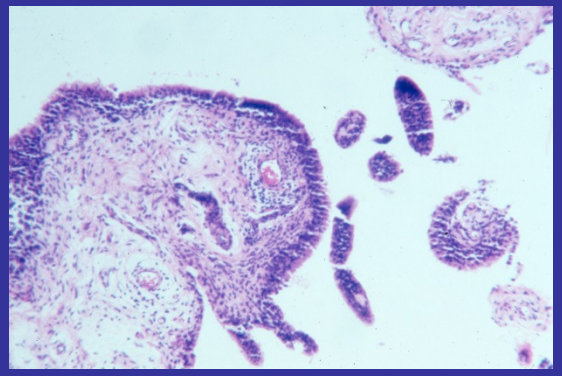
BONE



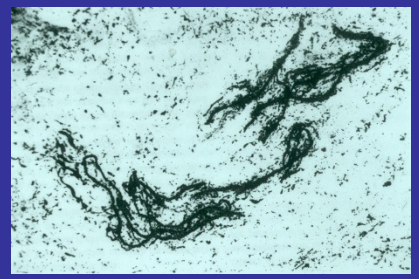
TENDON



RETINACULAR NEUROMA



SYNOVIUM



Biedert, RM,et al., The Occurance
Of free nerve endings in the soft tissues
Of the knee joint.Am J Sports Med 1992

Sanchis-Alfonso,V,et al.,Quantitative analysis
Of nerve changes in the lateral retinaculum,
Am J Sports Med 1998

Sanchis-Alfonso,Vand Rosello-Sastre,E
Immunohistochemical analysis for neural
Markers of the lateral retinaculum Am J Sports
Med, 2000

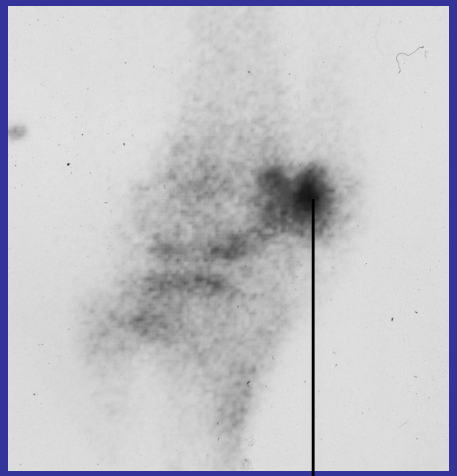
Biedert,RM, and Kernen,V, Nerosensory
Characteristics of the Patellofemoral Joint
Sports Med Arthrosc Rev 2001



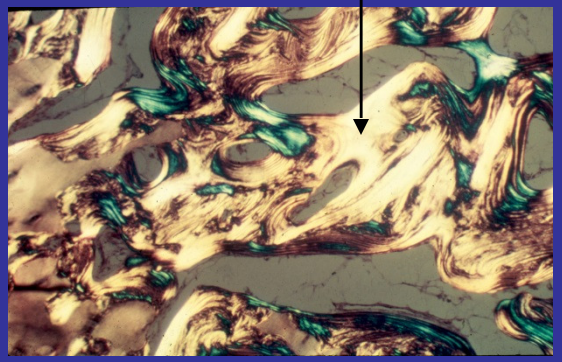
A Variable
MOSAIC
Of Pathophysiology
Loss of
Tissue Homeostasis

Of Innervated
Patello-Femoral Structures

Best Accounts for the
Variable expression of
PatelloFemoral Pain



Loss of osseous Homeostasis

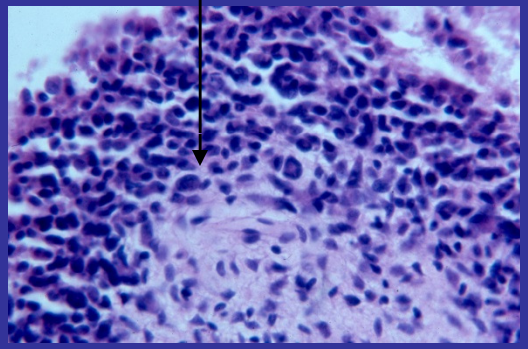


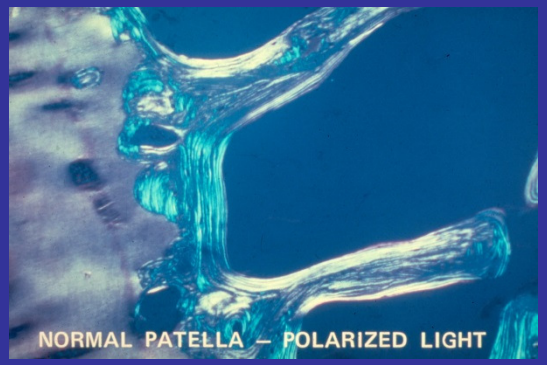


Two Main "TILES " Of the Mosaic

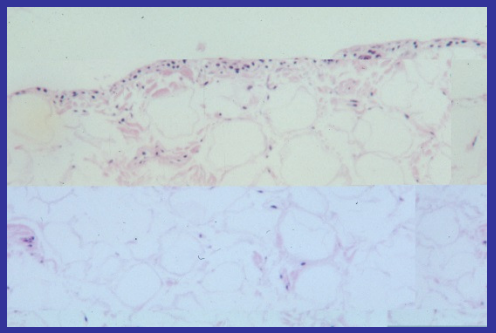


P/F Synovitis





Normal Patellar Bone

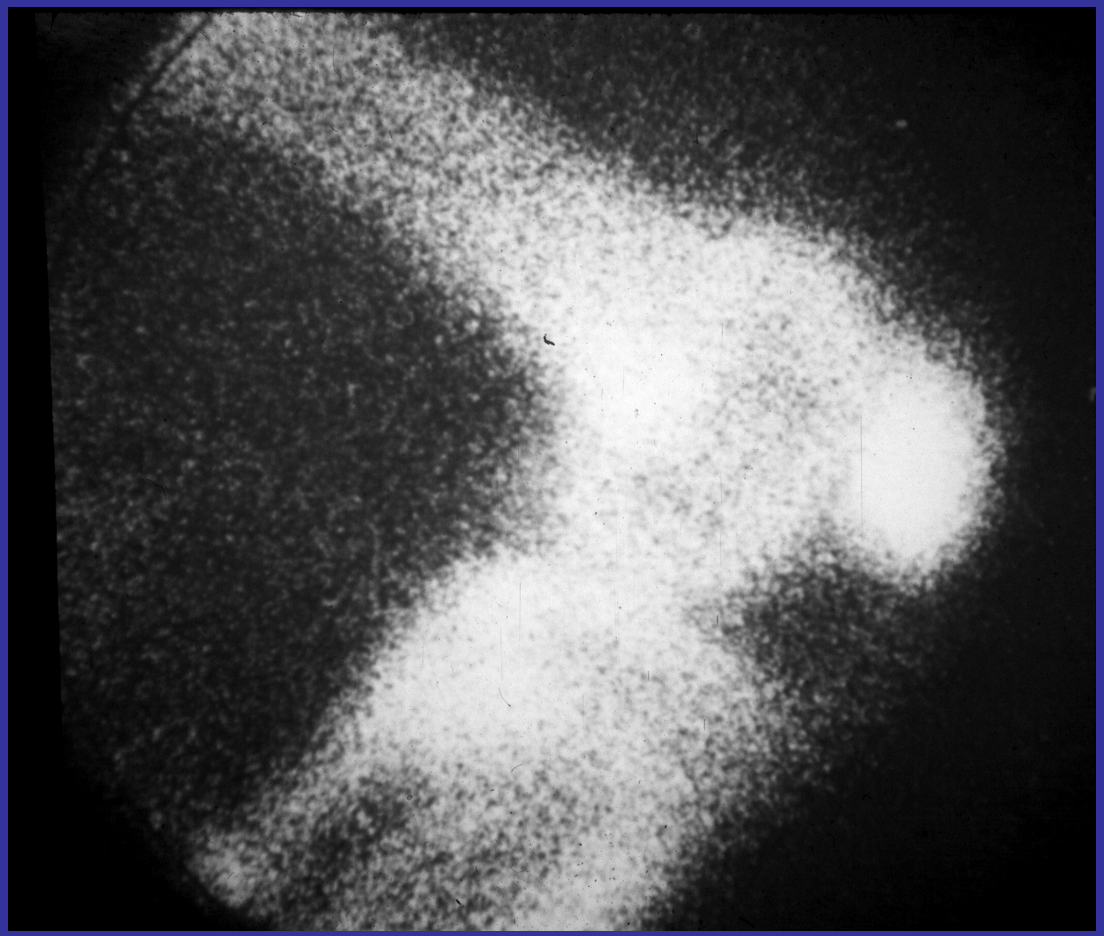


Normal Synovium

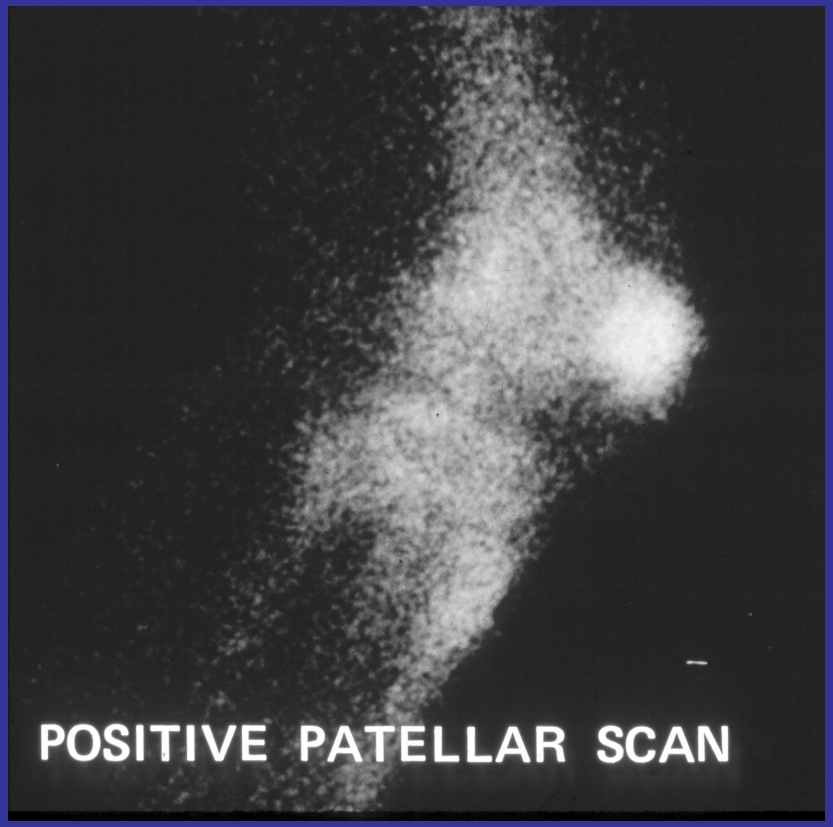
TABLE 1. *The pathophysiology of patellofemoral pain*

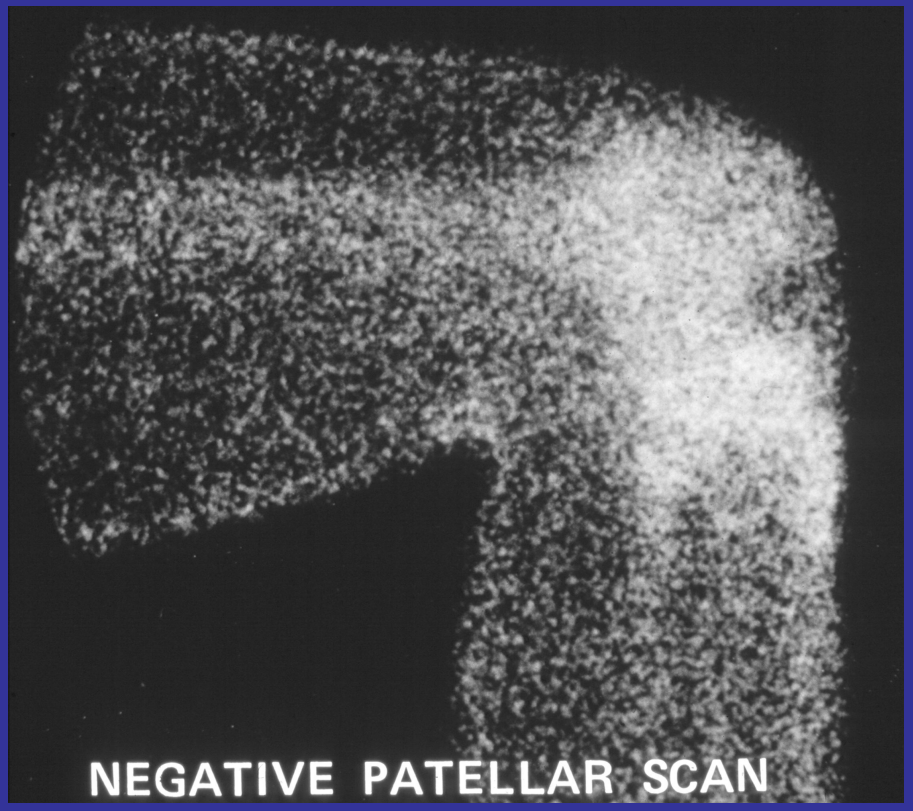
Factors inducing patellofemoral nociceptive output
Mechanical environment
Direct patellofemoral trauma
Excessive intrinsic compressive and tensile forces
Normal alignment
Malalignment (load shifting)
Impingement of intraarticular structures
Increased intraosseous pressure
Barometric pressure changes
Chemical environment
Presence of cytokines
Altered pH of damaged tissues
Localized peripheral neuropathy
Painful neuroma
Nonpatellofemoral sources
Referred pain (e.g., hip osteoarthrosis)
Phantom limb pain in above-the-knee amputee

Positive Patellar Bone Scan
28 yo Female with P/F Pain
Normal Radiographs



1982

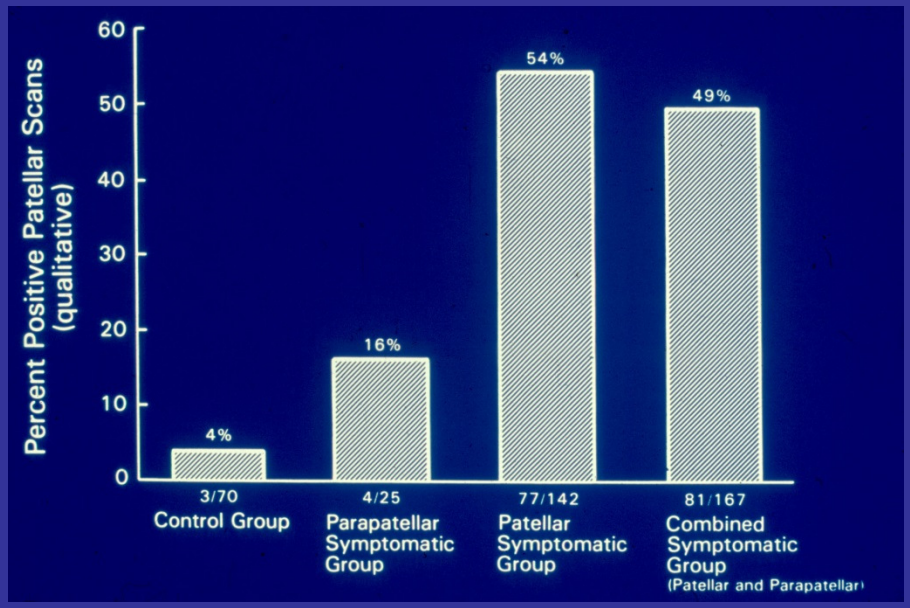

POSITIVE PATELLAR SCAN


NEGATIVE PATELLAR SCAN

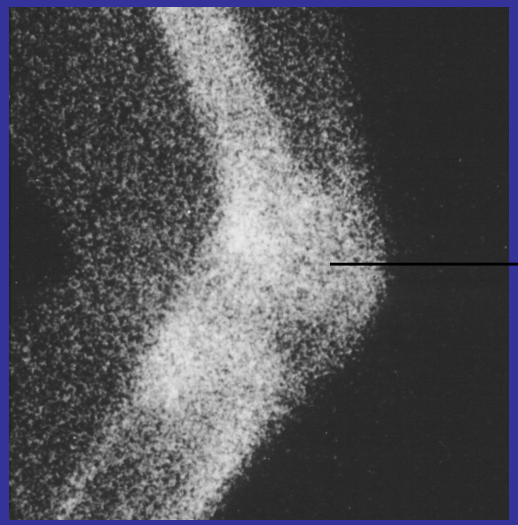
OBJECTIVE MEASUREMENTS

No Statistical Diff. From Controls

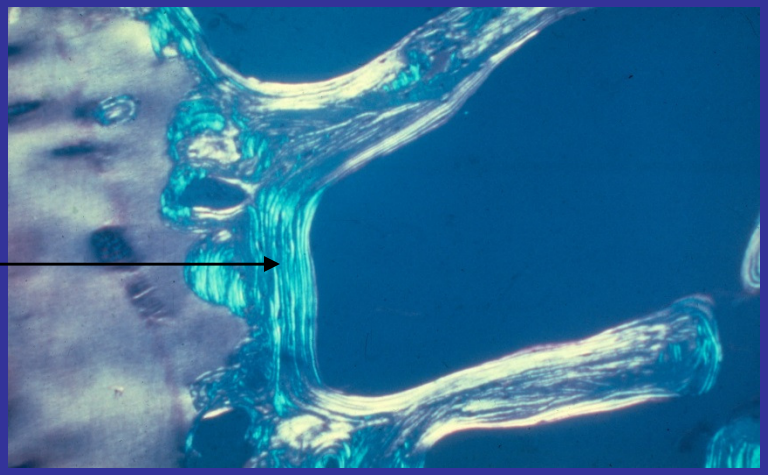
- Height/weight ratio
- Leg length discrepancy
- Thigh atrophy
- Q angle
- Insall – Salvati ratio
- Perpendicularization trabeculae lateral facet
- Radiodensity lateral facet

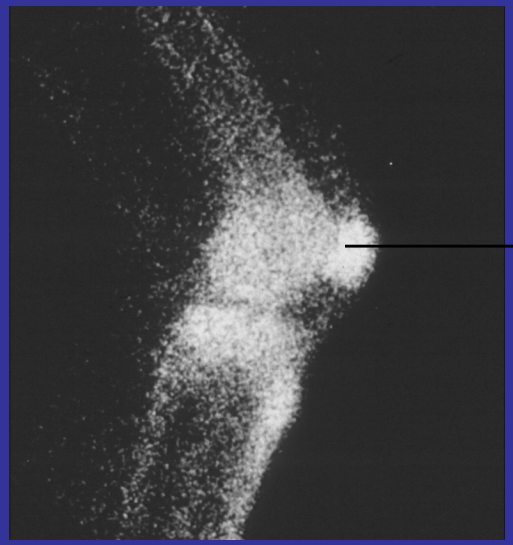


Tissue Homeostasis

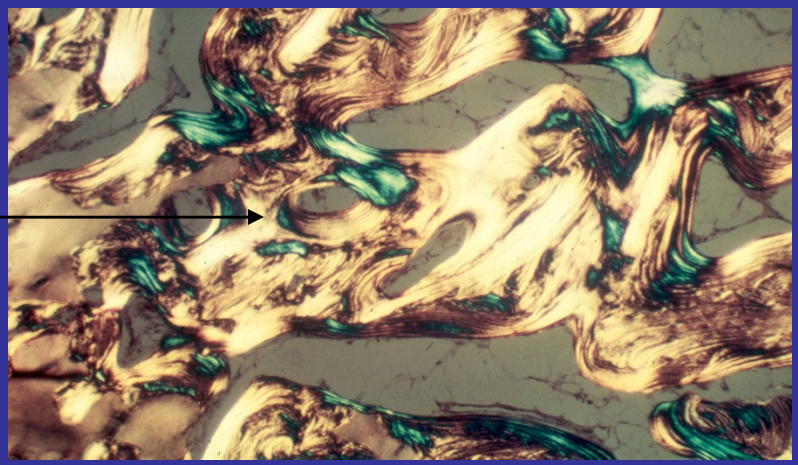


Osseous Homeostasis



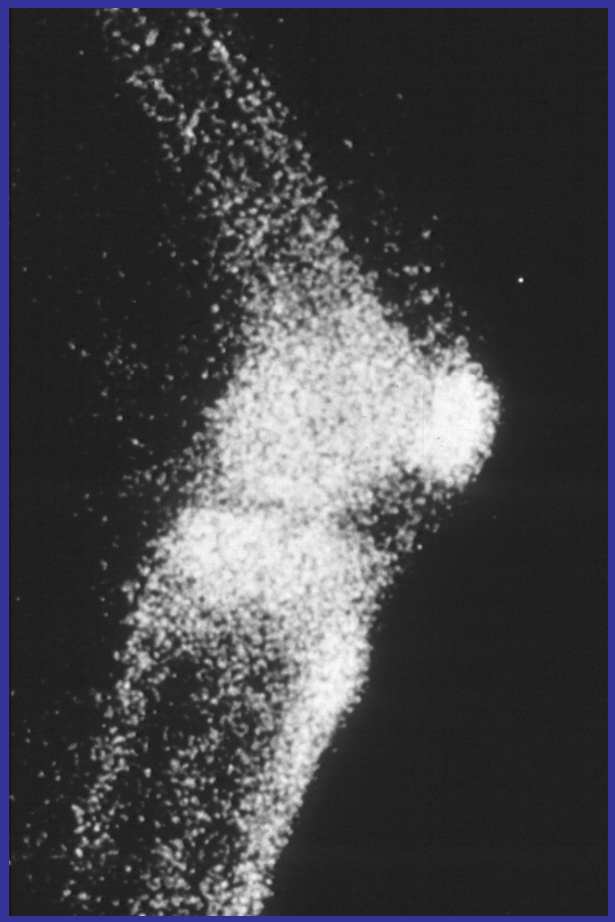


Loss of Osseous Homeostasis



28 yo Male with AKP No Malalignment

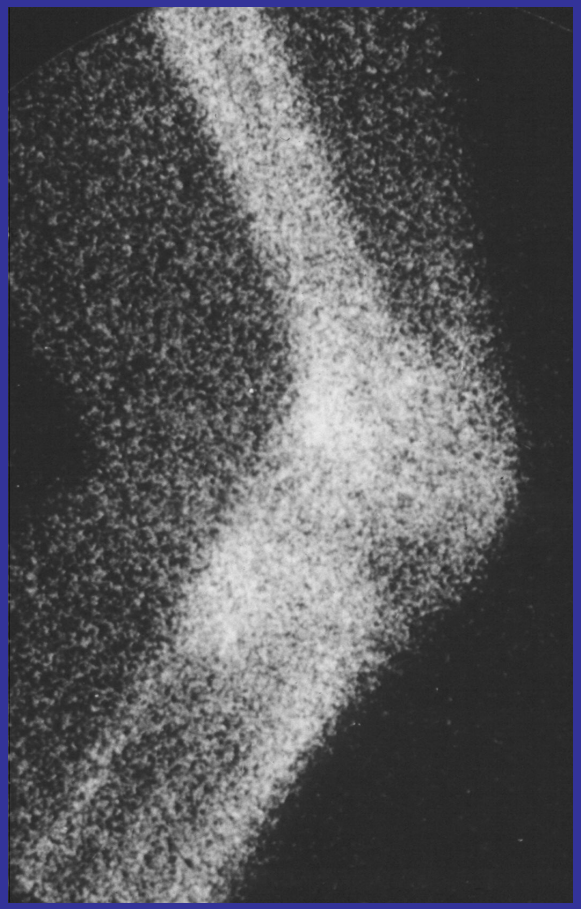
Pre Rx



Positive Bone Scan

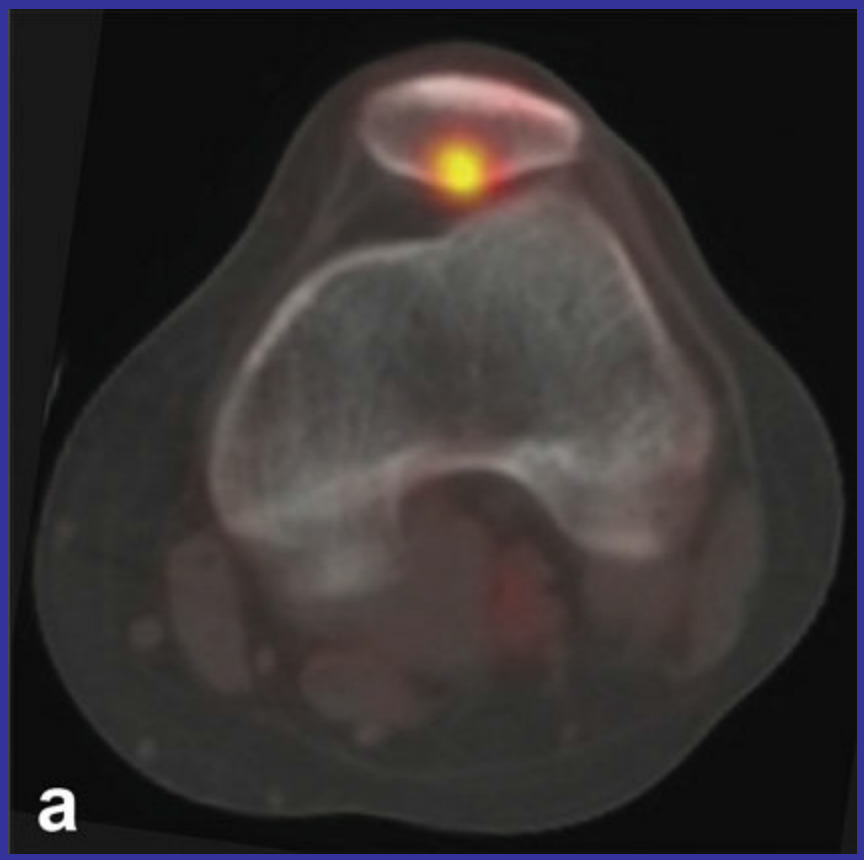
4 Months Conservative Rx

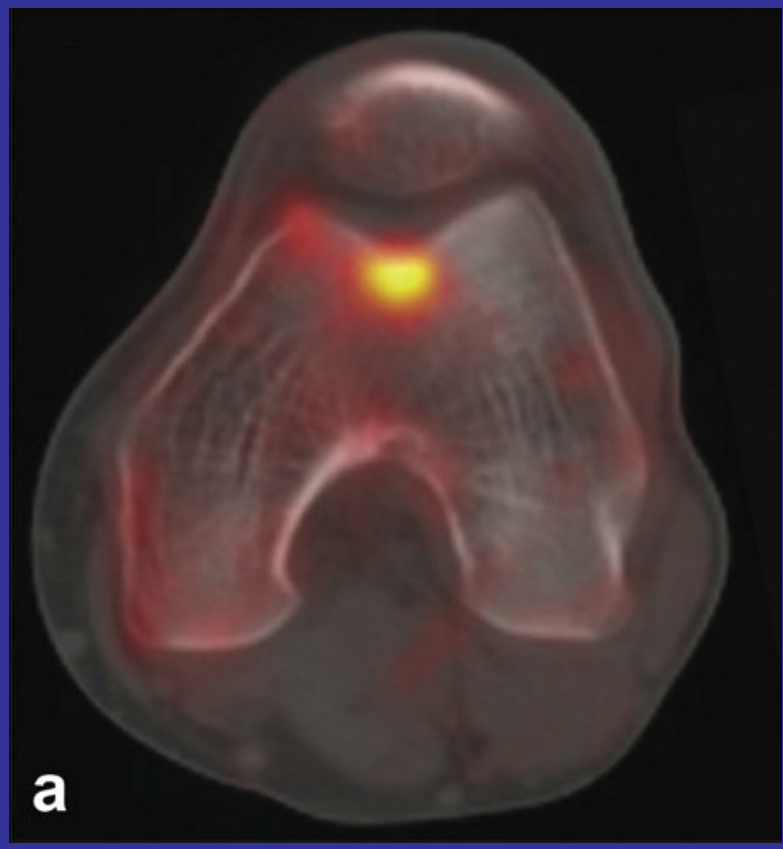
Resolution of AKP



Negative Bone Scan

Stanford Radiology Confirmed our Findings With High Resolution PET-CT

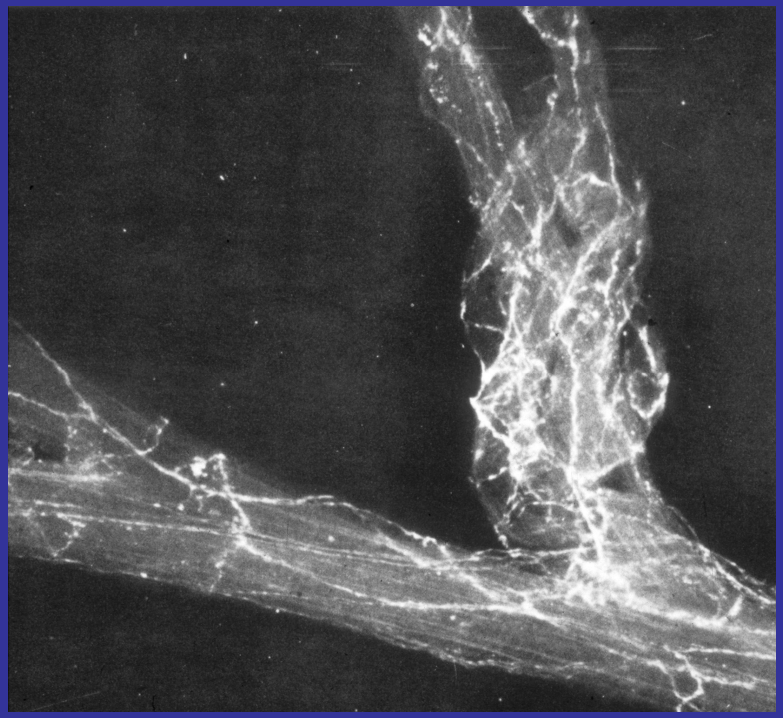


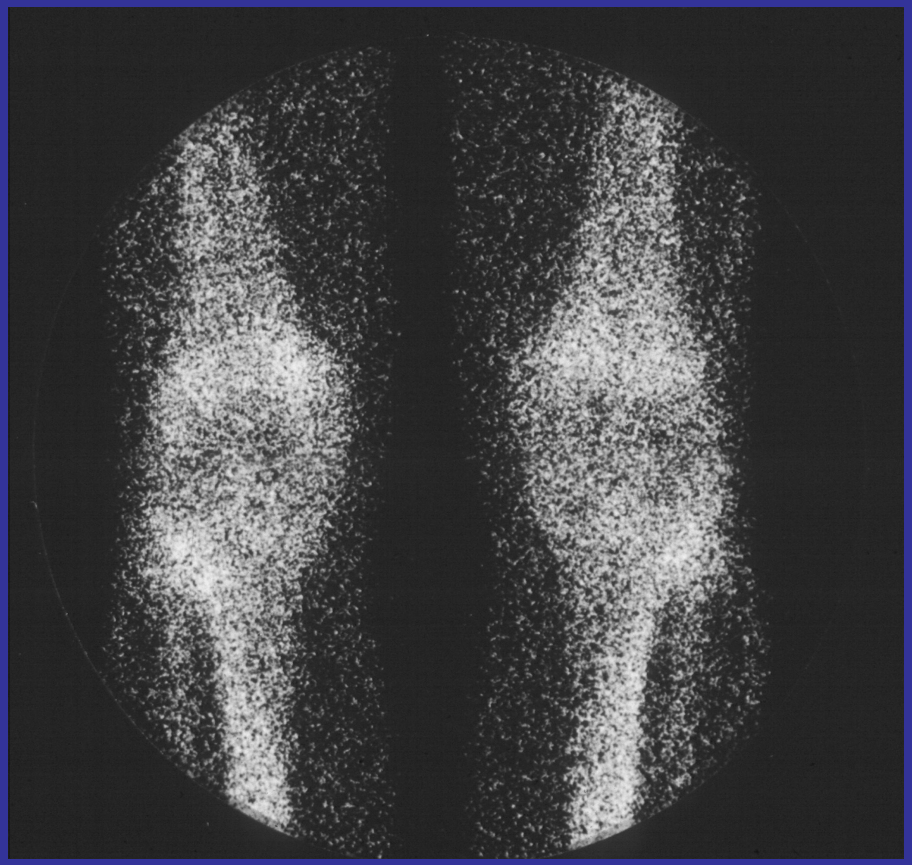


Tc99m-MDP Bone Scan = 4 ms

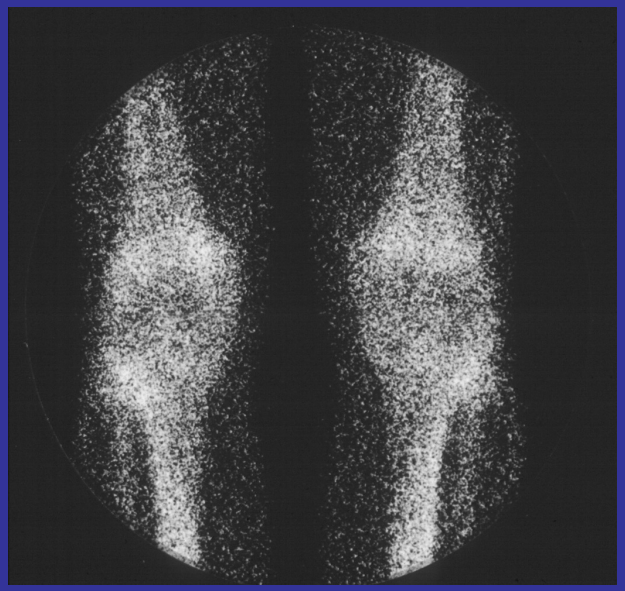
But It Is Very High Radiation **PET-CT = 25 ms**





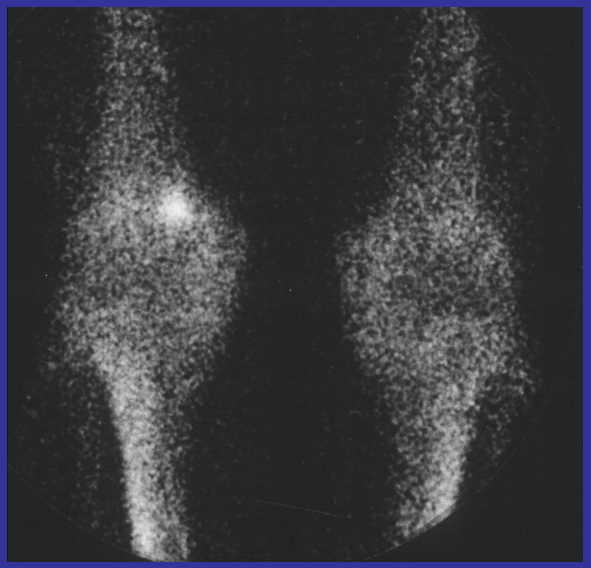


Homeostasis



Pre Needle Penetration

Loss of Homeostasis



7 weeks Post

Restoration of Homeostasis



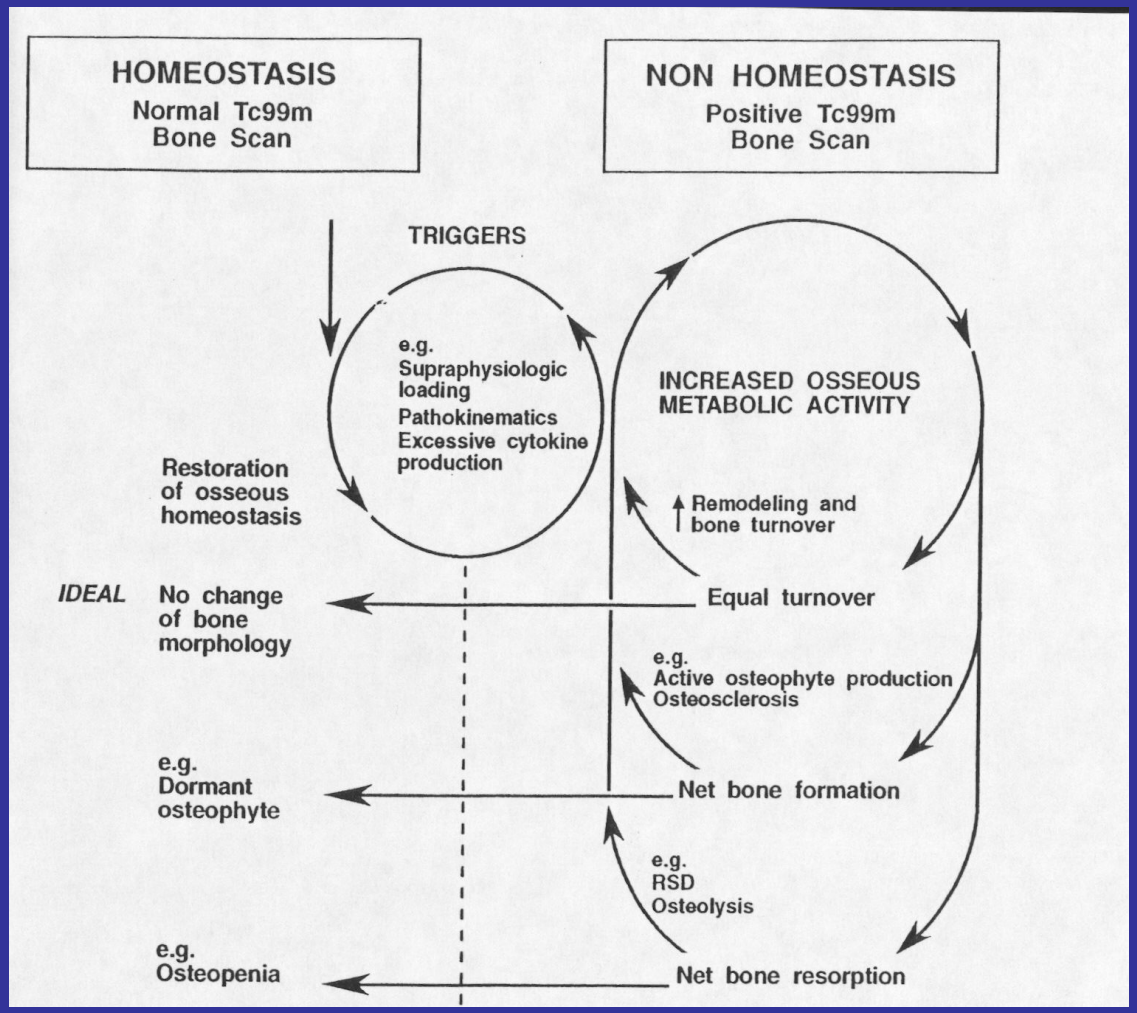
14 Months Post

Dye and Chew
JBJS (Am) 1993

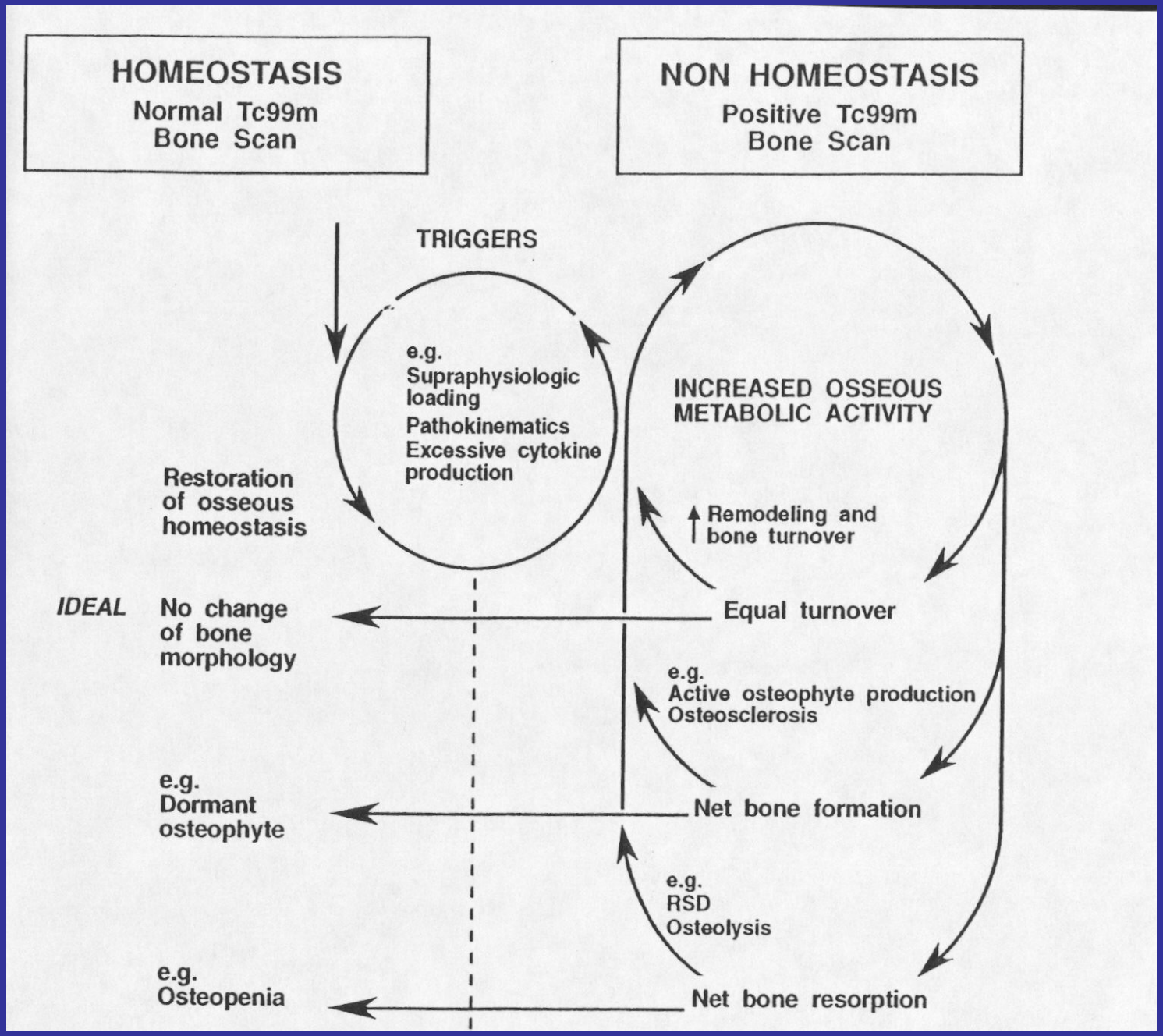
Vol. 75-A, no. 9, pp. 1388-1406, September 1993]
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The Use of Scintigraphy to Detect Increased Osseous Metabolic Activity about the Knee*

BY SCOTT F. DYE, M.D.†, AND MAILINE H. CHEW, M.D.‡, SAN FRANCISCO, CALIFORNIA



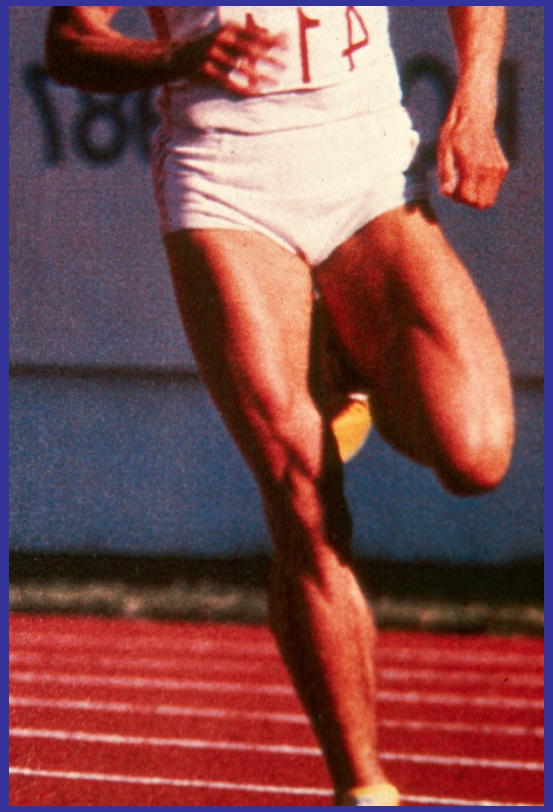
Dye's Model of Bone Homeostasis



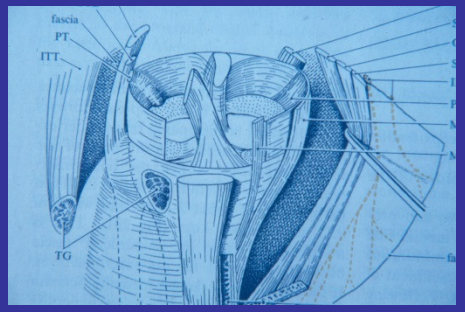
Principle of Treatment

Restoration of Musculoskeletal FUNCTION

What is the Function Of the Knee ?

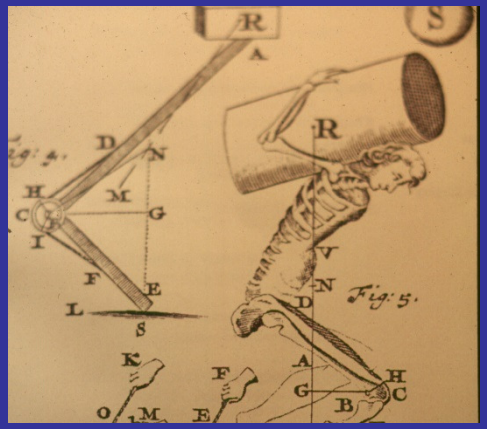


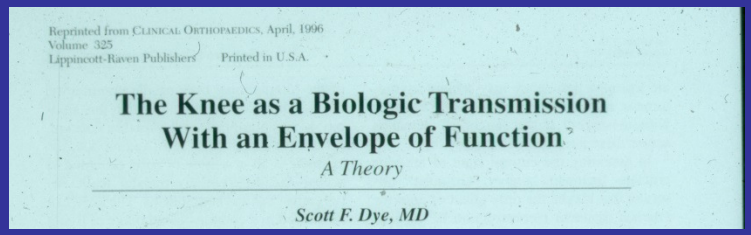






The Knee Functions as a Biologic Transmission



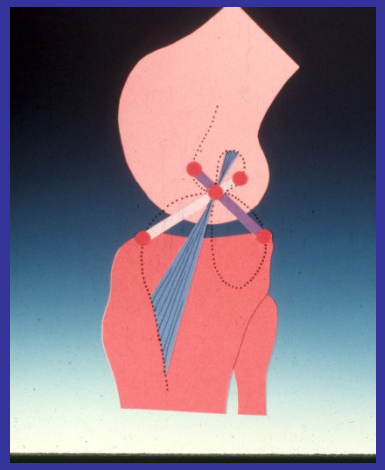

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Volume 325
Lippincott-Raven Publishers Printed in U.S.A.

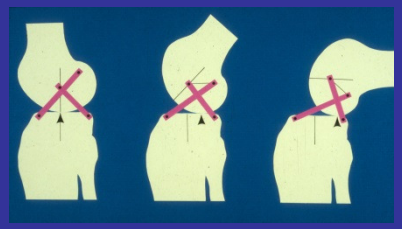
The Knee as a Biologic Transmission With an Envelope of Function

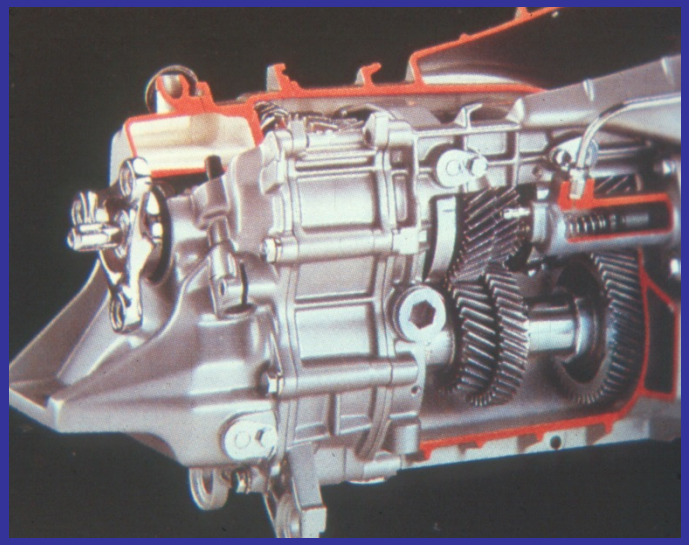
A Theory

Scott F. Dye, MD

CORR 1996



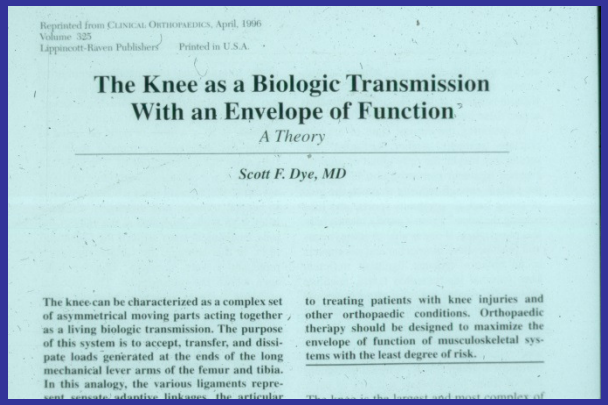






MENSCHICK

The Knee is a Biologic Transmission



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The Knee as a Biologic Transmission With an Envelope of Function

A Theory

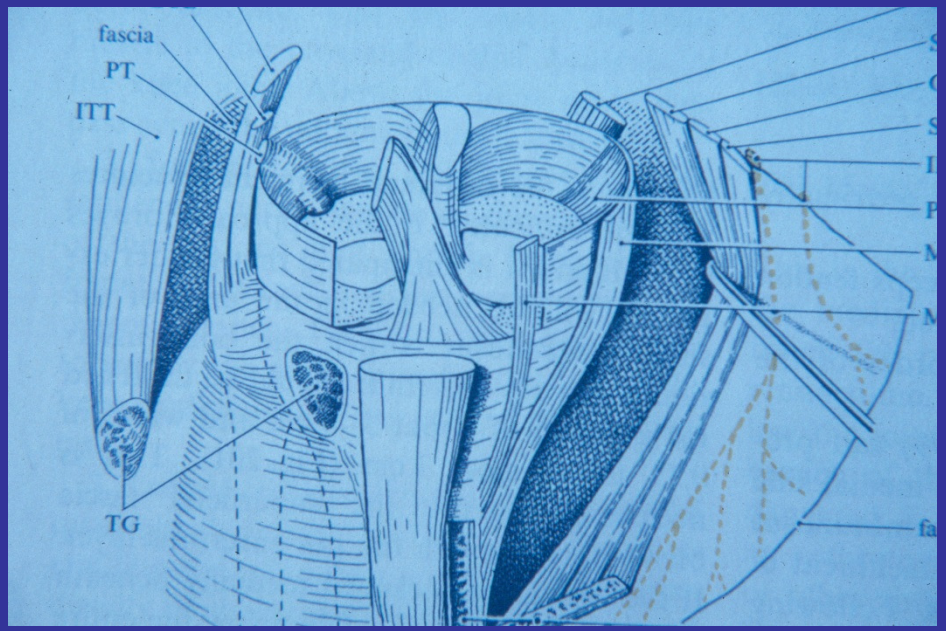
Scott F. Dye, MD

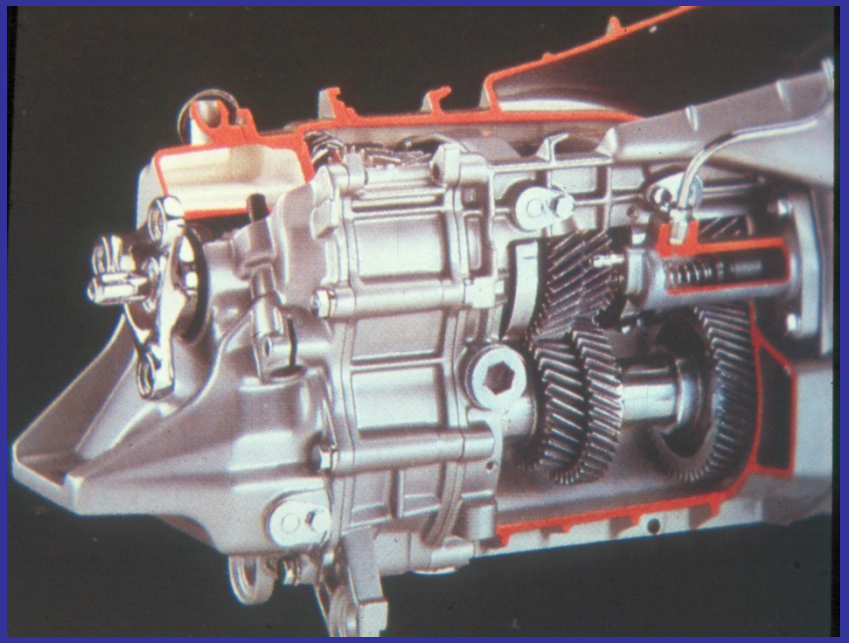
The knee can be characterized as a complex set of asymmetrical moving parts acting together as a living biologic transmission. The purpose of this system is to accept, transfer, and dissipate loads generated at the ends of the long mechanical lever arms of the femur and tibia. In this analogy, the various ligaments represent sensate adaptive linkages the articular

to treating patients with knee injuries and other orthopaedic conditions. Orthopaedic therapy should be designed to maximize the envelope of function of musculoskeletal systems with the least degree of risk.

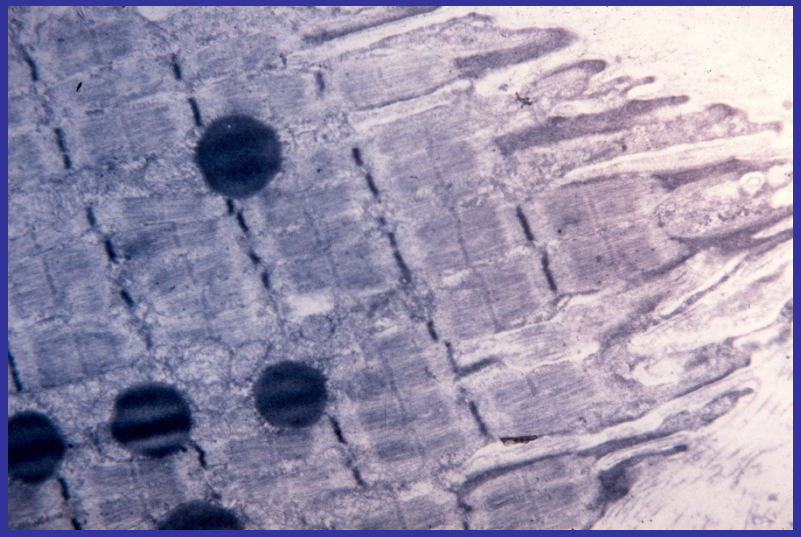
CORR 1996

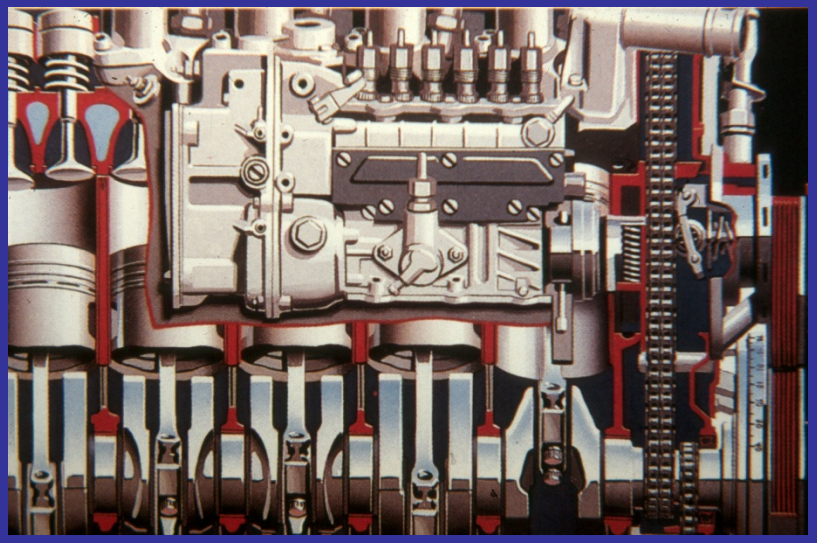
One Trillion living, metabolically active cells
Self-maintaing, Self-repairing System
2 to 8 Million Load cycles/ Year for Decades
Ligaments are Sensate , Adaptive Linkages
Menisci are Mobile, Sensate Bearings

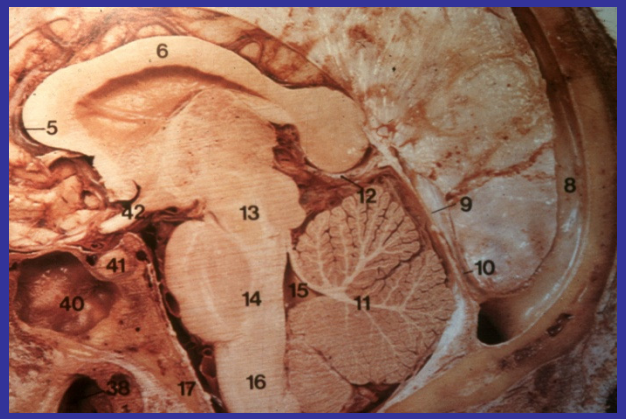




Muscles are Molecular Engines



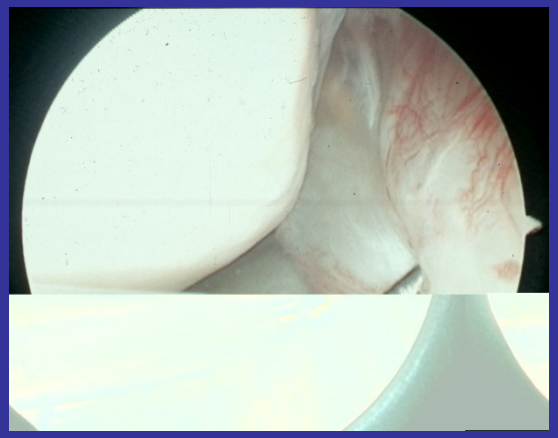




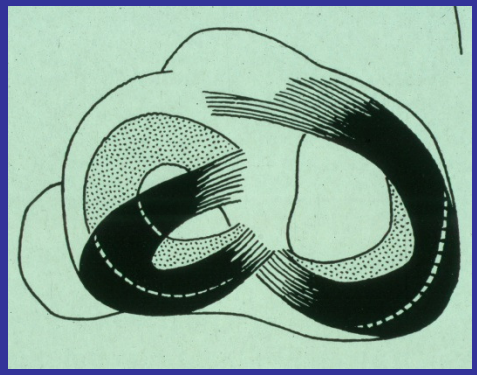
PURPOSE:

To Accept, Transfer and Dissipate Loads Between Femur, Patella, Tibia ,Fibula

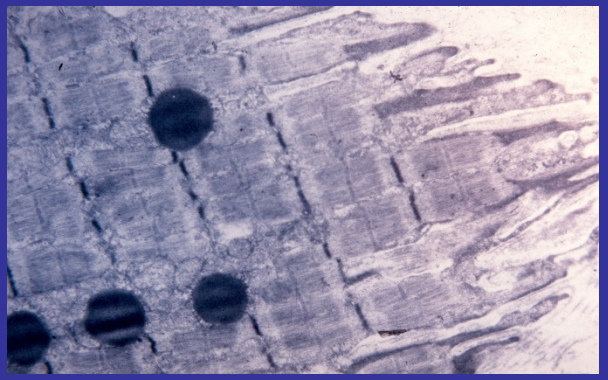
Ligaments = Sensate Linkages



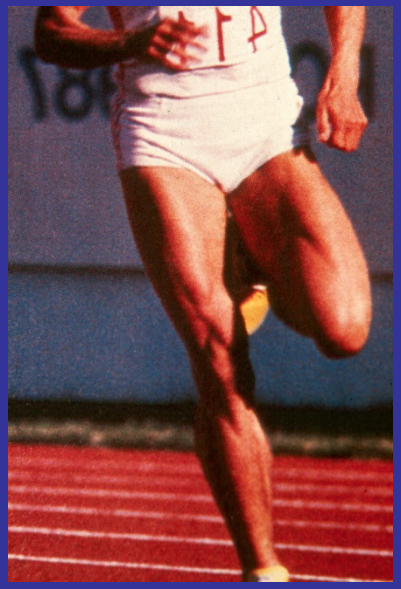
Menisci = Sensate Mobile Bearings



Muscles = Cellular Engines



The PatelloFemoral Joint
Functions as
A Large Slide Bearing
Within the Biologic Transmission







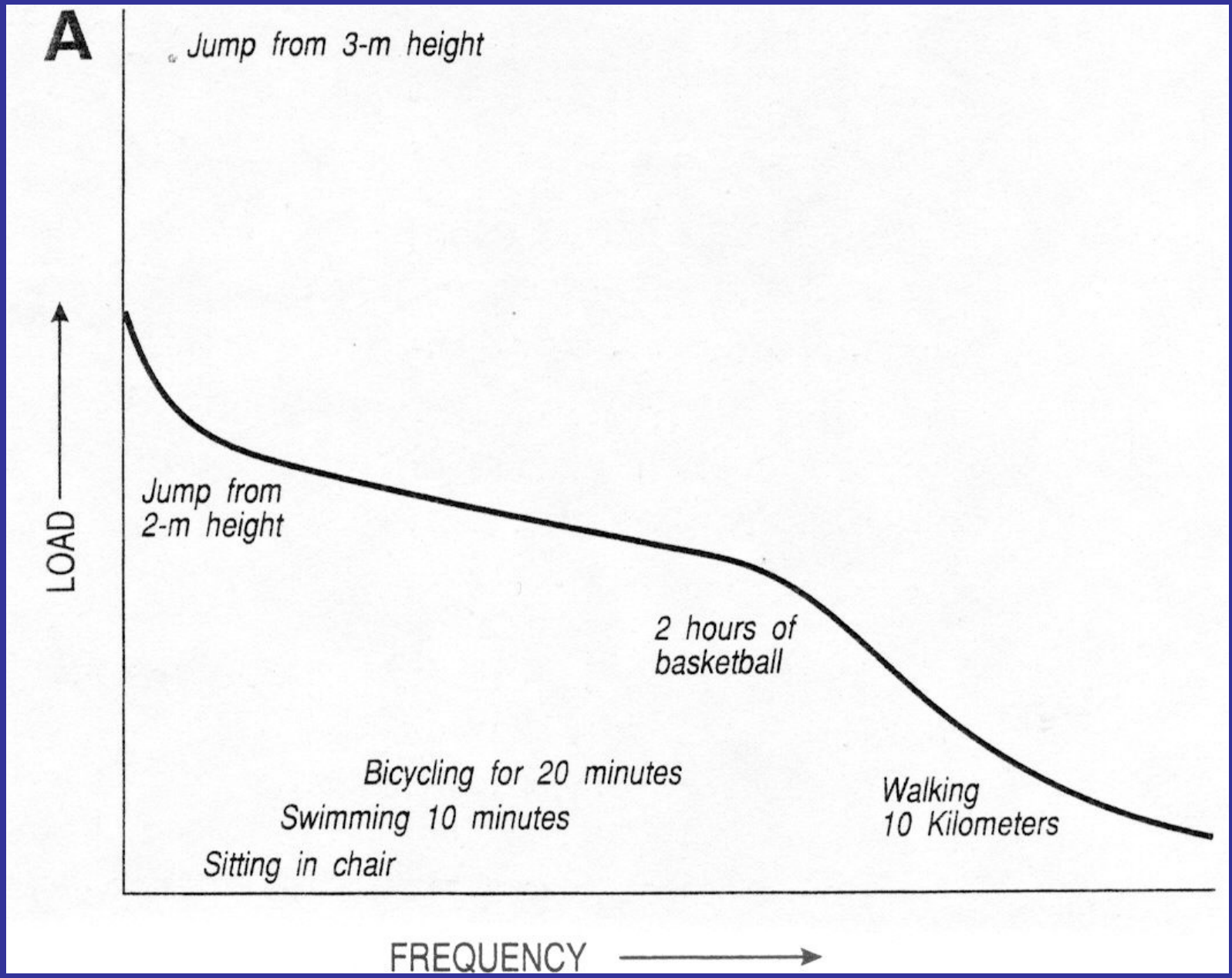
The PatelloFemoral Joint

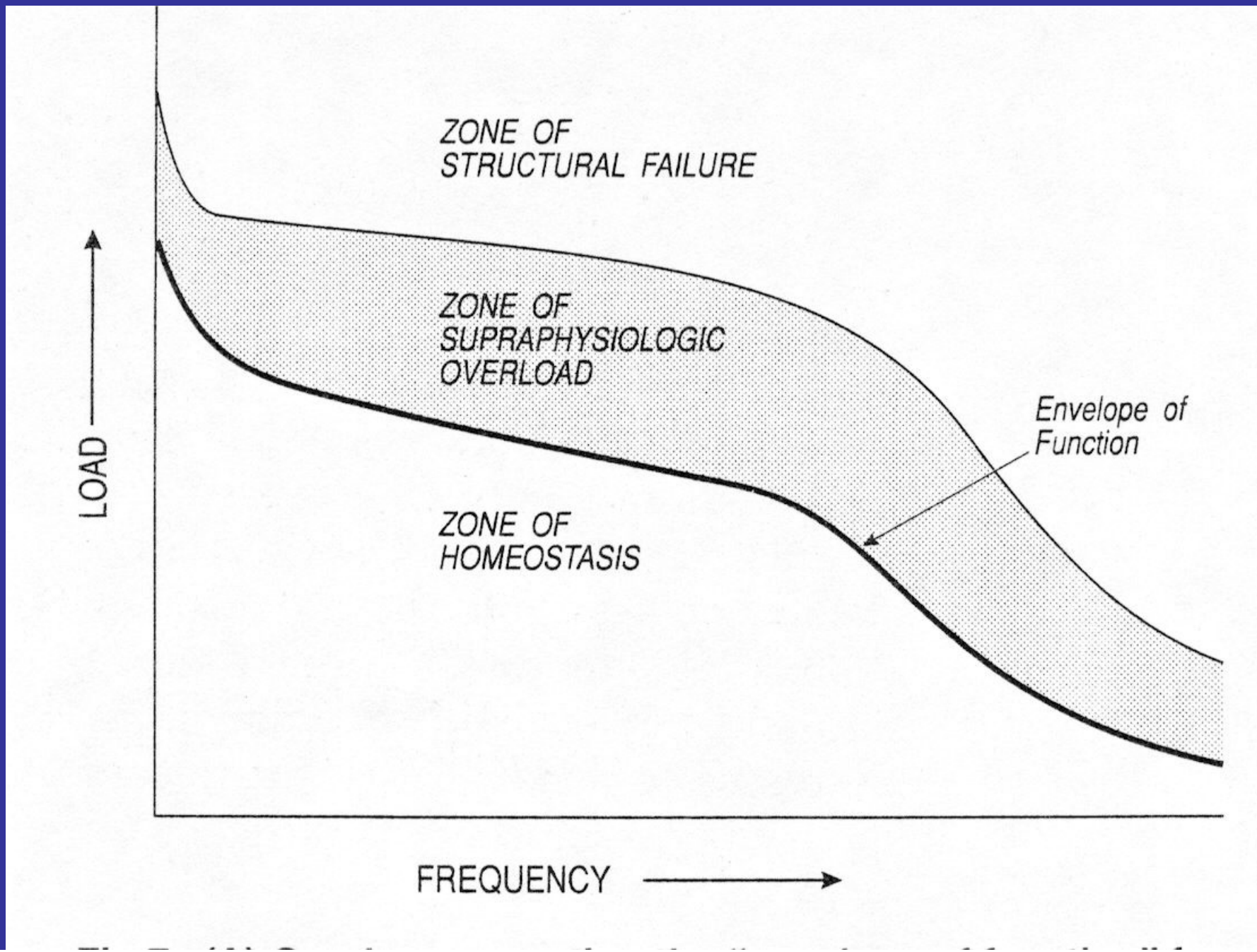
Is Exposed to the Highest Loads of All Human Joints

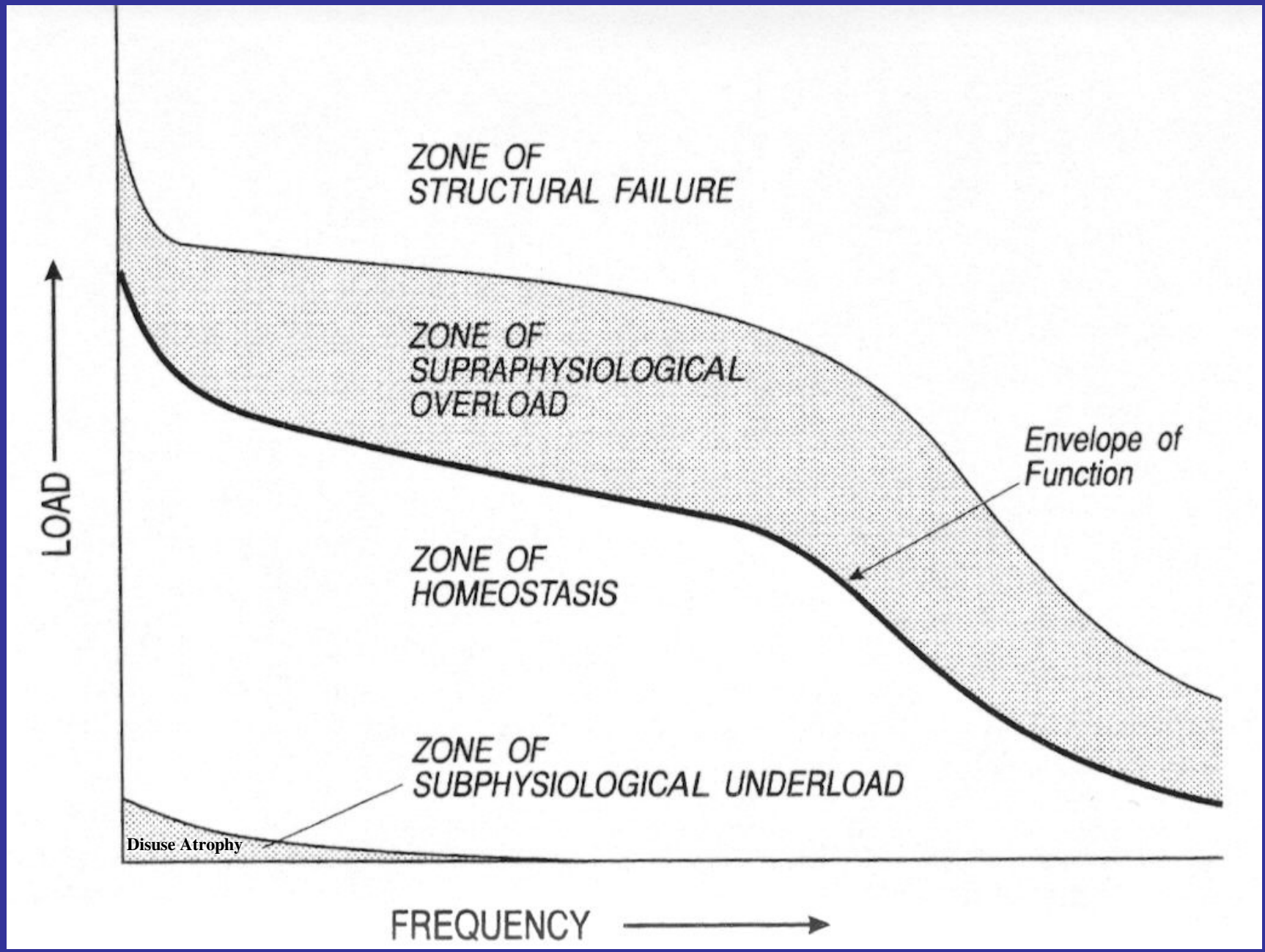
Often Exceeding the Load Acceptance Capacity of Biologic Structures, Leading to Micro failure and Painful Loss of Tissue Homeostasis

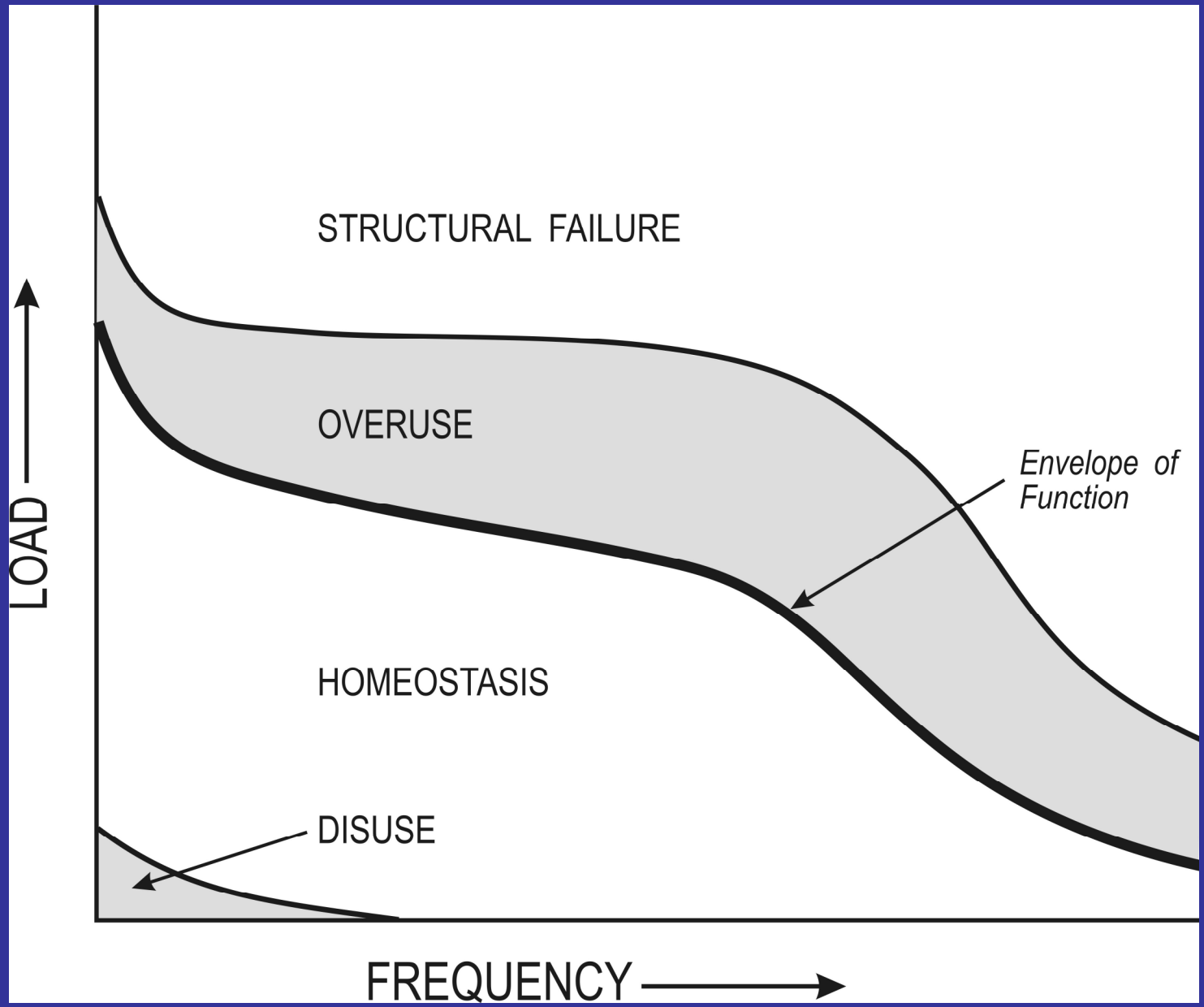
The Envelope of Function

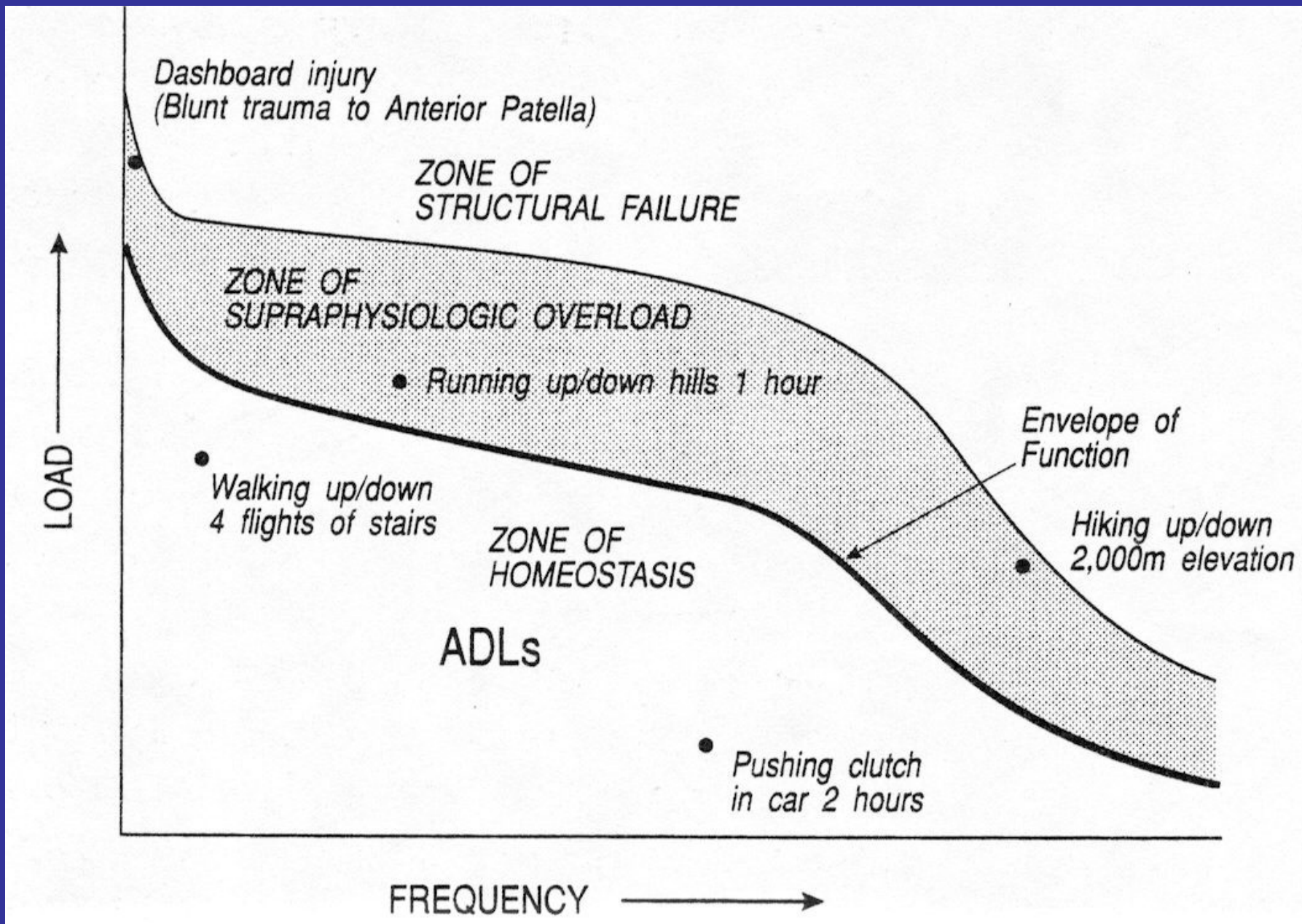
Defines the Capacity of the Knee (any Joint or M/S) To accept a Range of Loads and still Maintain Tissue Homeostasis

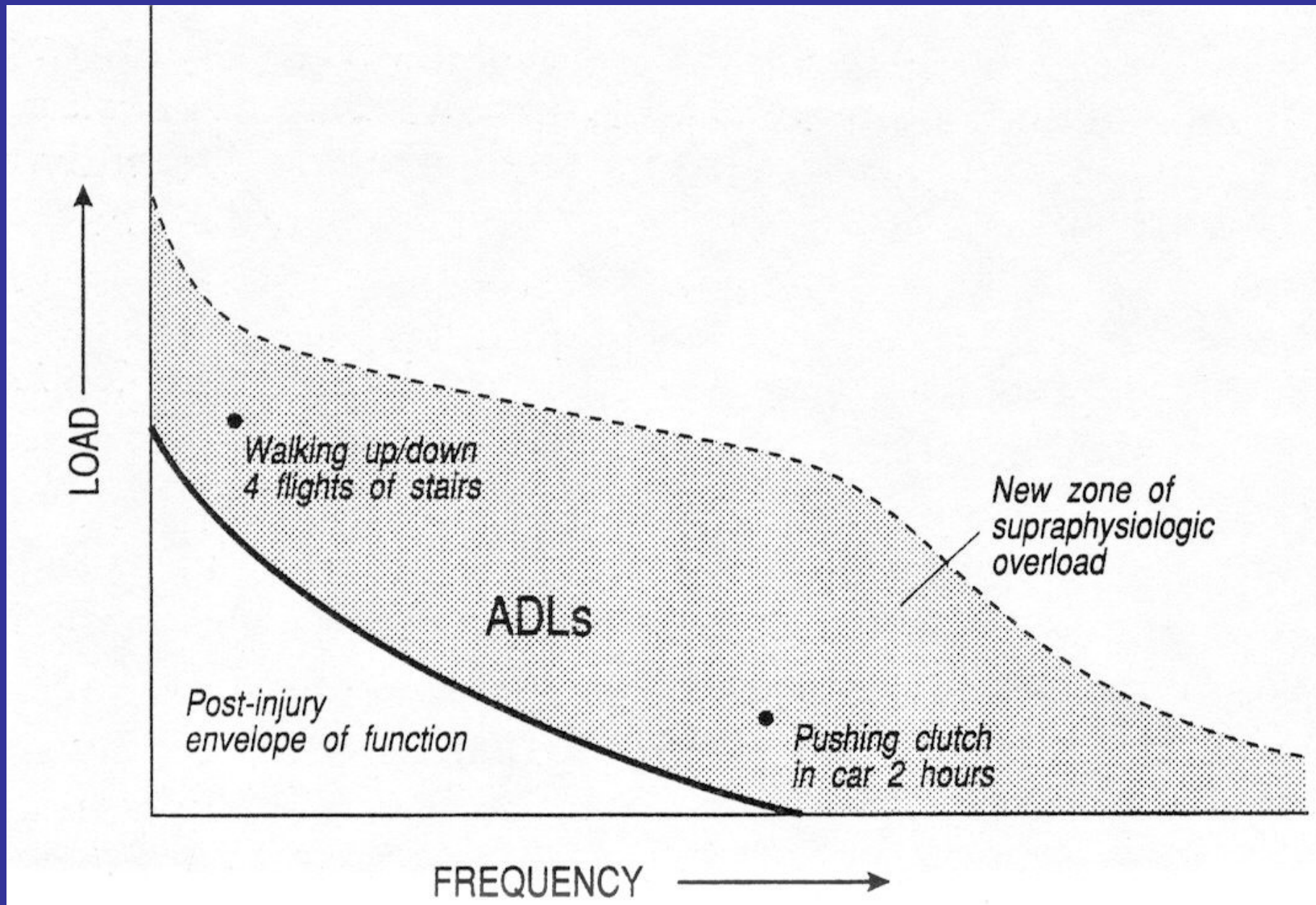

A
Jump from 3-m height
LOAD
Jump from
2-m height
2 hours of
basketball
Bicycling for 20 minutes
Swimming 10 minutes
Sitting in chair
Walking
10 Kilometers
FREQUENCY


ZONE OF
STRUCTURAL FAILURE
ZONE OF
SUPRAPHYSIOLOGIC
OVERLOAD
Envelope of
Function
ZONE OF
HOMEOSTASIS
LOAD
FREQUENCY


ZONE OF
STRUCTURAL FAILURE
ZONE OF
SUPRAPHYSIOLOGICAL
OVERLOAD
Envelope of
Function
ZONE OF
HOMEOSTASIS
ZONE OF
SUBPHYSIOLOGICAL UNDERLOAD
Disuse Atrophy
LOAD
FREQUENCY

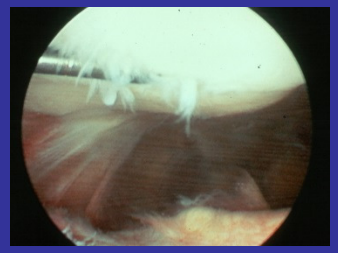

STRUCTURAL FAILURE
OVERUSE
Envelope of Function
HOMEOSTASIS
DISUSE
LOAD
FREQUENCY


Dashboard injury
(Blunt trauma to Anterior Patella)
ZONE OF
STRUCTURAL FAILURE
ZONE OF
SUPRAPHYSIOLOGIC OVERLOAD
Running up/down hills 1 hour
Envelope of
Function
Walking up/down
4 flights of stairs
ZONE OF
HOMEOSTASIS
Hiking up/down
2,000m elevation
ADLs
Pushing clutch
in car 2 hours
LOAD
FREQUENCY

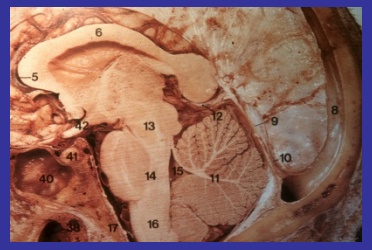

LOAD
Walking up/down
4 flights of stairs
New zone of
supraphysiologic
overload
ADLs
Post-injury
envelope of function
Pushing clutch
in car 2 hours
FREQUENCY

FACTORS Determining the Envelope

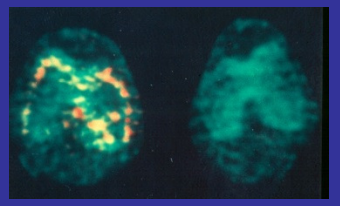
Anatomic/Structural



Kinematic/Neuromuscular



Metabolic/Physiologic



PET Scan Fl $_{18}$





CORR 1996

Goal of Treatment:

Maximize the Envelope of Function

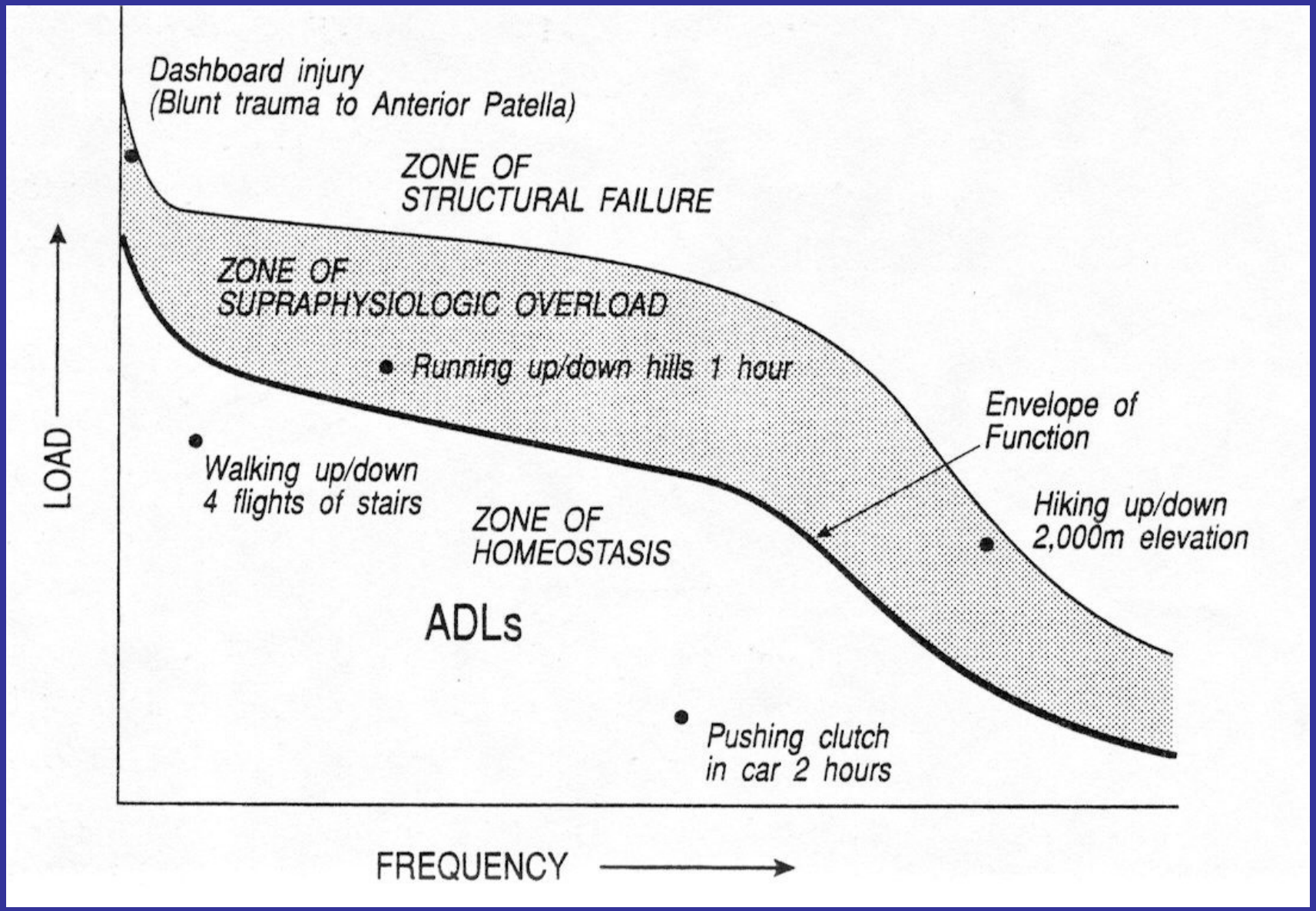
As Safely and Predictably As Possible

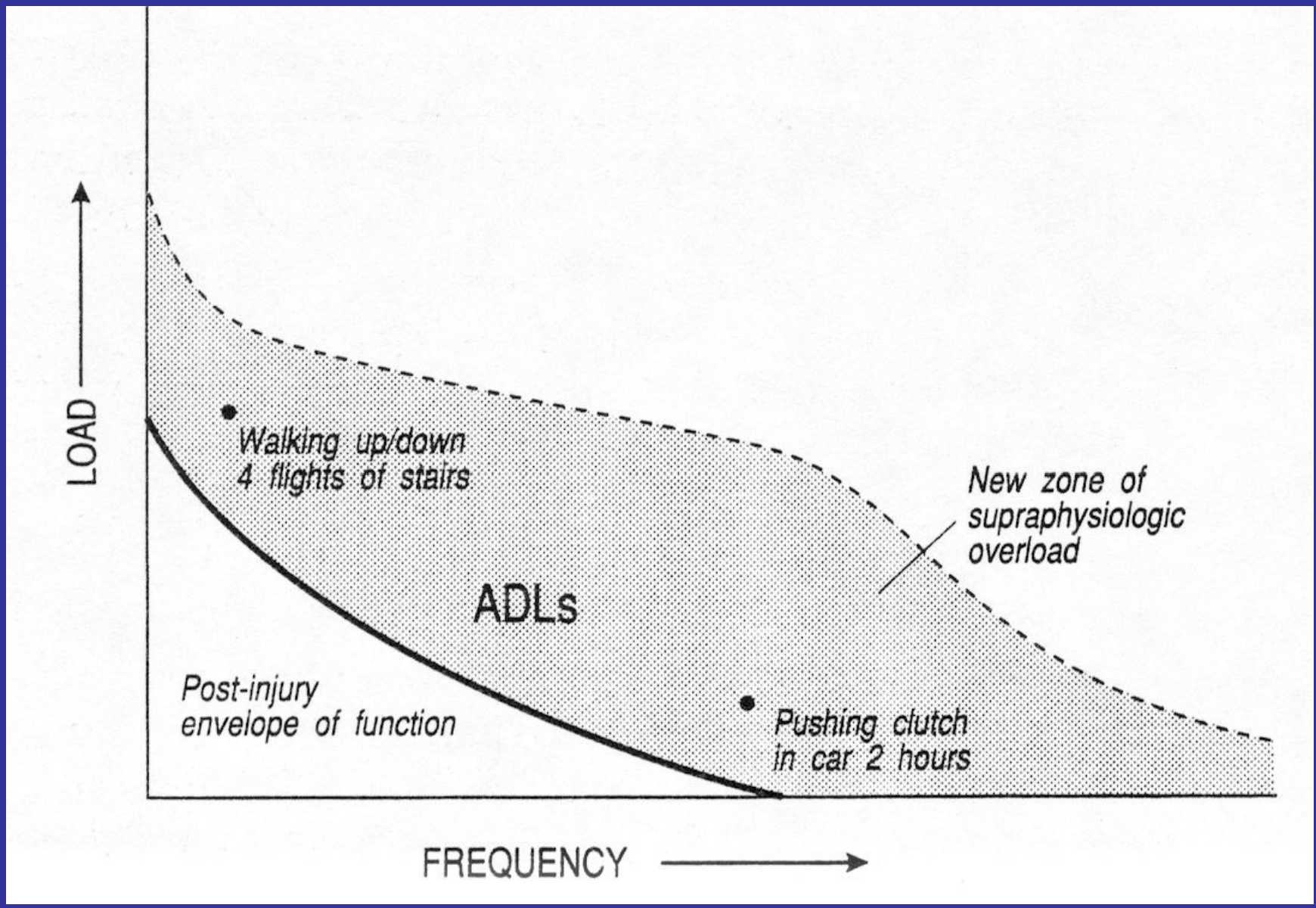
PRIMUM NON NOCERE!

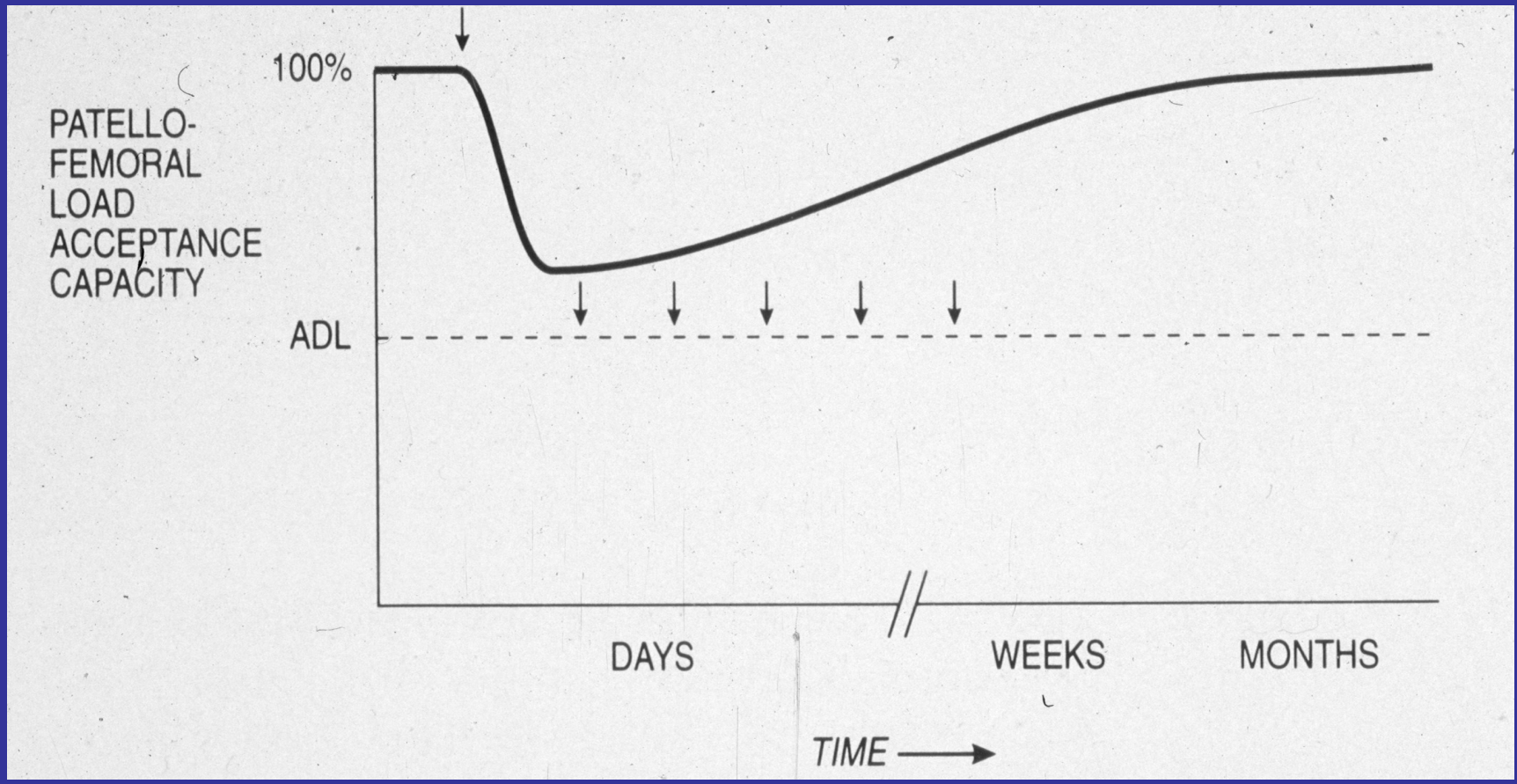
I Decrease Loading to within the current Envelope of Function

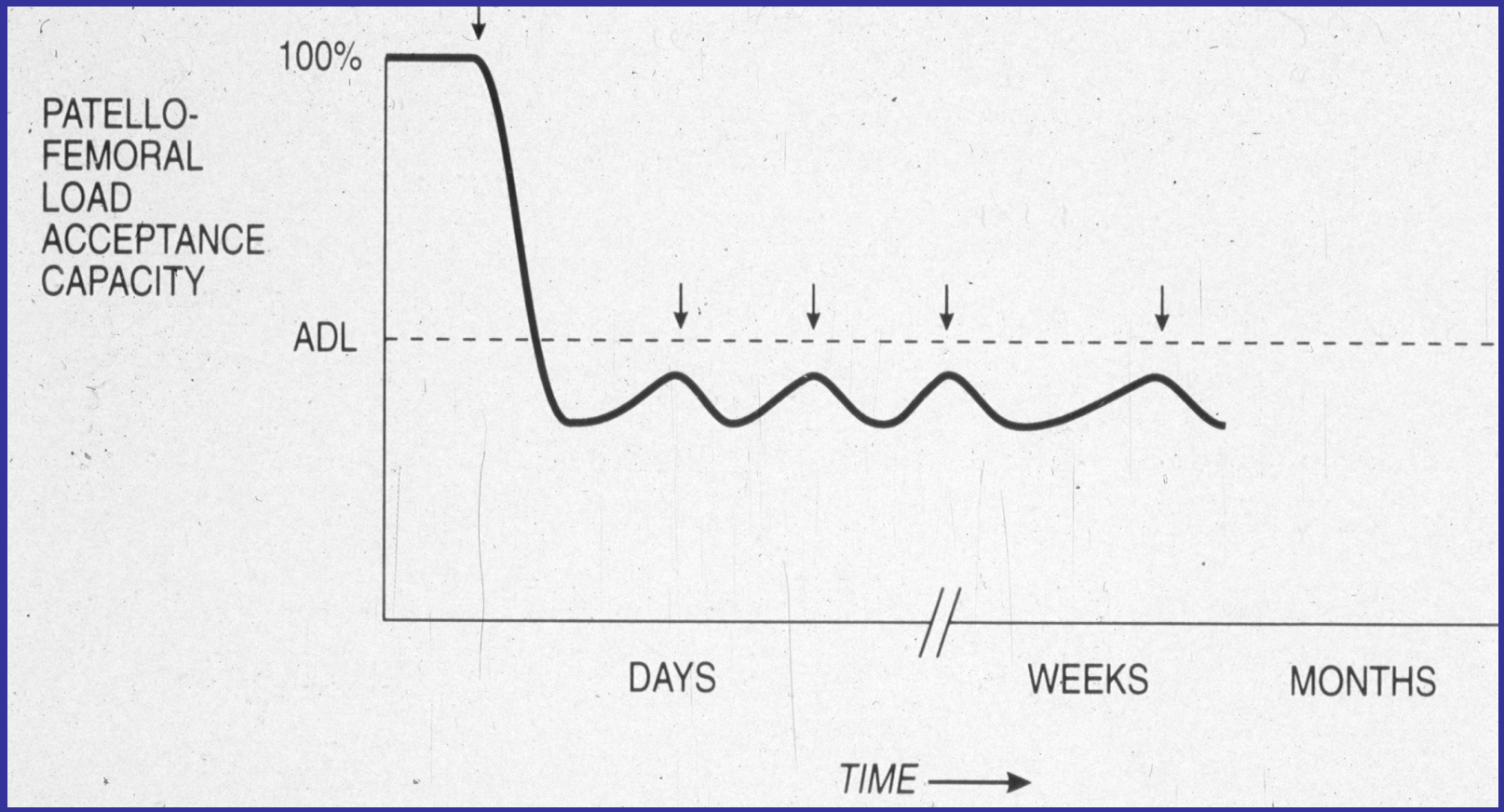
II An Anti-inflammatory program

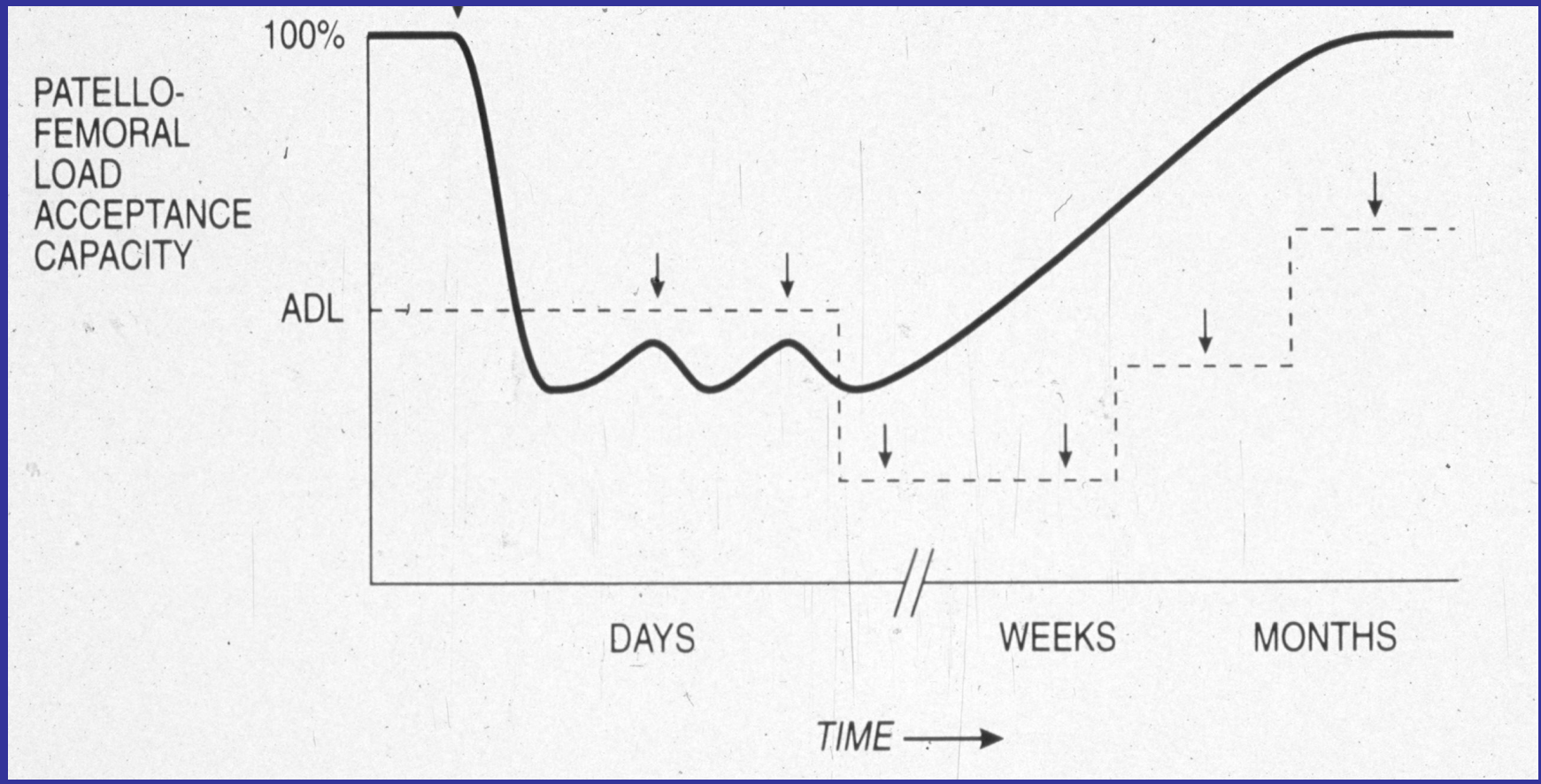
III Rehabilitation

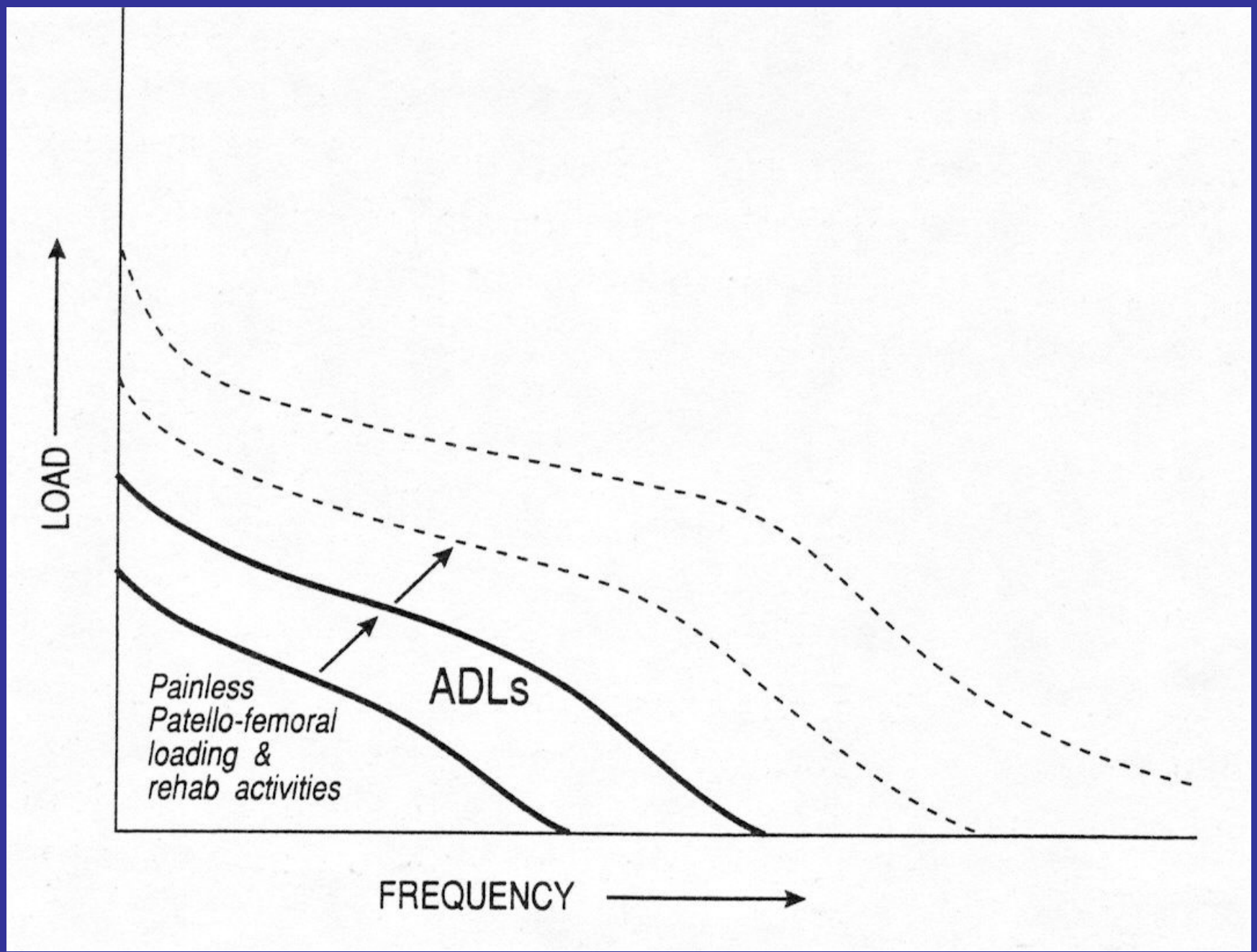

Dashboard injury
(Blunt trauma to Anterior Patella)
ZONE OF
STRUCTURAL FAILURE
ZONE OF
SUPRAPHYSIOLOGIC OVERLOAD
Running up/down hills 1 hour
Envelope of
Function
Walking up/down
4 flights of stairs
ZONE OF
HOMEOSTASIS
Hiking up/down
2,000m elevation
ADLs
Pushing clutch
in car 2 hours
LOAD
FREQUENCY


LOAD
Walking up/down
4 flights of stairs
New zone of
supraphysiologic
overload
ADLs
Post-injury
envelope of function
Pushing clutch
in car 2 hours
FREQUENCY


100%
PATELLO-
FEMORAL
LOAD
ACCEPTANCE
CAPACITY
ADL
DAYS
WEEKS
MONTHS
TIME

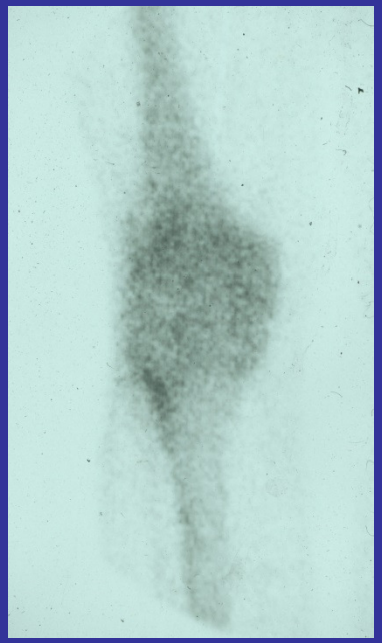

100%
PATELLO-
FEMORAL
LOAD
ACCEPTANCE
CAPACITY
ADL
DAYS
WEEKS
MONTHS
TIME


100%
PATELLO-
FEMORAL
LOAD
ACCEPTANCE
CAPACITY
ADL
DAYS
WEEKS
MONTHS
TIME


LOAD
Painless
Patello-femoral
loading &
rehab activities
ADLs
FREQUENCY

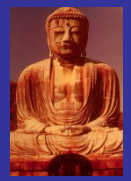
Healing is a Rate-Limited Process!





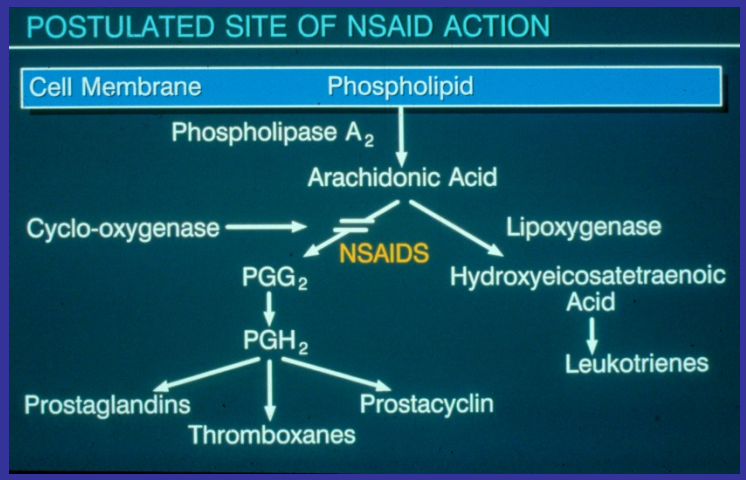


Patience is a Virtue

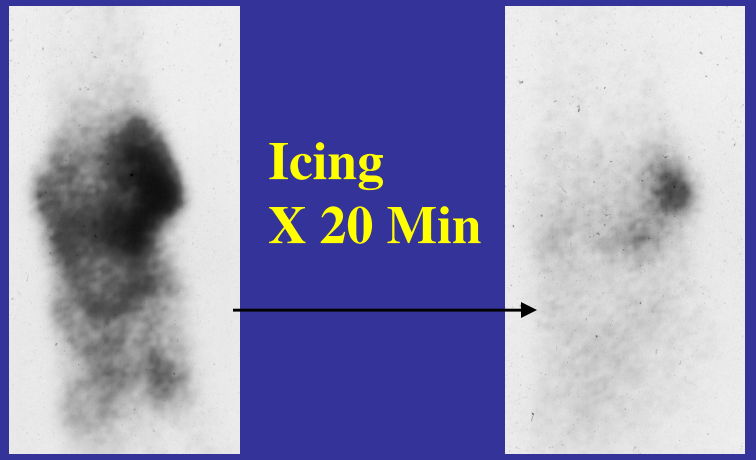


An Anti-inflammatory Program

NSAIDs
Physicians' Choice
(Kenalog Injection)



Tissue cooling,
Icing



Ankle Bone Scan
Pre- icing

Ankle Bone Scan
Post- icing

Rehabilitation

Painless Muscle Strengthening,
Stretching,
Increase in ROM, Proprioception

Within the
Envelope of Function!

No Pain

No Gain! ?



NO!

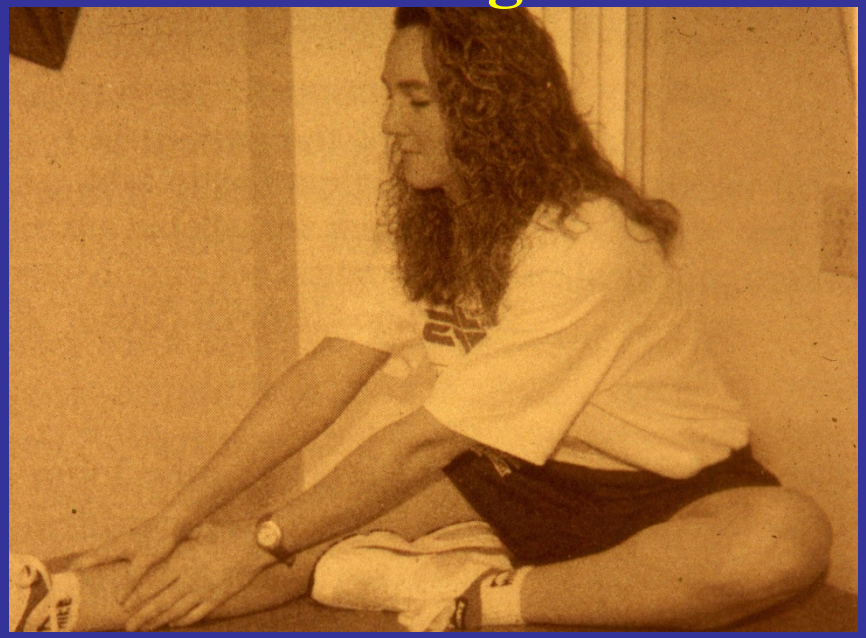


Lunges

Any activity that increases P/F Pain Must be Avoided

Pain = Loading out of the Envelope!

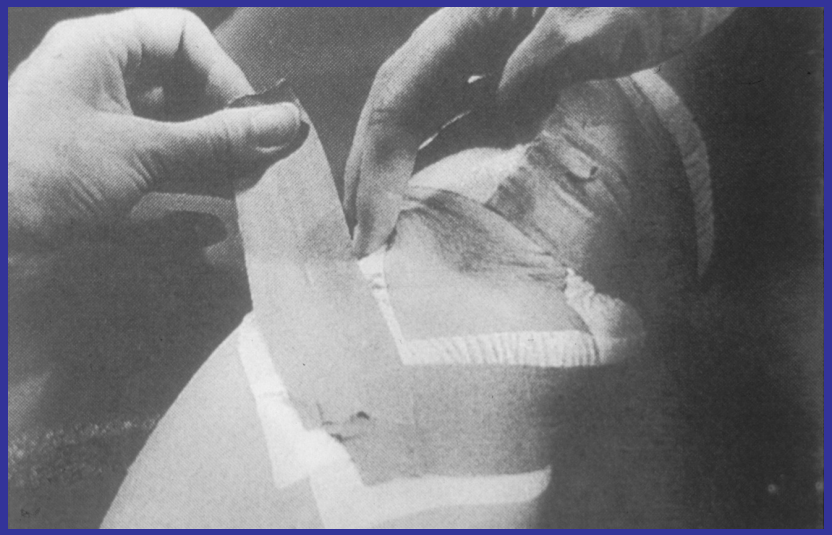
Stretching





YES !

McConnell Taping




NIKE



The Patellofemoral Joint is UNFORGIVING!

Of Aggressive or Ill considered Surgical Intervention







The Knee is a High Value Asset!

We Should NOT Risk Its Destruction



The Worst Cases

Of Patellofemoral Pain

Are Iatrogenic!



5 Operations

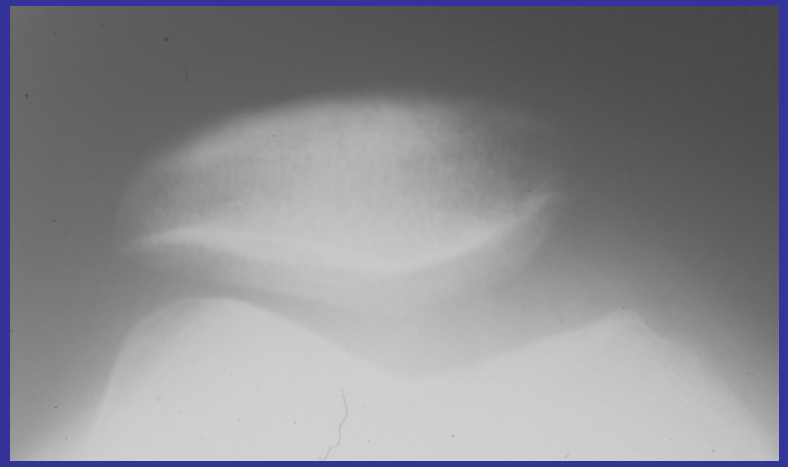


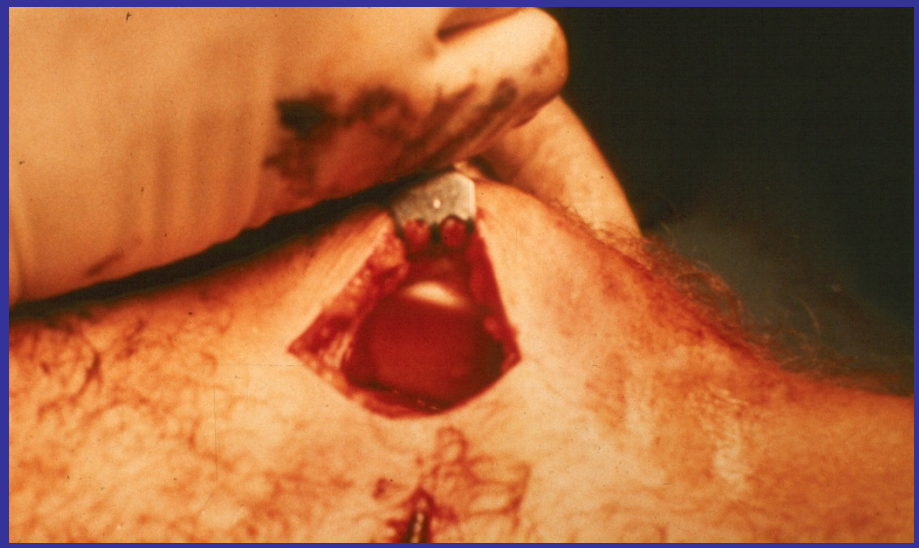
7 Operations

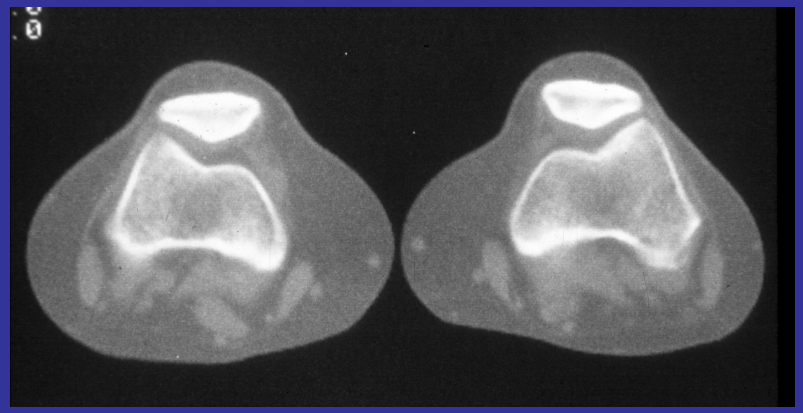


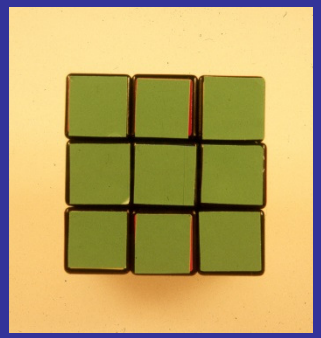
9 Operations

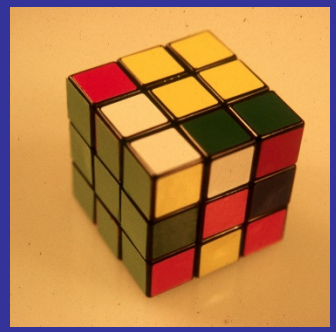
Lateral Retinacular Release



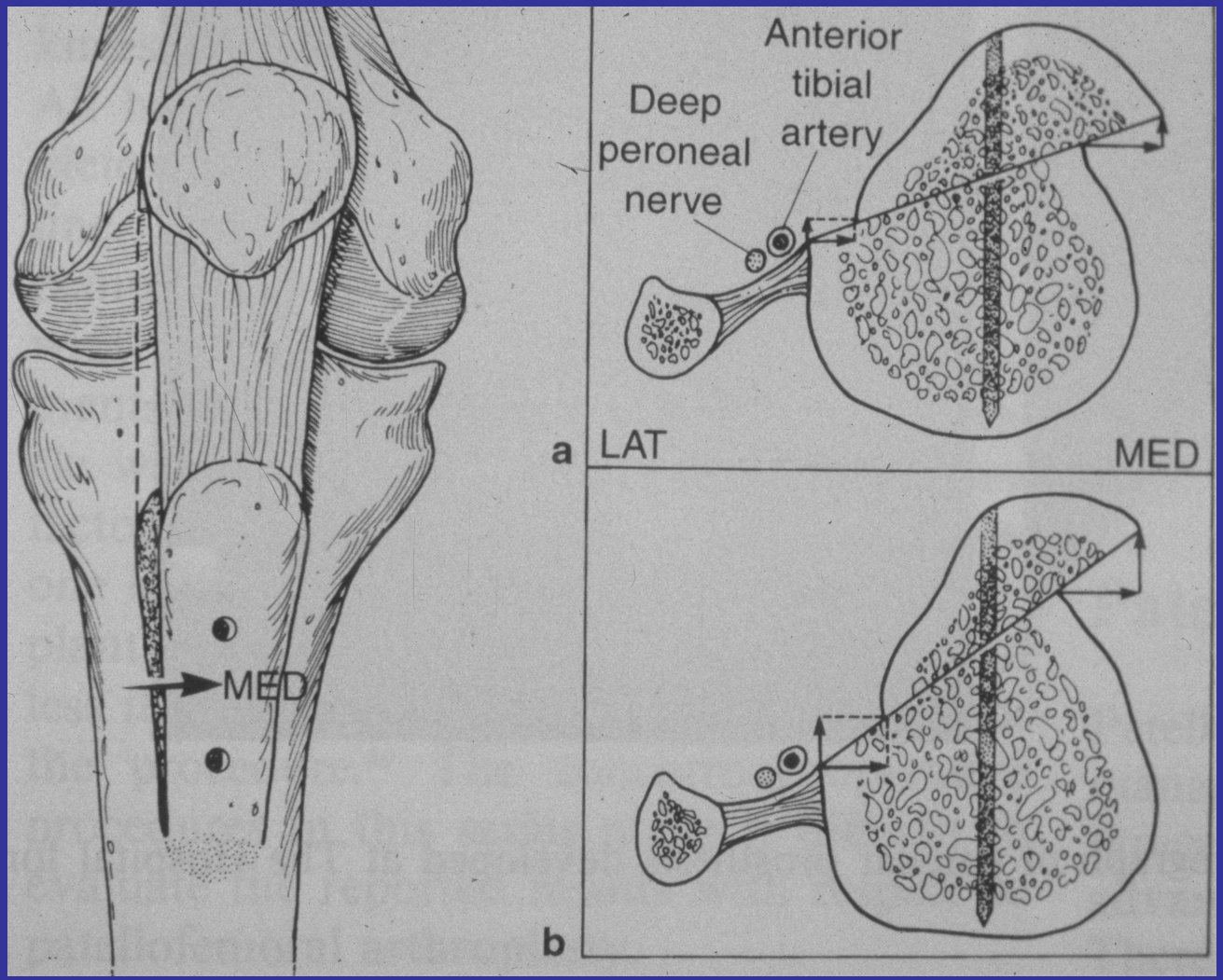




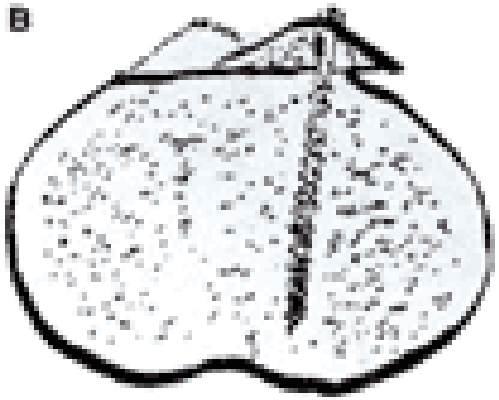




Fulkerson Osteotomy



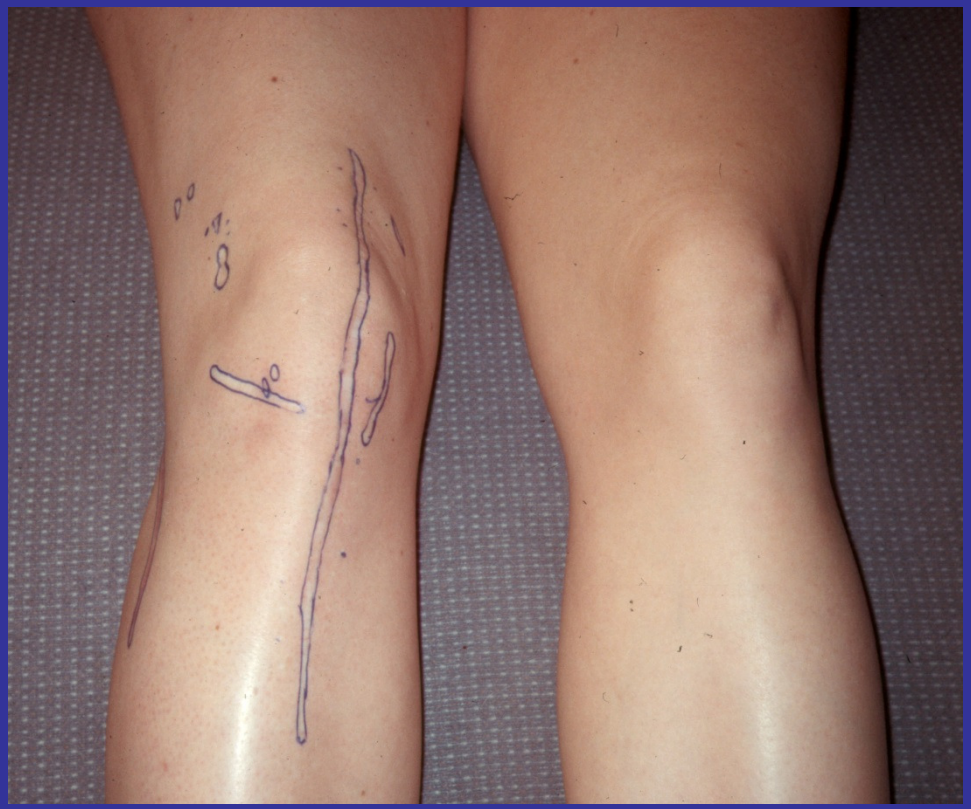




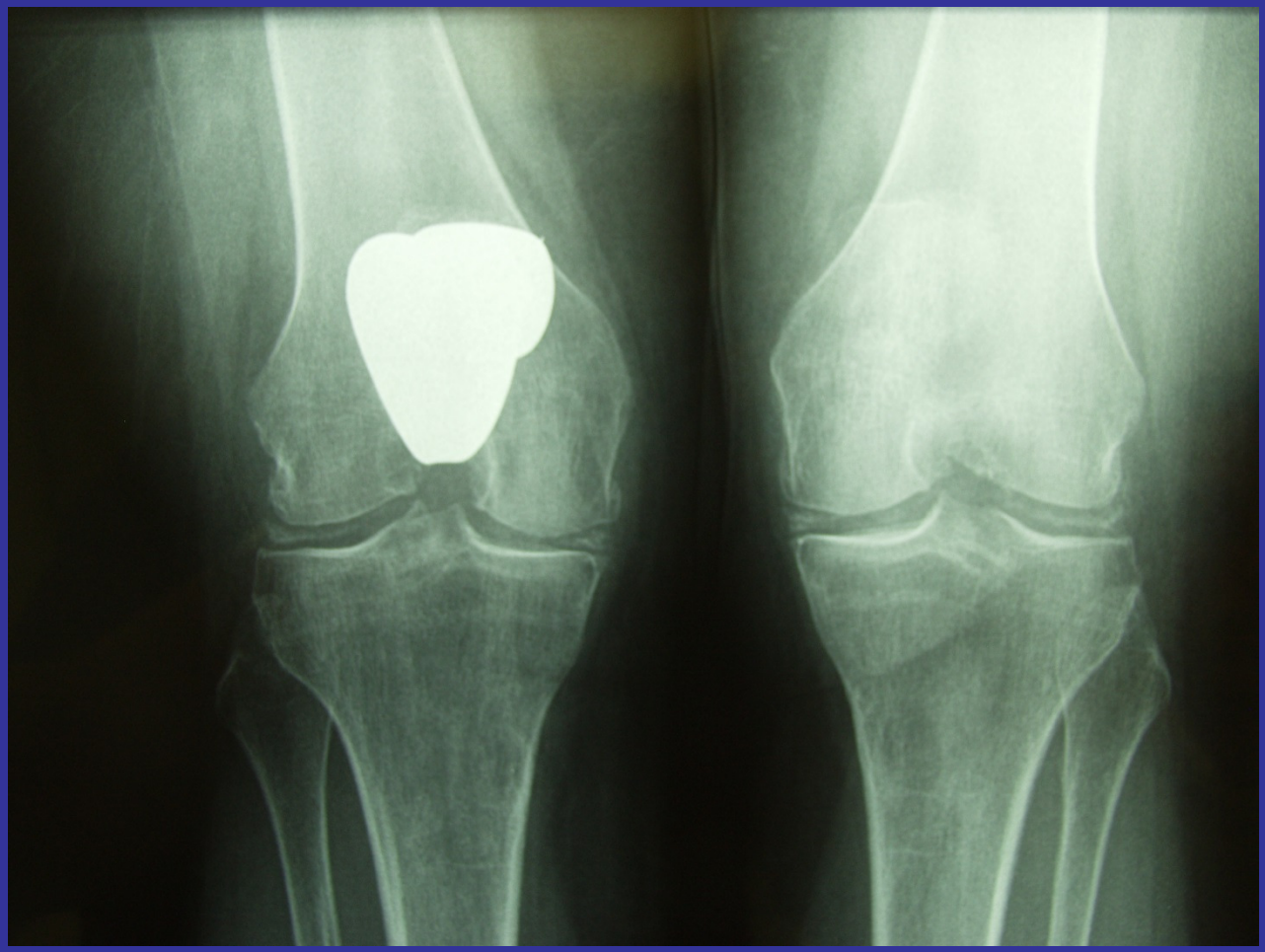
Elmslie-Trillat

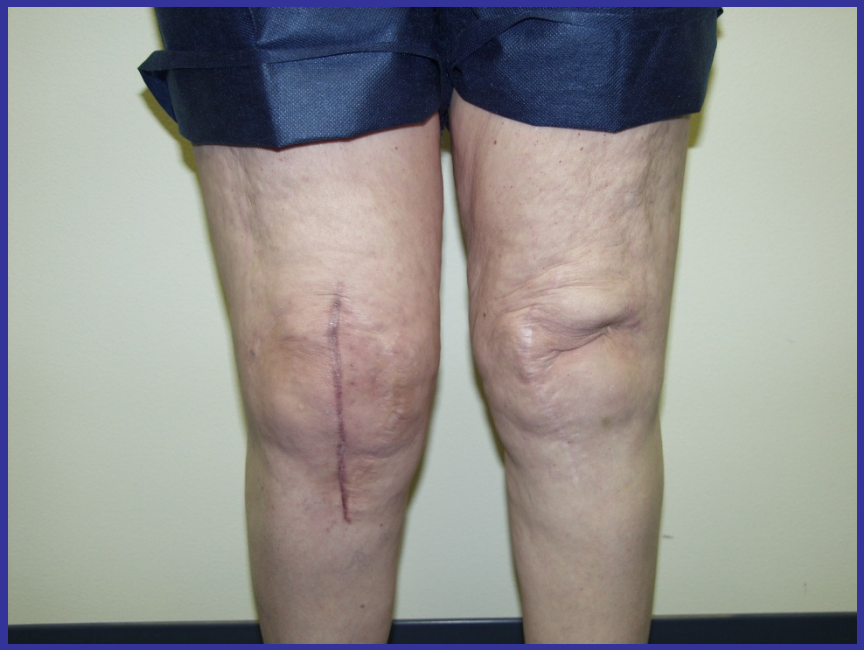
Chondroplasties

Autologous Chondrocyte Transplantation

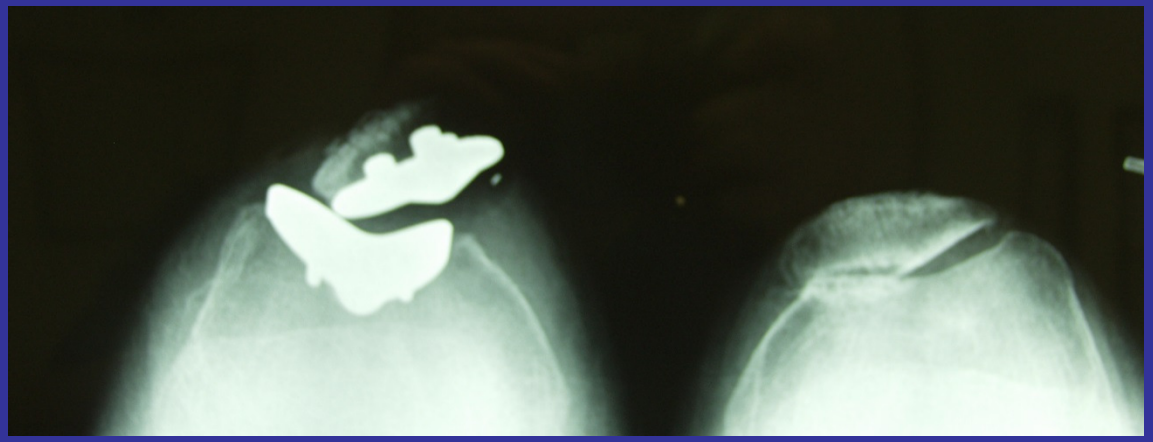


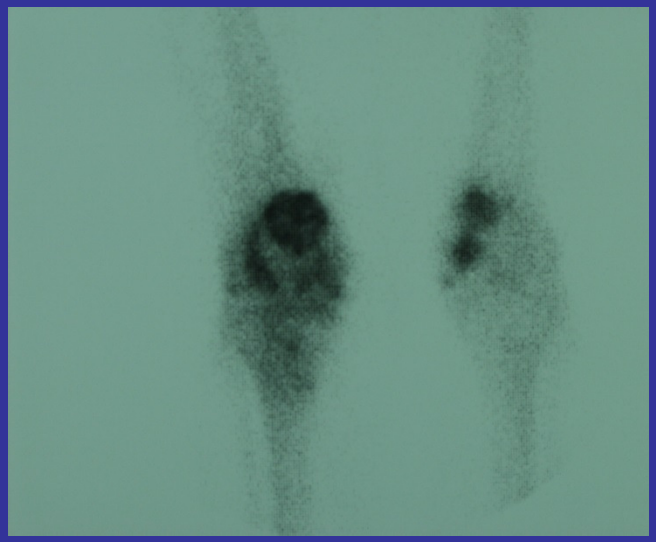
Patellofemoral Replacement

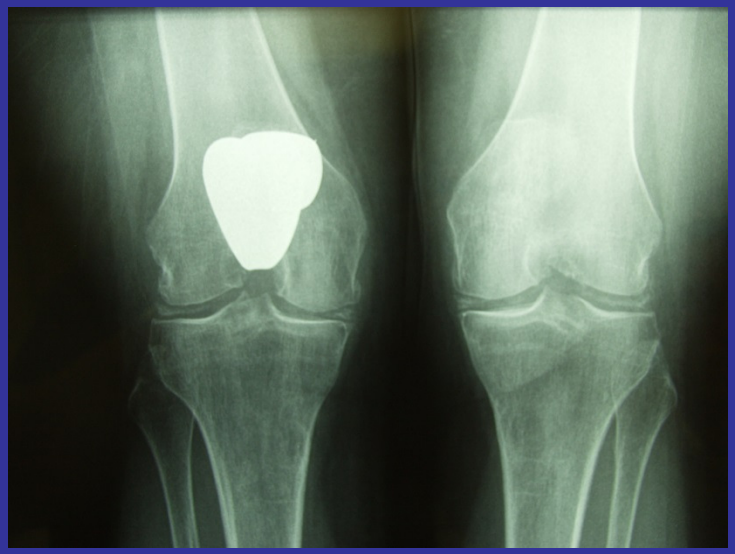






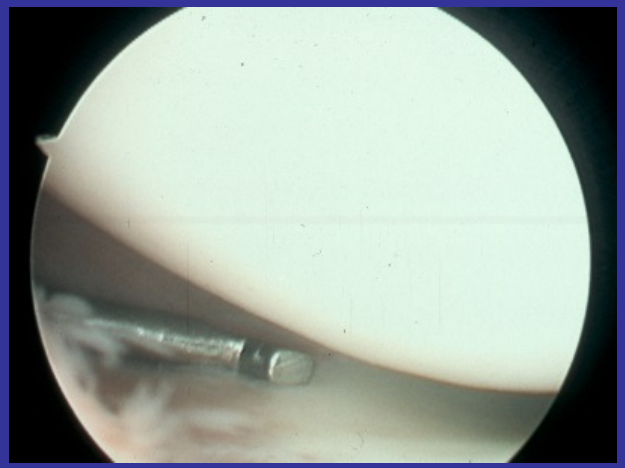


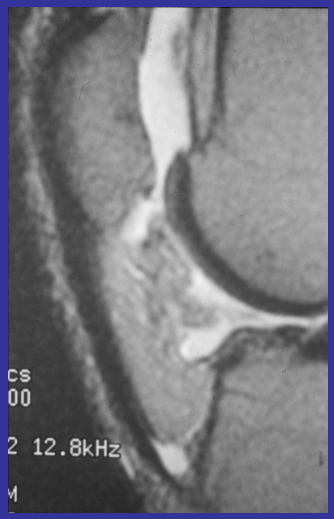




Patellar Instability

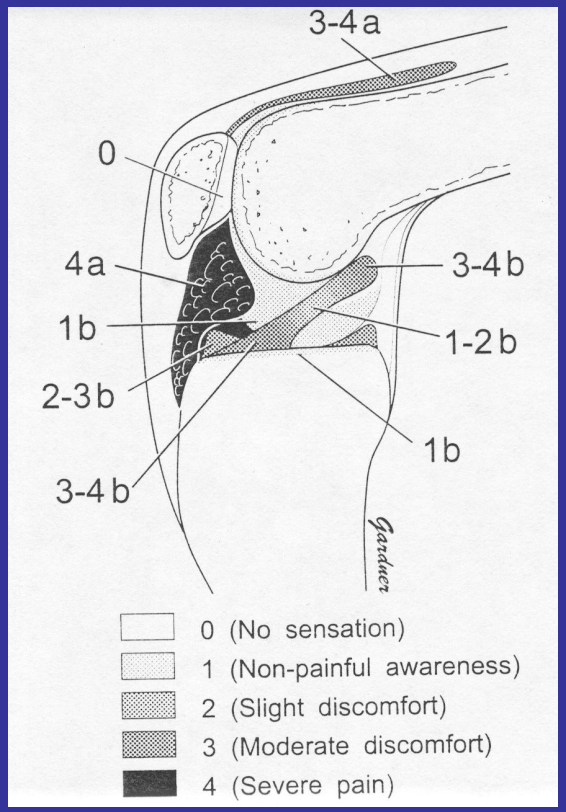
Very Often Due To Reflex Inhibition Of the Quadriceps 2nd To Synovial Impingement (Mis-Interpreted as Mal-tracking)

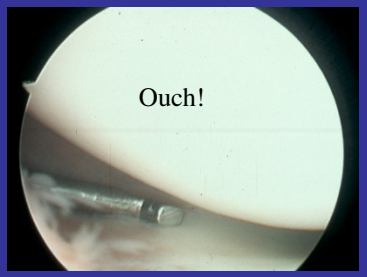


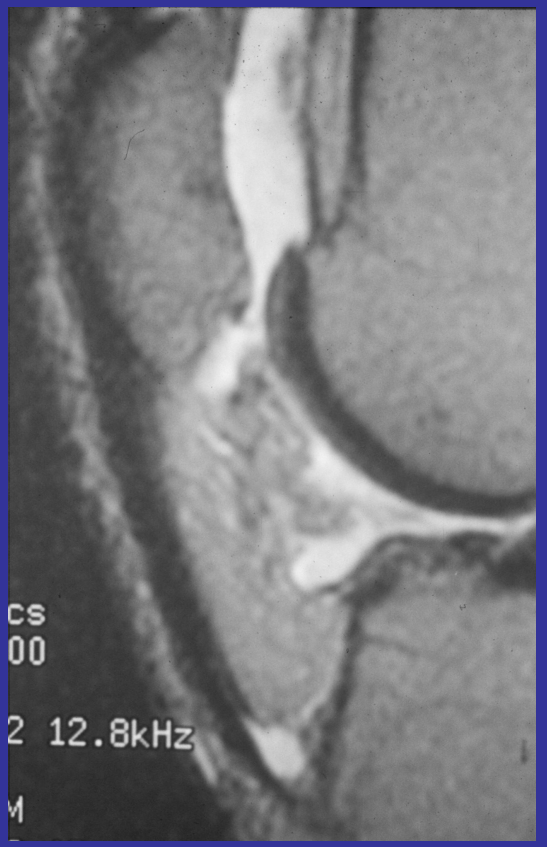


Rationale for PeriPatellar Synovectomy

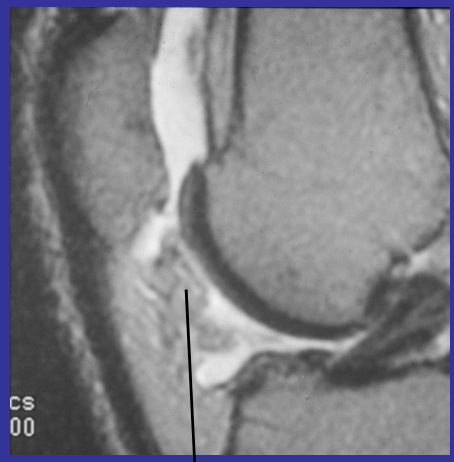


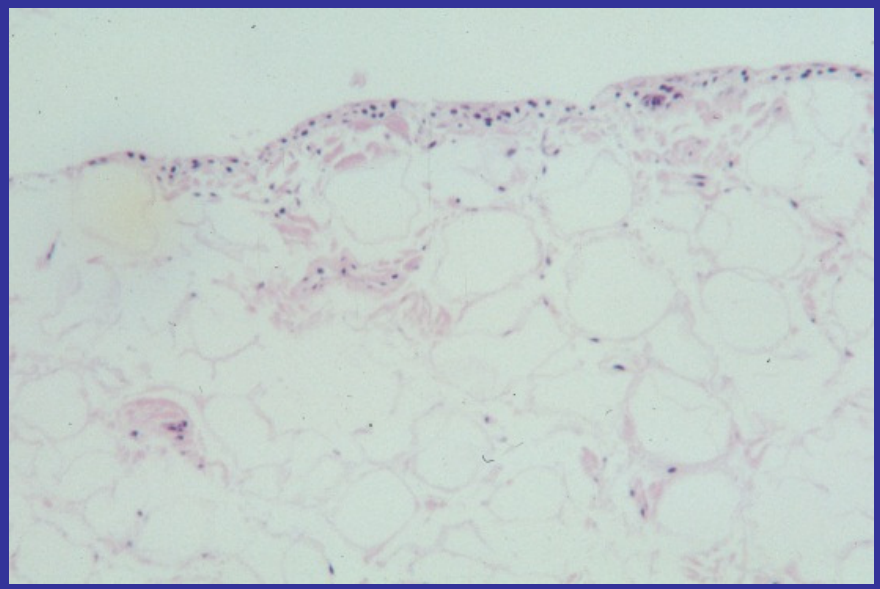


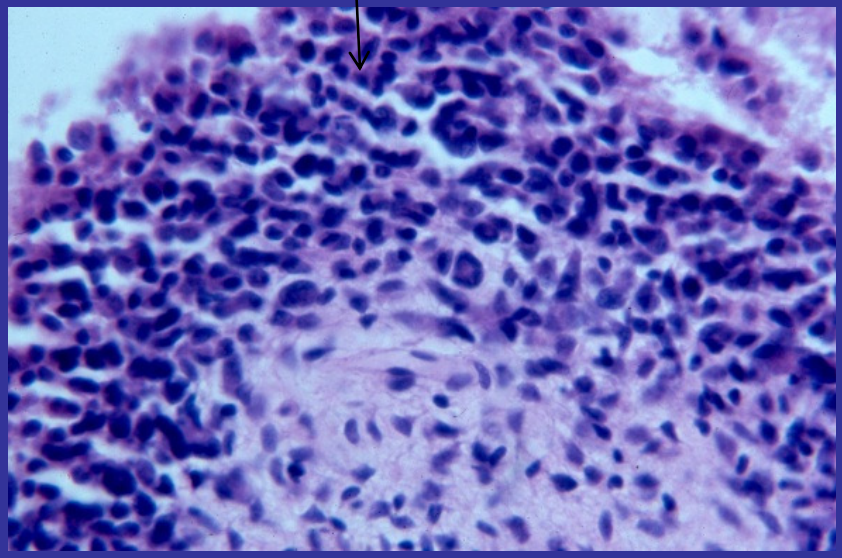




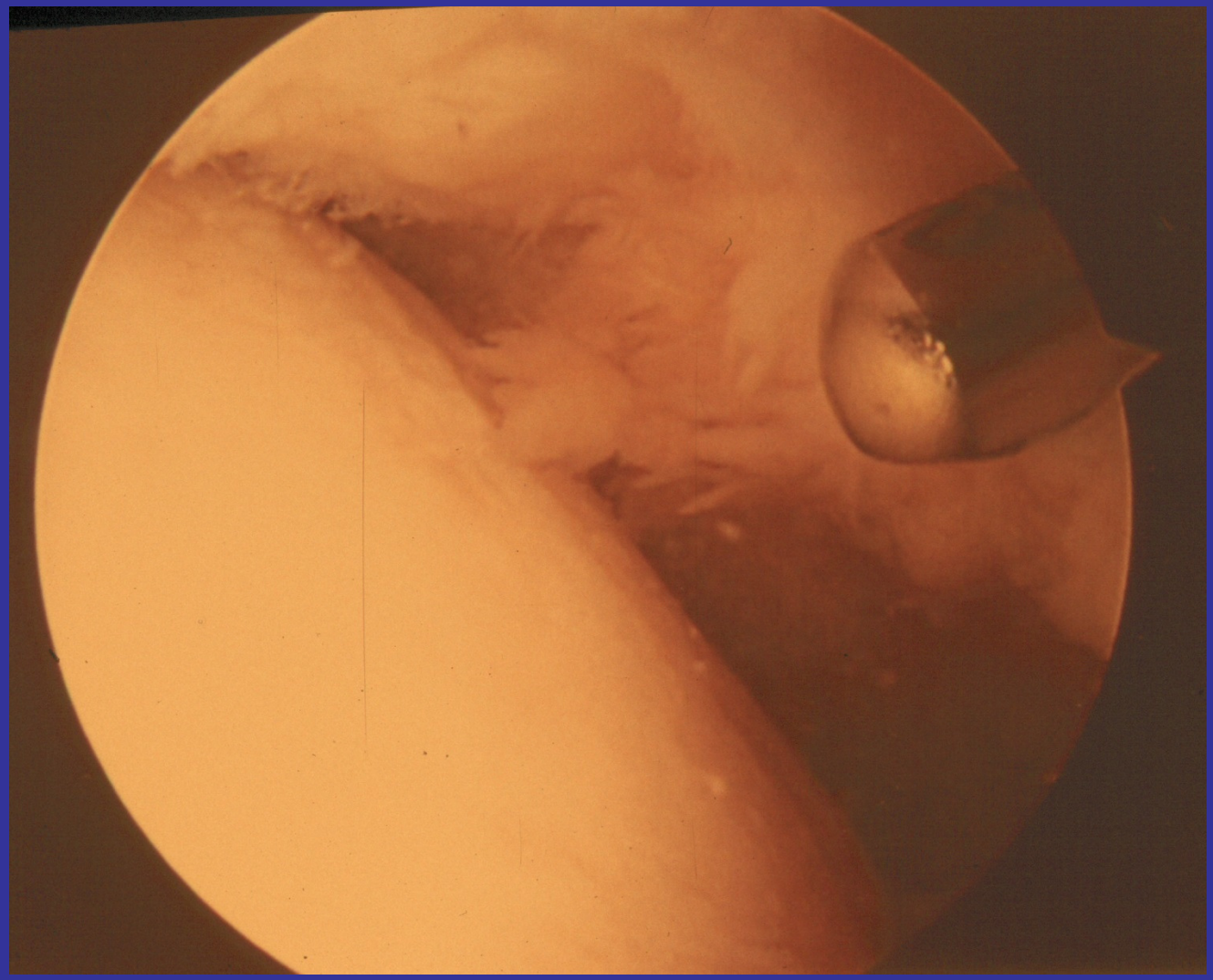
Synovitis
Synovial Impingment



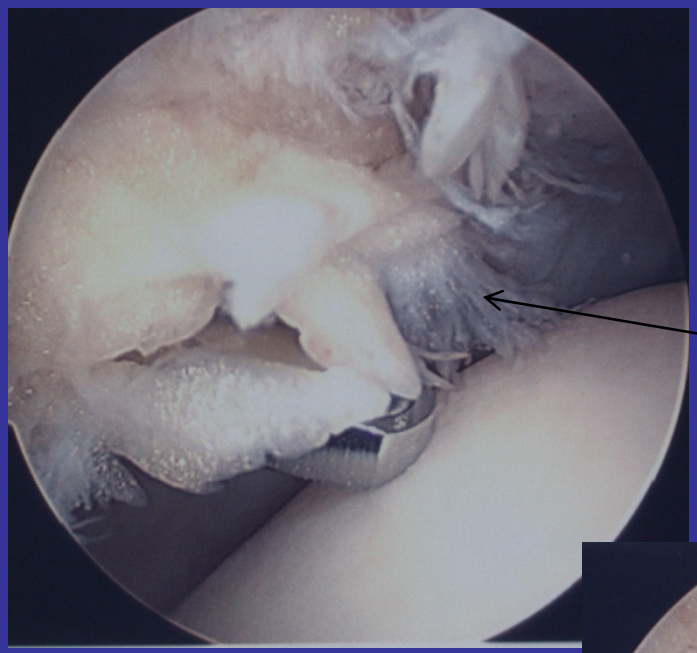




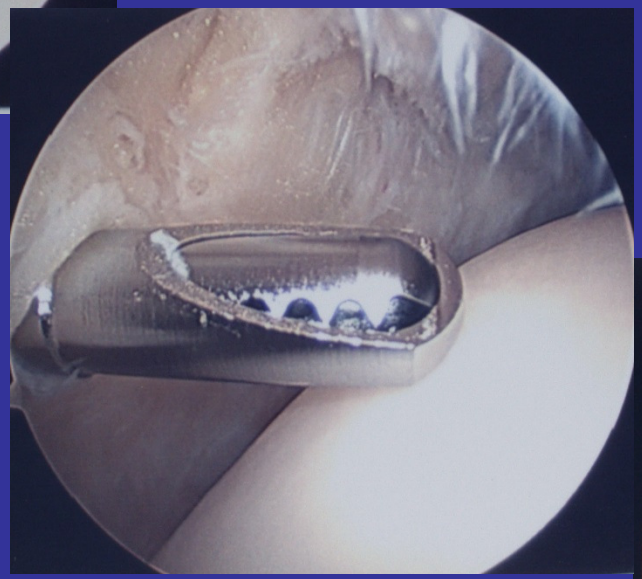
Patellofemoral Synovectomy



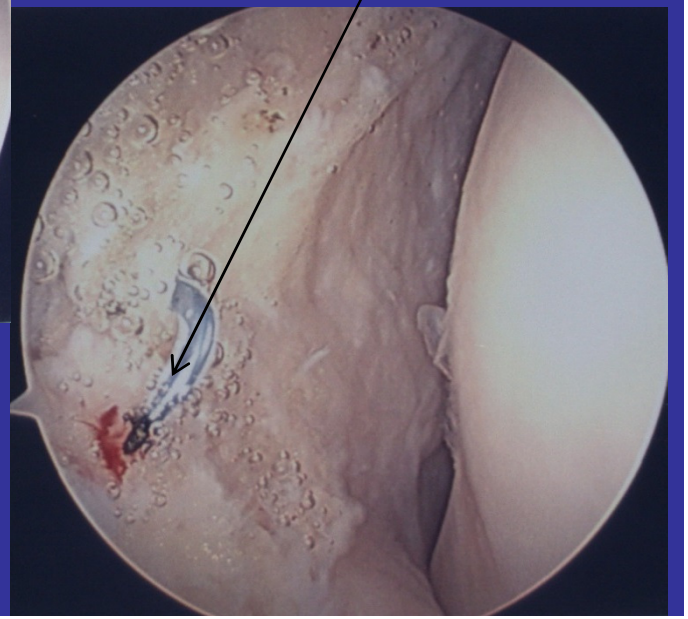
Typical Synovectomy



Plenty of Nerves Here



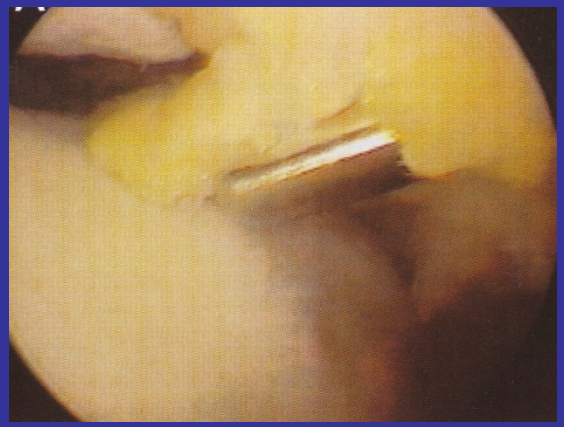
Meticulous Haemostasis

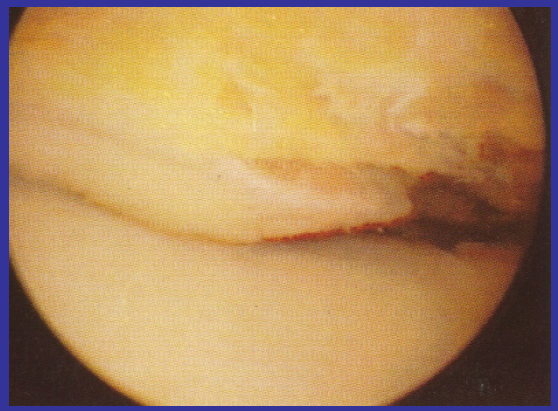


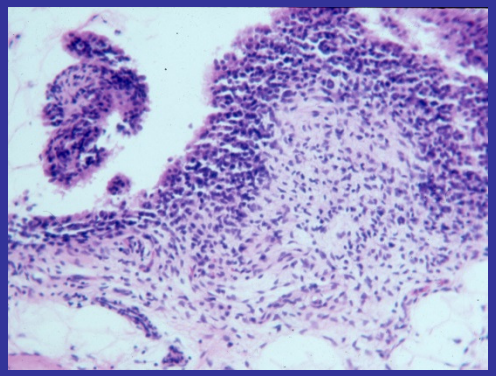
Gentle,
Low-Energy,
Conservative.

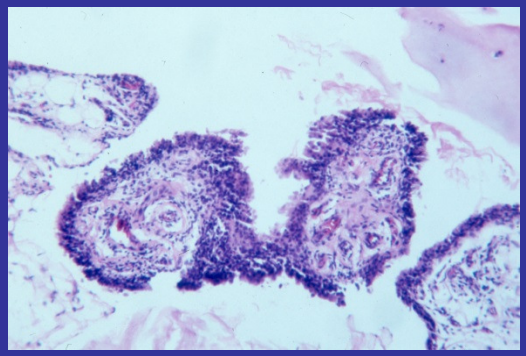
Pre and Post-Operative
Management Critical

Patellofemoral Synovectomy

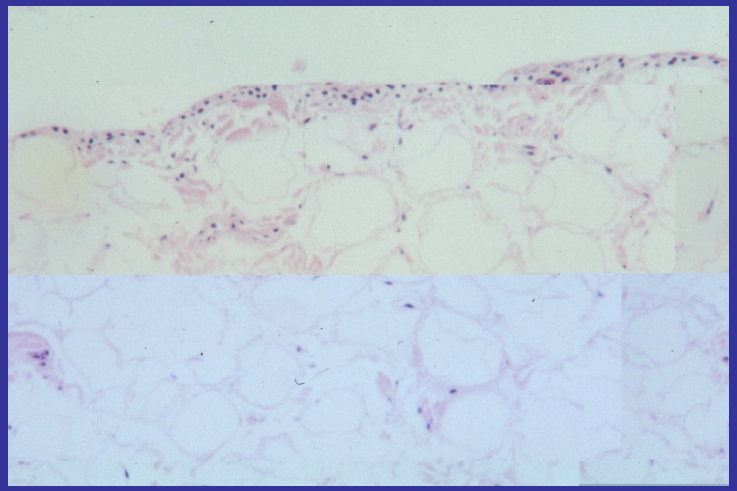




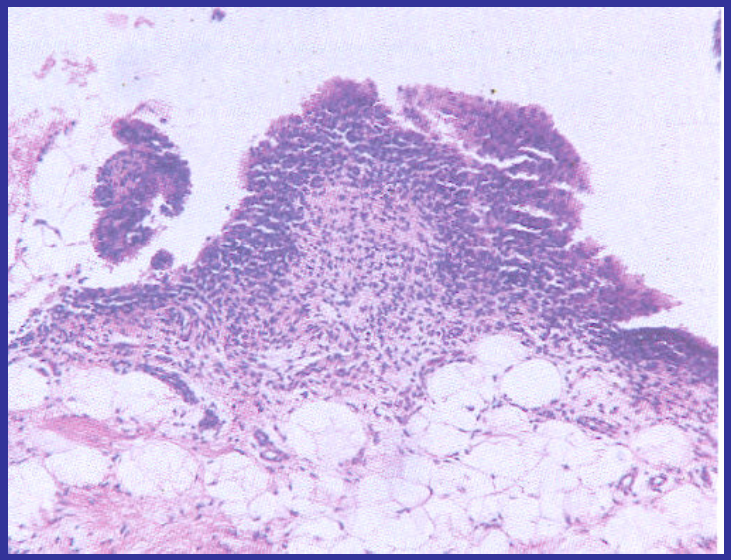




Normal Synovium

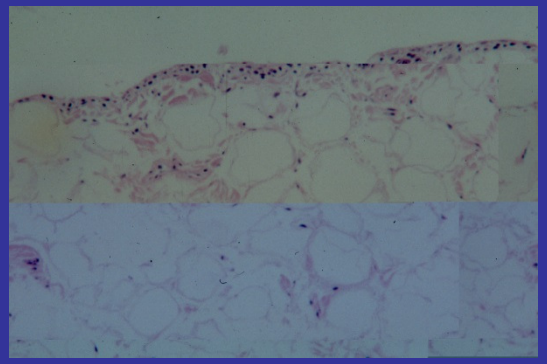


Synovitis

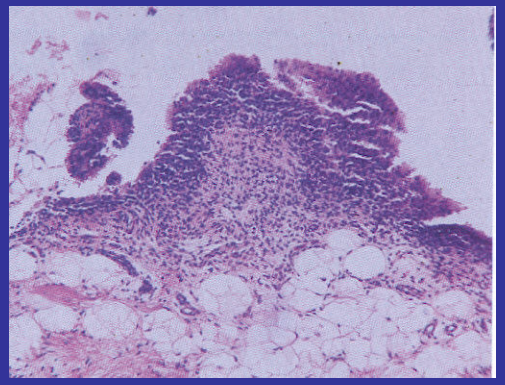


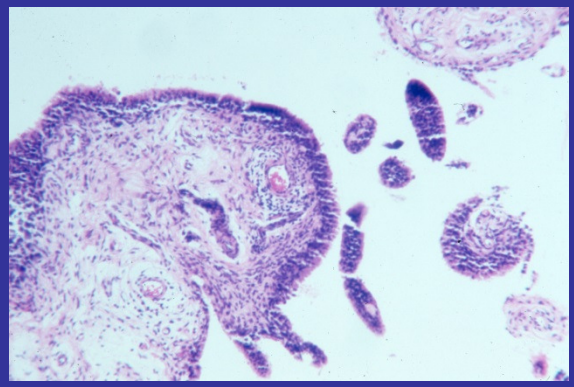
Pathology :

Synovial Hyperplasia
Lymphocyte Aggregations
Chronic non-specific Proliferative Synovitis



Normal Synovium





Synovectomy

MUST AVOID a HEMARTHROSIS!

Meticulous Intra Op Hemostasis!

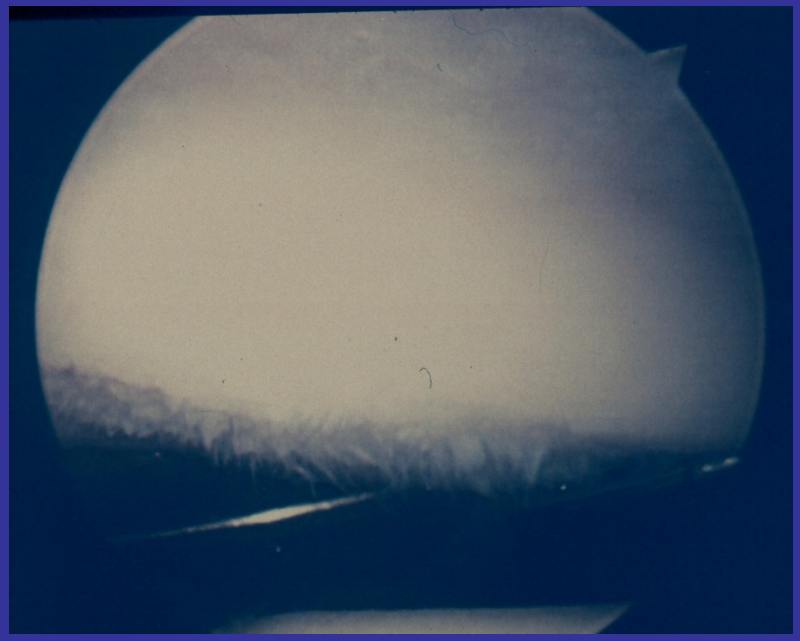
40cc 1% Lido with Epi **(Sub-Synovial)**

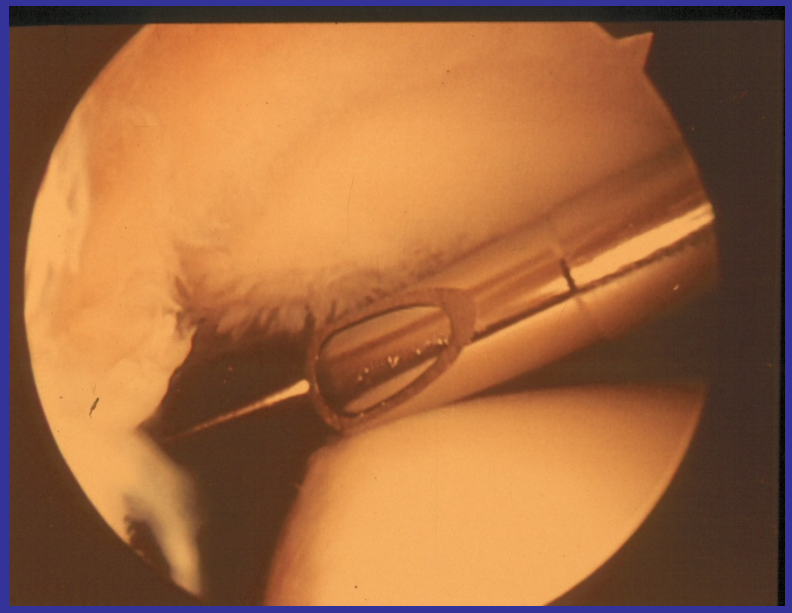
50cc ¼% Marcaine **(Intra-articular)**

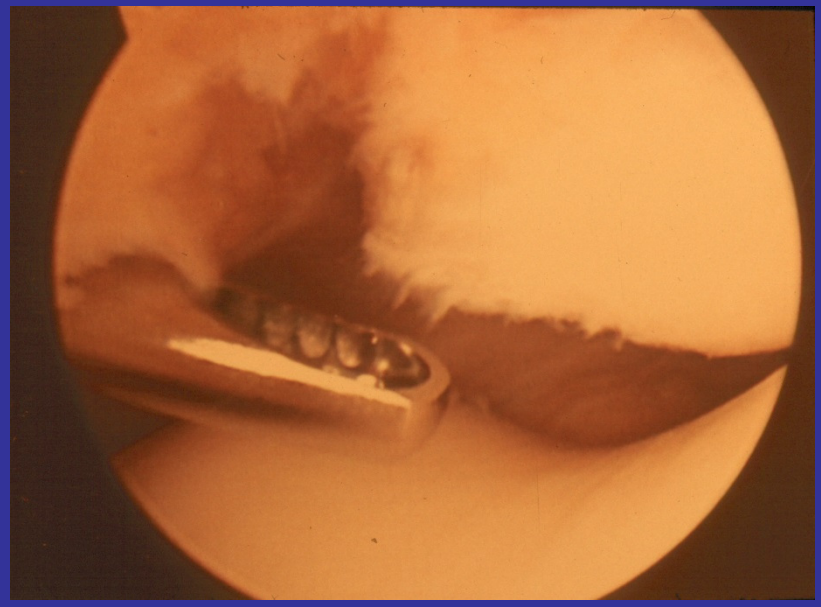
All Knees Drained Min 3hrs

GENTLE P/O Rehab









The New England Journal of Medicine

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VOLUME 347 JULY 11, 2002 NUMBER 2

A CONTROLLED TRIAL OF ARTHROSCOPIC SURGERY FOR OSTEOARTHRITIS OF THE KNEE

J. BRUCE MOSELEY, M.D., KIMBERLY O'MALLEY, PH.D., NANCY J. PETERSEN, PH.D., TERRI J. MENKE, PH.D., BARUCH A. BRODY, PH.D., DAVID H. KUYKENDALL, PH.D., JOHN C. HOLLINGSWORTH, DR.P.H., CAROL M. ASHTON, M.D., M.P.H., AND NELDA P. WRAY, M.D., M.P.H.

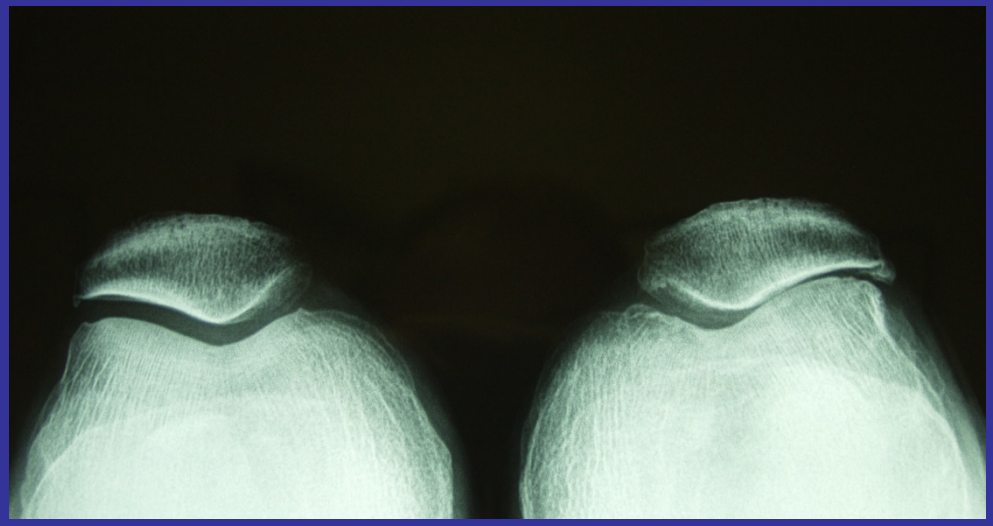
ABSTRACT

Background Many patients report symptomatic relief after undergoing arthroscopy of the knee for osteoarthritis, but it is unclear how the procedure achieves this result. We conducted a randomized, placebo-controlled trial to evaluate the efficacy of arthroscopy for osteoarthritis of the knee.

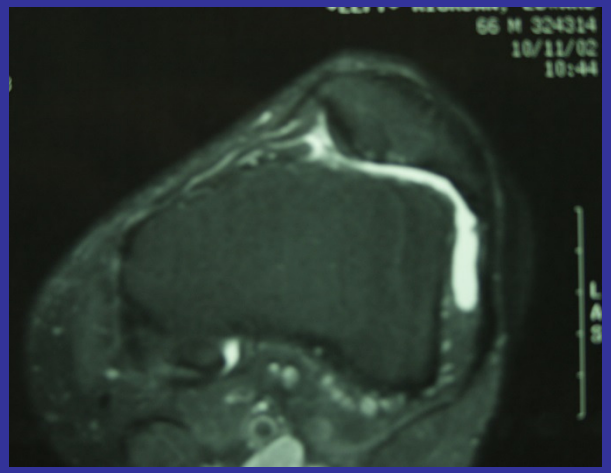
Methods A total of 180 patients with osteoarthritis of the knee were randomly assigned to receive arthroscopic débridement, arthroscopic lavage, or placebo surgery. Patients in the placebo group received skin incisions and underwent a simulated débridement

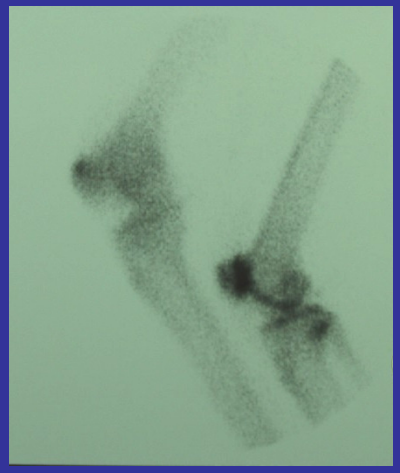
WHEN medical therapy fails to relieve the pain of osteoarthritis of the knee, arthroscopic lavage or débridement is often recommended. More than 650,000 such procedures are performed each year[1] at a cost of roughly $5,000 each. In uncontrolled studies of knee arthroscopy for osteoarthritis, about half the patients report relief from pain.[2-16] However, the physiological basis for the pain relief is unclear. There is no evidence that arthroscopy cures or arrests the osteoarthritis. Therefore, we conducted a random-

66 yo Male Left Anterior Knee Pain

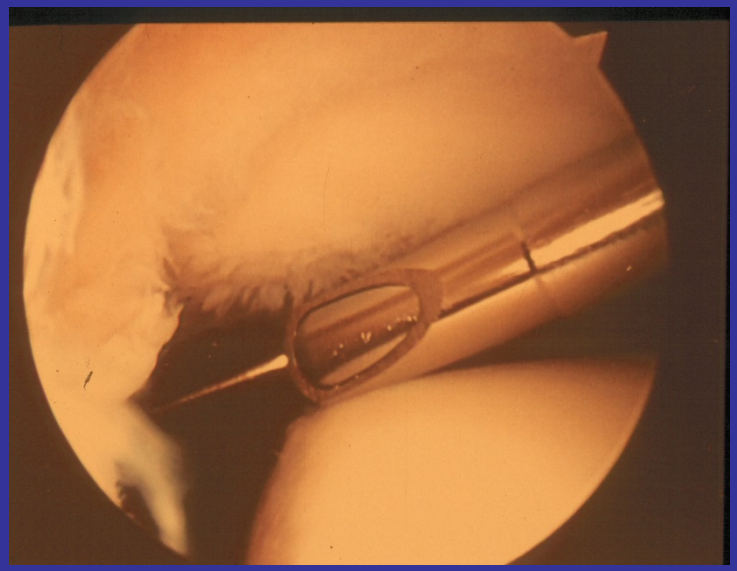


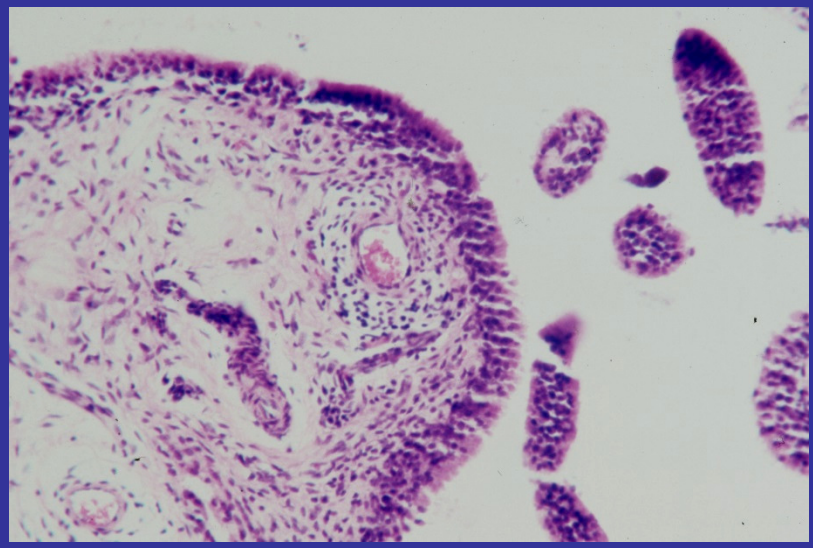






Synovectomy, Gentle Chondroplasty

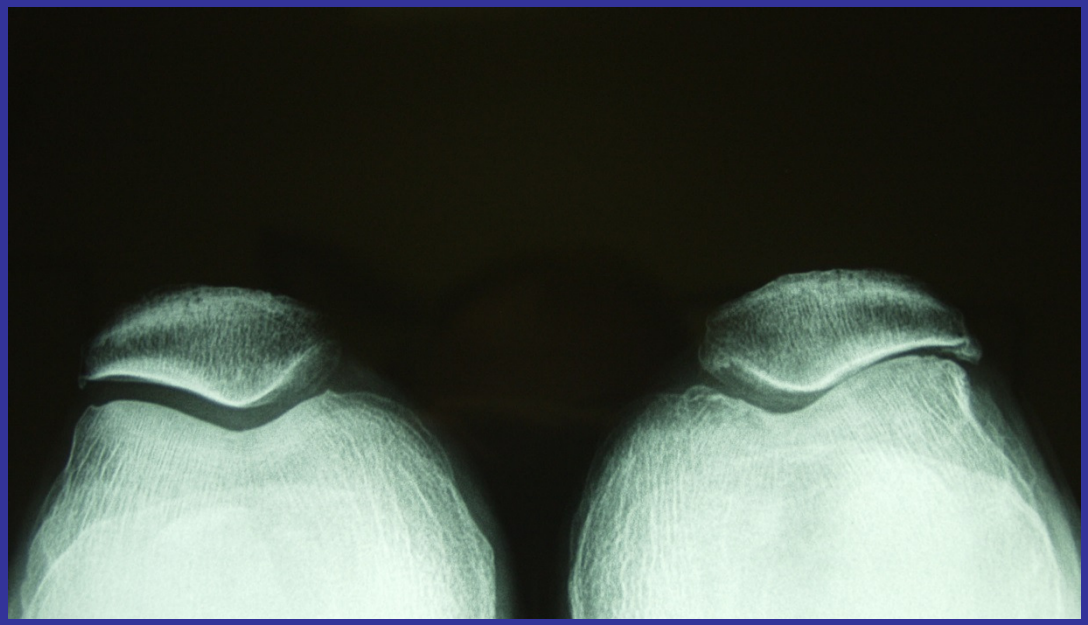




Careful Post Op Rehab, In the Envelope!
Daily icing, NSAIDS,
Persistent Exercise Program, In the Envelope!

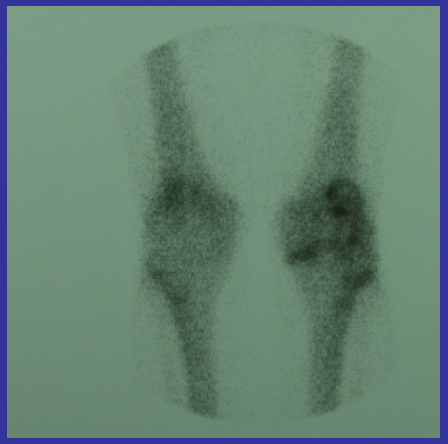
4yrs 8ms Post Op

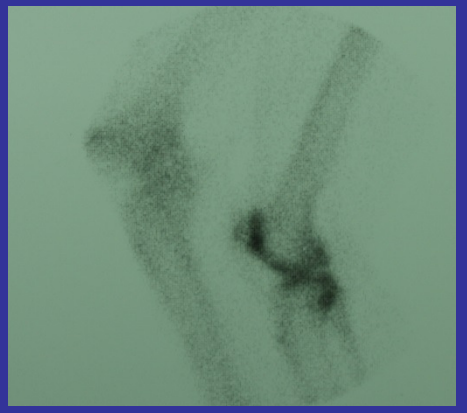
PAIN FREE



No Change of X-rays

Improved Bone Scans

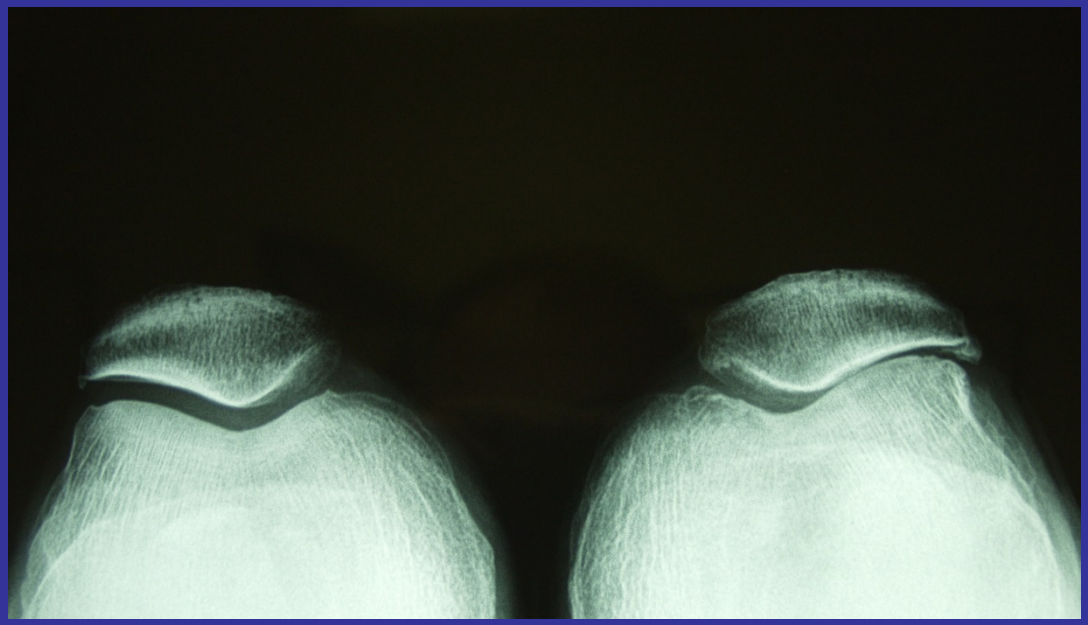




Towards Homeostasis

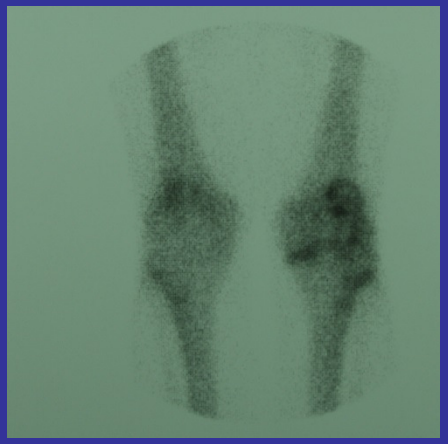
4yrs 8ms Post Op

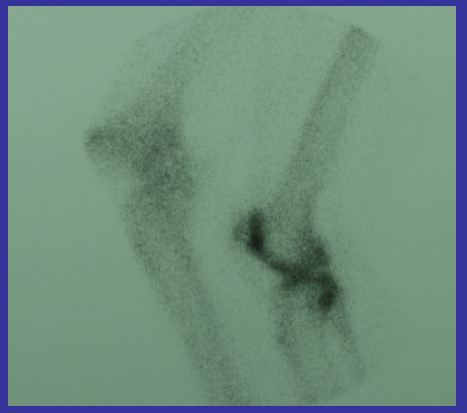
PAIN FREE



No Change of X-rays

Improved Bone Scans



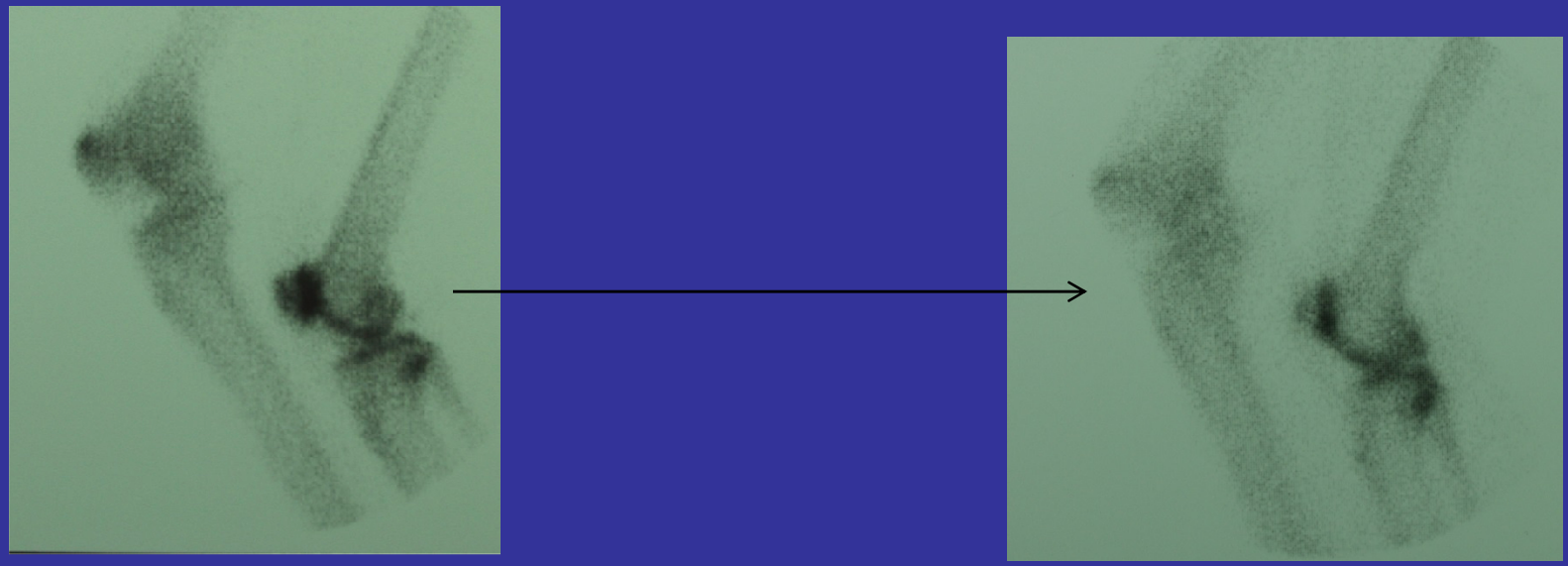


Towards Homeostasis

Patellar Activity Much Improved

Pre op

4yrs 8ms Post Op



Can Be “Disease Modifying”

3 Conditions to R/O

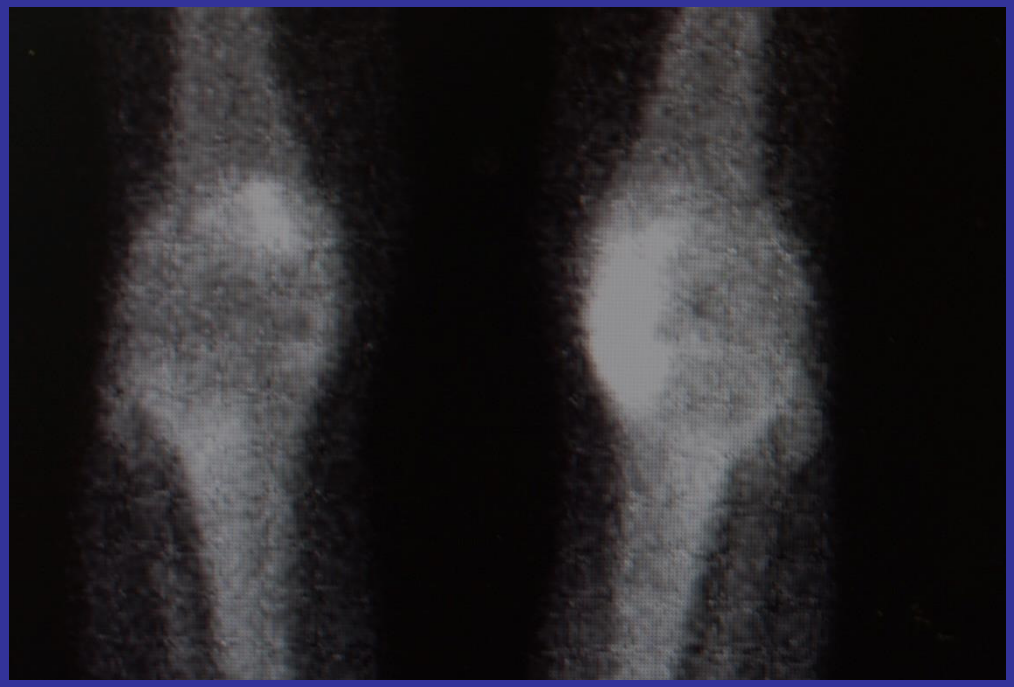
Hip Pathology

Saphenous Nerve Impingement

Somatization (Esp in Teen Females)

2^{nd} to Abuse (Sexual, Physical)

“A Most Amazing Case”





Something As Simple As a ¼ Inch Lateral Sole Wedge

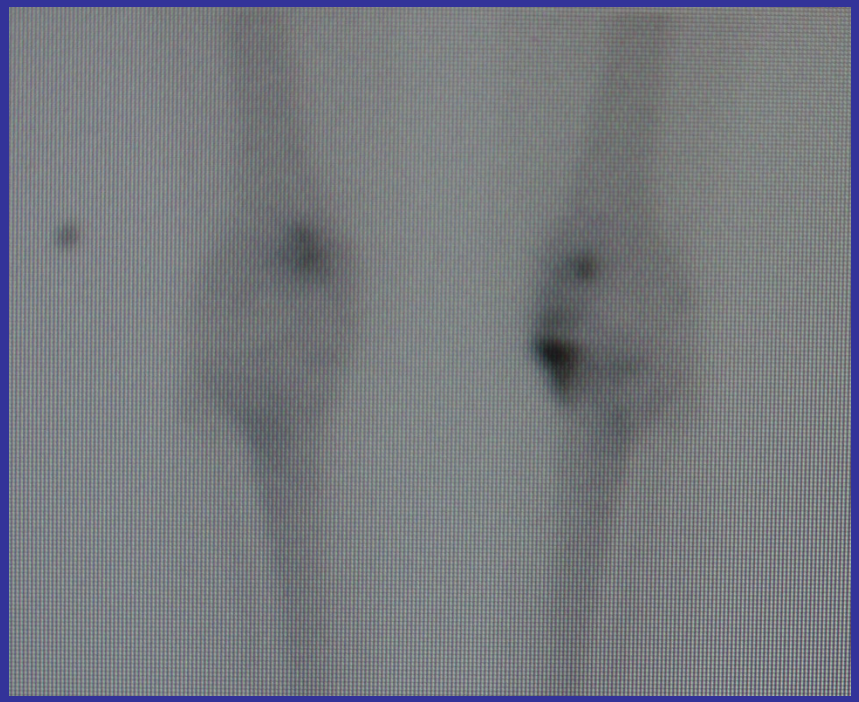
CAN Actually BE DISEASE MODIFYING!

Represents HOPE for Millions of Pts Who Can't Afford

Or Do Not Wish to Proceed with Major Surgery!

Obvious Implications for Our Patients as Well as

The WORLD HEALTH ORGANIZATION



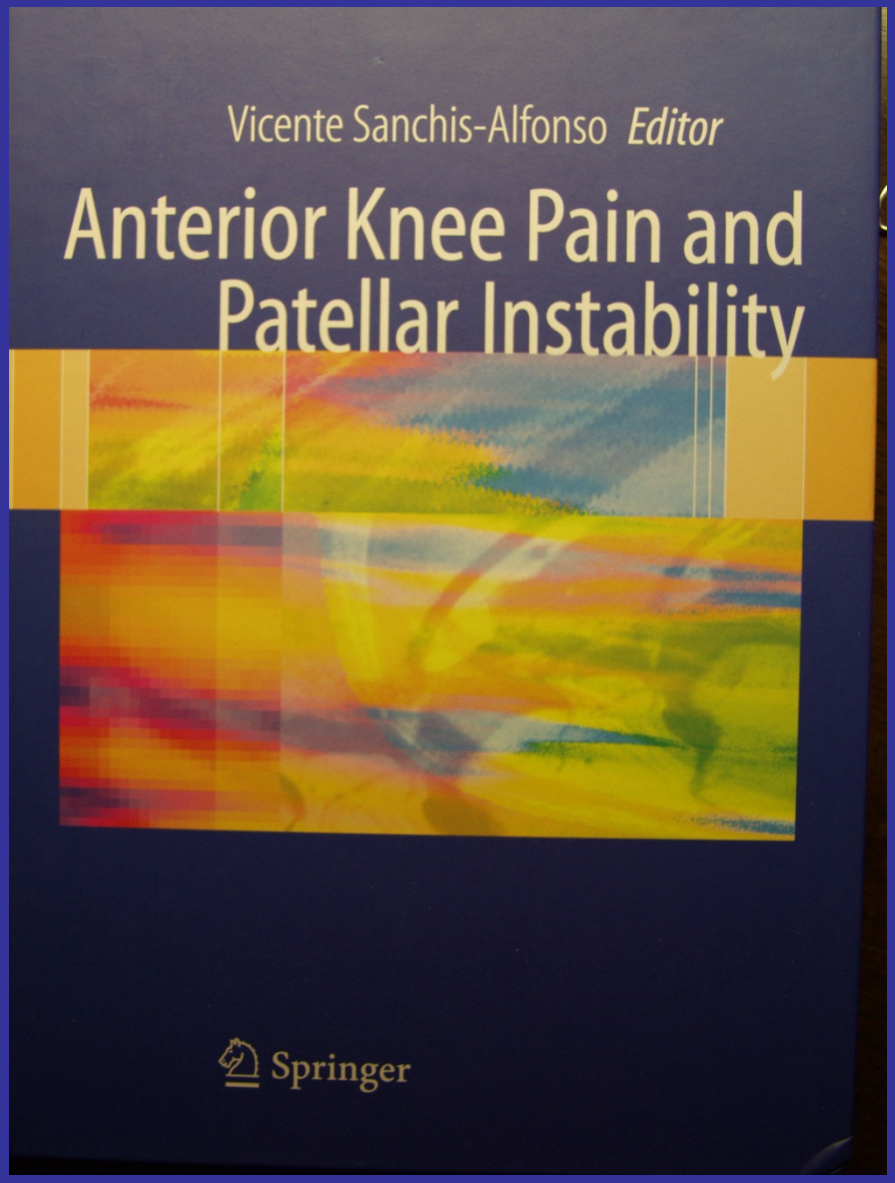


Benefits of a PeriPatellar Synovectomy / Gentle Chondroplasty

Aims Directly at Common Source of Patellofemoral Pain

Relatively Gentle and Recoverable

Doesn't "Burn any Surgical Bridges"



2006

1

Background: Patellofemoral Malalignment versus Tissue Homeostasis

Myths and Truths about Patellofemoral Disease

Vicente Sanchis-Alfonso

Introduction

he or she has a license or "green light" to correct it with misguided surgical procedures that very often make the patients' pain worse (see Chapters 20 and 21).

Tissue Homeostasis Theory

In the 1990s, Scott F. Dye, of the University of California, San Francisco, and his research group, came up with the tissue homeostasis theory.[17,19] The initial observation that led to the development of the tissue homeostasis theory of patellofemoral pain was made by Dye, when a patient with complaints of anterior knee pain without evidence of chondromalacia or malalignment underwent a technetium 99m methylene diphosphonate bone scan evaluation of the knees in an attempt to assess the possible presence of covert osseous pathology. The bone scan of that individual manifested an intense diffuse patellar uptake in the presence of normal radiographic images. This finding revealed the presence of a covert osseous metabolic process of the patella in a symptomatic patient with anterior knee pain

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