

# Αγκυλοποιητική Σπονδυλίτιδα

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# Introduction

- Most prominent Spondyloarthritis : 0.1 -1.4%
- Males x2 or x4 than females
- Strong association AS with HLA-B27 , varied worldwide

Race	Prevalence rates of HLA-B27
African-American	50
Arabs	64
Latin Americans	71



# HLA-B27

- group of related proteins that are encoded by the MHC
- 48 genetic loci ~ increased risk for AS
- HLA-B27 : serologic specificity
  - ➔ HLA-B\*27:(No.HLA locus)
- HLA-B\*27 molecules ~ AS only differ at a few amino acid compared with HLA-B\*27 not associated with AS
- HLA-B\*27:06,HLA-B\*27:09 assembled, dimerize & interact > HLA-B\*27:05

# Hypotheses on pathophysiological role of HLA-B\*27

## 1. “Arthritogenic peptide” hypothesis :

Altered HLA-B\*27 amino acid sequence change the specificity for peptides derived from certain bacterial proteins

- Cross-reactivity with joints and/or entheses peptides
- Mediated by CD8+ T-cells

## 2. “ER stress model” :

Misfolded protein response in stress leads to autophagy & unfolded protein response (UPR)

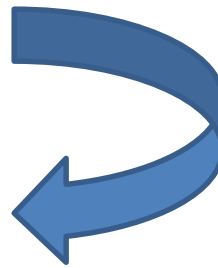
# Hypotheses on pathophysiological role of HLA-B\*27

## 2. “ER stress model”

Upregulation of UPR genes



T-cells , IL-17 , IL-23 , TNF- $\gamma$



## 3. “HLA-B\*27 homodimer”

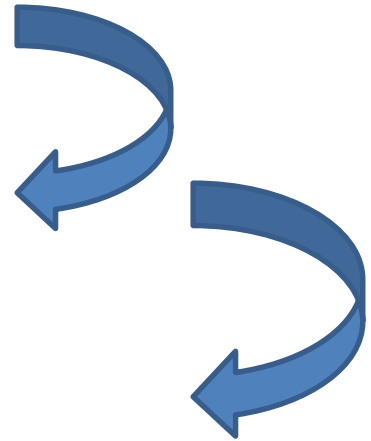
Free heavy chains of HLA-B\*27 / (B\*27)<sup>2</sup>

- No presentation of antigens
- Abnormal interaction with killer cells & leukocytes

# Hypotheses on pathophysiological role of HLA-B\*27

## 4. “ Mucosal immunodeficiency hypothesis”

- HLA-B\*27 fails to present bacterial peptides
- Invasion in the mucosa
- Upregulation IL-23 pathway



# MHC genes beyond HLA-B\*27

- HLA-A\*02:01
- HLA-DRB1\*01:03
- HLA-DPB1 alleles

*Independent role of both MHC I & II alleles to AS*

# Genetic research conclusion

- TNF & IL-17 : pivotal for AS development
- Human Clinical trials : IL-17 / no IL-23
  
- Unclear HLA-B\*27 causes inflammation
- No data for IL-17 role in bone remodeling
- Unknown mechanism linking inflammation & new pathological bone formation



# AS development

- Axial skeleton
  - inflammatory back pain
  - Peripheral arthritis
  - Enthesopathy
  - Anterior uveitis
- 
- ✓ Typical 26 yo
  - ✓ prevalence 0.1%-2%

# General data

- Unknown etiology
- Strong genetic effect
- 15% - 20 % (+) family history
- 80% - 95% HLA-B\*27 (+)
- No develop in all patients HLA-B\*27 (+)

# New York criteria

- Low back pain & stiffness >3 months ,improved by exercise ,no relieved in rest
- Restriction of motion of lumbar spine in both planes
- Restriction of chest expansion

# Radiologic criteria


- ❑ Sacroiliitis > grade 2 bilaterally or
- ❑ >Grade 2 or grade 3 unilaterally
- ✓ Diagnosis : radiologic criterion + at least 1 clinical



- Grade 0** normal
- Grade 1** suspicious changes
- Grade 2** minimal definite changes: circumscribed areas with erosions or sclerosis with no changes of the sacroiliac joint space.
- Grade 3** distinctive changes, sclerosis, change of joint space (decrease or widened), partial ankylosis
- Grade 4** ankylosis

# Altered vertebral bone composition

- 62 % AS patients have low bone mineral density
- Syndesmophyte formation & ligament ossification :  
Spurious increase in BMD
- Dual BMD X-ray absorptiometry : falsy normal results
- AS had 2.9% annual bone loss
- AS also 5.3% annual loss of Ca in men > 50 yo

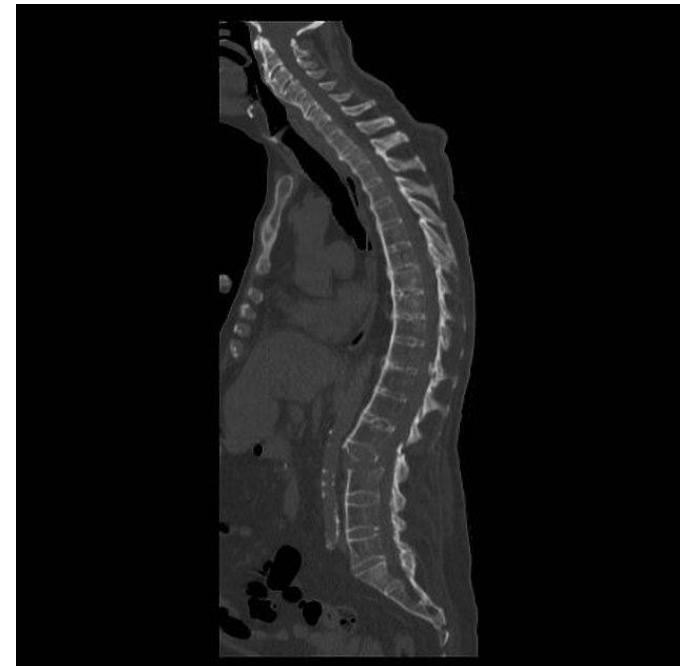
❑ Osteoporosis in AS  rate of vertebral fractures

# Etiology of osteoporosis in AS

- Unknown
- Multifactorial with phases of :
  - ✓ enhanced bone resorption or
  - ✓ Reduced bone deposition at inflammatory sites
  - ✓ Inflammatory cytokine mediation and
  - ✓ Altered hormonal influences
- In progressive AS demineralization of axial skeleton
  - ↑ Increase rate of vertebral fractures

# Altered Spine Biomechanics

- Paravertebral ossification bridge spine unit
- Flexibility loss
- Kyphotic
- Progression caudal to cranial
- ✓ Severe form : entire spine



# AS Biomechanical alteration

- Ligamentous ossification

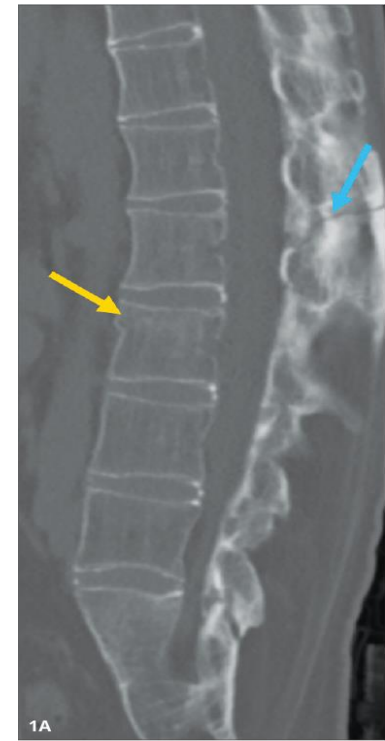
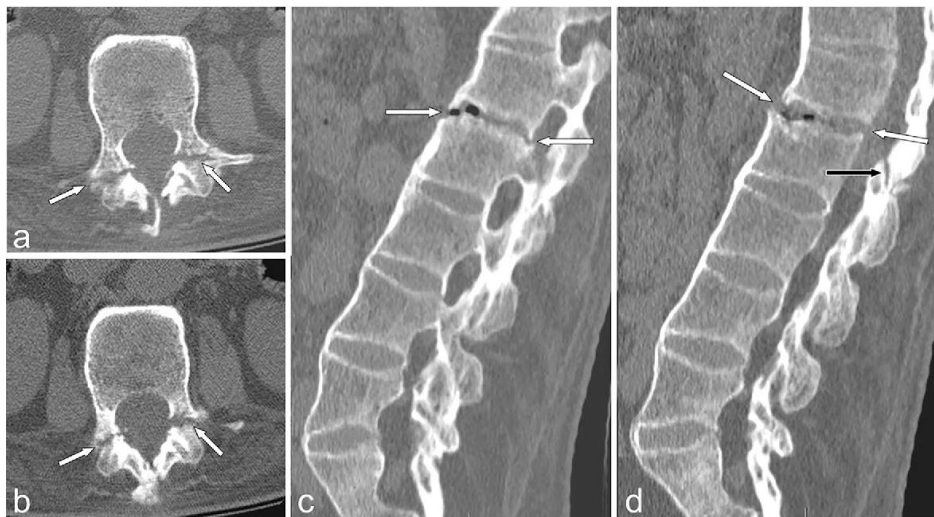


- No extra support
- Loss of elasticity
- Mechanical function as long bones
- Rigid , fused , kyphotic deformity : long level arm
- High risk of low energy spinal fractures



# AS in fractures

- Minor trauma
- Increased risk of multiple spinal fractures
- Usually occur through ossified disk and vertebral bodies
- Extension-distraction mechanism



# AS fractures

- ✓ Opening of the anterior column
- ✓ Characteristic gap of vertebral bodies



# Radiographic evaluation

- Acute-onset neck or back pain
  - Change in posture
  - 48% of cervical spine fracture in AS &
  - 60% with MRI
- Fracture until proven otherwise
- ✓ Routine use of CT scan in ANY patient with AS
  - ✓ Additional MRI use

# MRI scan

- Evaluate 3-column fractures
  - Often concomitant spinal injuries
  - Detect epidural hematoma
  - Increase diagnostic accuracy
- ✓ Koivikko & Koskinen : MRI detect 2 # than CT  
CT detect 6 # than MRI
- ☐ CT & MRI : strong detection of fracture in AS

# Nonsurgical treatment

- High surgical risk
- Not ideal in patient with AS
- Orthoses usage complication from skin, respiratory
- Risk of dislocation and neurologic deficits
- Preexisting spinal deformity should fit to orthoses
  
- Shen & Samartzis : successful conservative trm at T5

Highlight the 4<sup>th</sup> column concept: rib-sternal complex

For upper and mid thoracic region

# Surgical treatment

- Prevent secondary deterioration of neurologic status
- Unstable fracture pattern
- Presence of epidural hematoma
- 59% after surgery no progression of neurologic deficit
- 27 % improvement of the deficit



# Cervical spine surgical treatment

1. No anterior approach alone
    - Chin-to-chest deformity narrows the surgical window
  2. Posterior approach
    - Multisegmented + autologous bone graft
  3. Combined posterior-anterior approach
- Higher morbidity rate
- Add a load-sharing device anterior to posterior construct

# Thoracic & lumbar surgical treatment

- Posterior stabilization with long constructs:
  - ✓ Recreation of alignment
  - ✓ Confer stabilization of the injured segment
  - ✓ Accomplish decompression

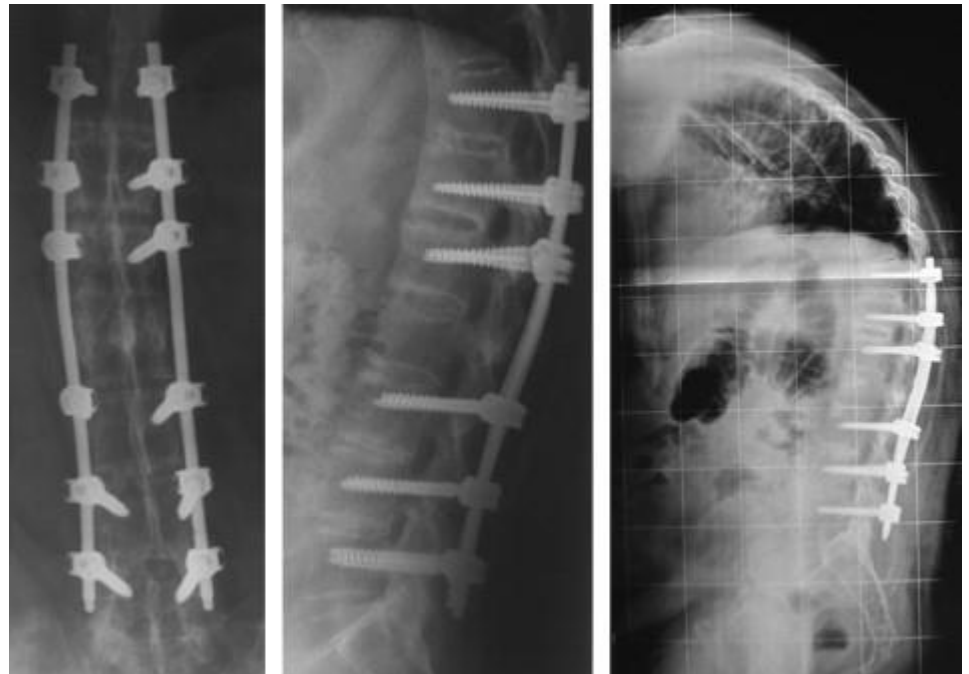
Reduce stress and risk of implant pullout



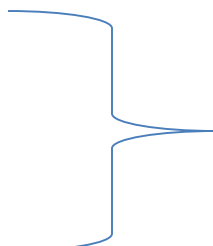


# Conclusion

- ✓ Long constructs 3 levels above and below fracture
- ✓ correct preexisting deformity



# Complications

- Range from 50 % to 84 %
  - Complications are :
    - ✓ Postoperative wound infection
    - ✓ Deep vein thrombosis
    - ✓ Pneumonia
    - ✓ Respiratory insufficiency
    - ✓ Epidural hematoma
    - ✓ Aortic dissection
- specific for AS population
- 

# Take home message

- ✓ Spinal fracture common & devastating in AS
- ✓ Increased fracture risk related to altered spine biomechanics and poor bone quality
- ✓ Radiographic evaluation with CT & MRI & for entire spine
- ✓ Management mainly surgical
- ✓ Surgical treatment typically posterior fixation at a minimum
- ✓ Suspicion of fracture in AS patients

3<sup>ο</sup> ΘΕΡΙΝΟ ΣΧΟΛΕΙΟ  
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*Ευχαριστώ πολύ  
για την προσοχή σας*