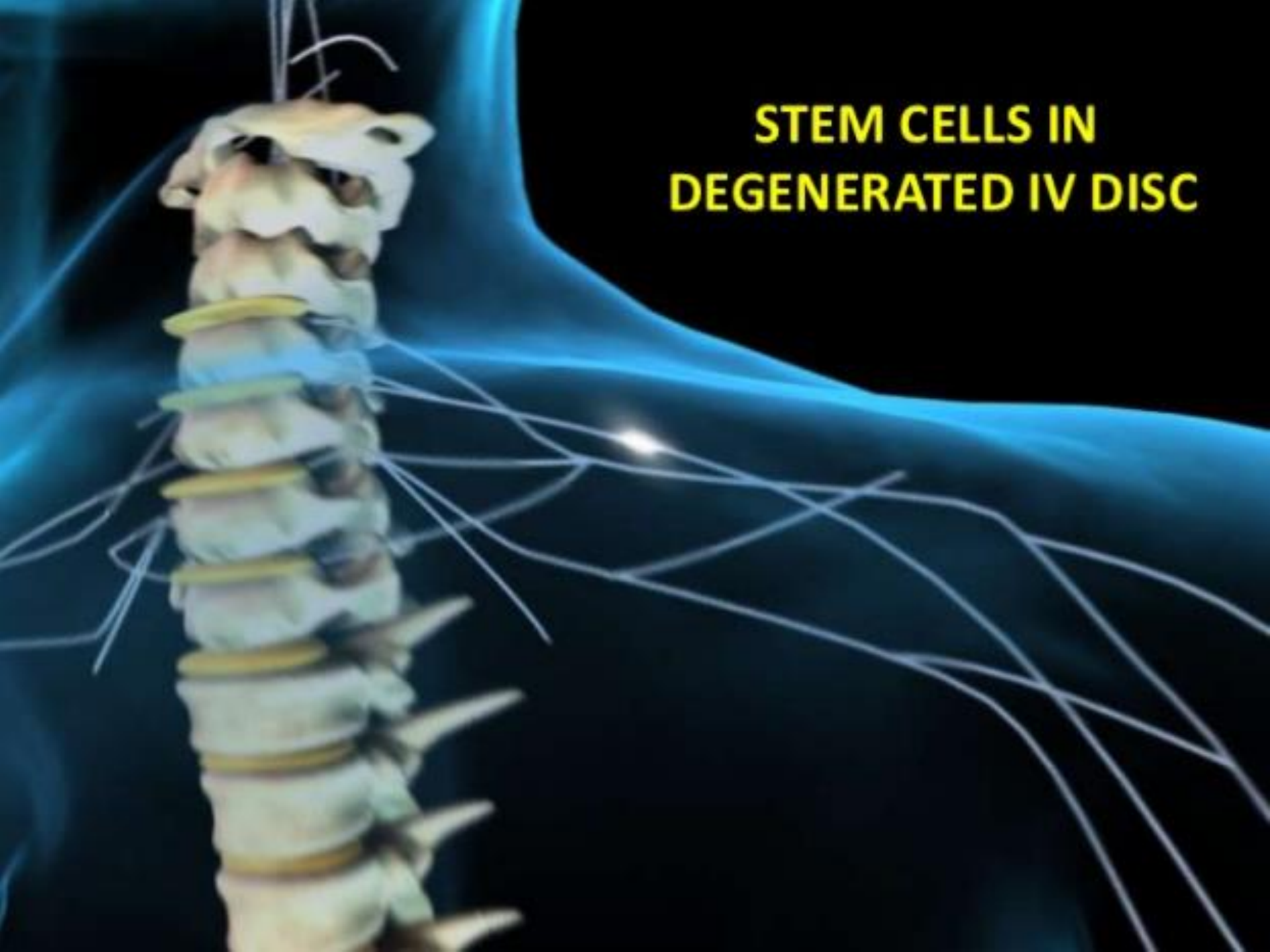


**STEM CELLS IN  
DEGENERATED IV DISC**



# Introduction

- IVD is a disease that affects a considerable proportion of the population
- About 60-80% of all people suffer from intervertebral disc degeneration at some time during their life
- Degeneration of the intervertebral disc (IVD) is the main cause of back pain and radicular pain respectively.
- Intervertebral disc degeneration is a aberrant, cell mediated response to progressive structural failure

# Degenerated Disc

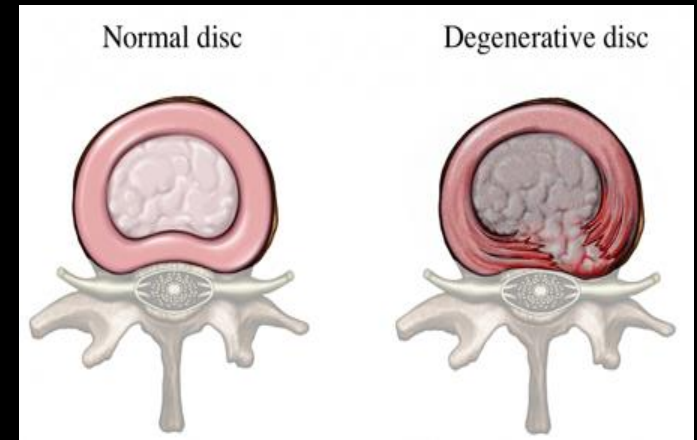


Fig 2: Normal Disc and Degenerated Disc

Fig 1: X-Ray picture showing normal and degenerated Disc




# Causes

- Body weight
- Lifting Strength
- Ageing
- Occupational Risks.
- Smoking and atherosclerosis
- Tissue weakening
- Nutritional Compromise
- Sports




# Methods for the treatment of disc regeneration

- Anticatabolic agents
  - Growth factors
  - Cellular Components
    - NP cell transplantation
    - Stem Cell Therapy
- 

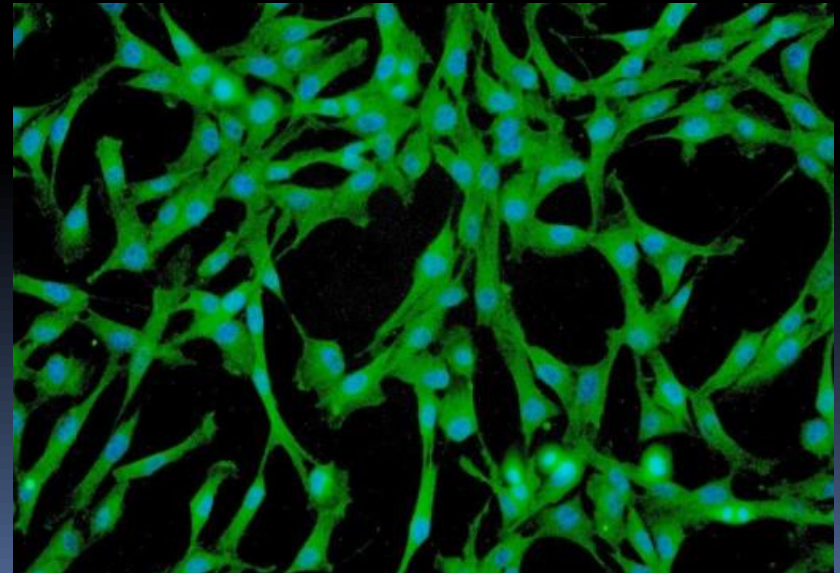


# Growth Factor Treatment

- Autologous Platelet-Rich Plasma (PRP)
  - Platelet derived transforming growth factor-13 (TGF-13)
  - Epidermal Growth Factor (EGF)
  - Osteogenic Protein -1 (OP-1) also known as bone morphogenetic protein-7 (BMP7)
- 

# Potential of Stem Cells to Repair Discs

- Patient's own adult stem cells are used
- They are injected directly into the damaged discs
- They have the potential to restore disc's cell structure, hydration and function
- They have the potential to minimize pain

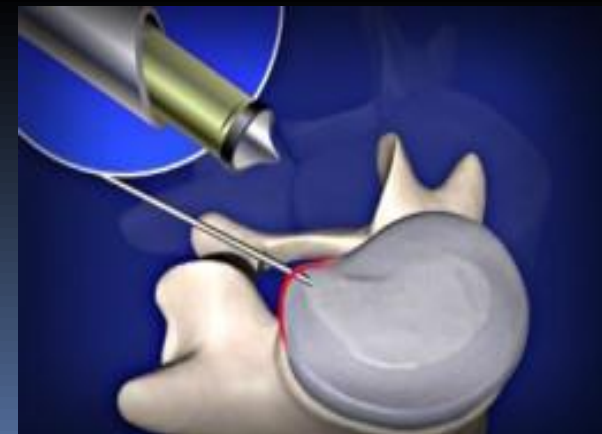
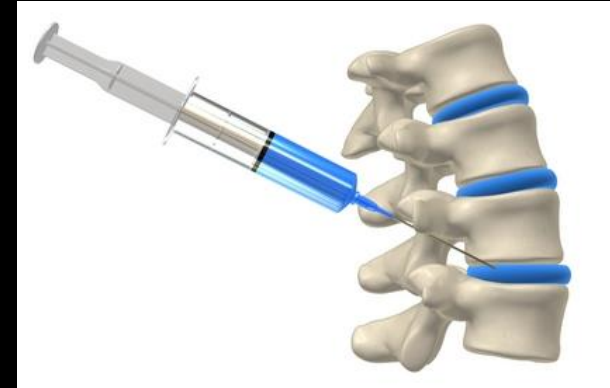


# Stem Cell Injection Procedure

Collection of bone marrow aspirate from the posterior iliac crest, centrifugal separation of stem cells

Collection of Stem cells from adipose tissue

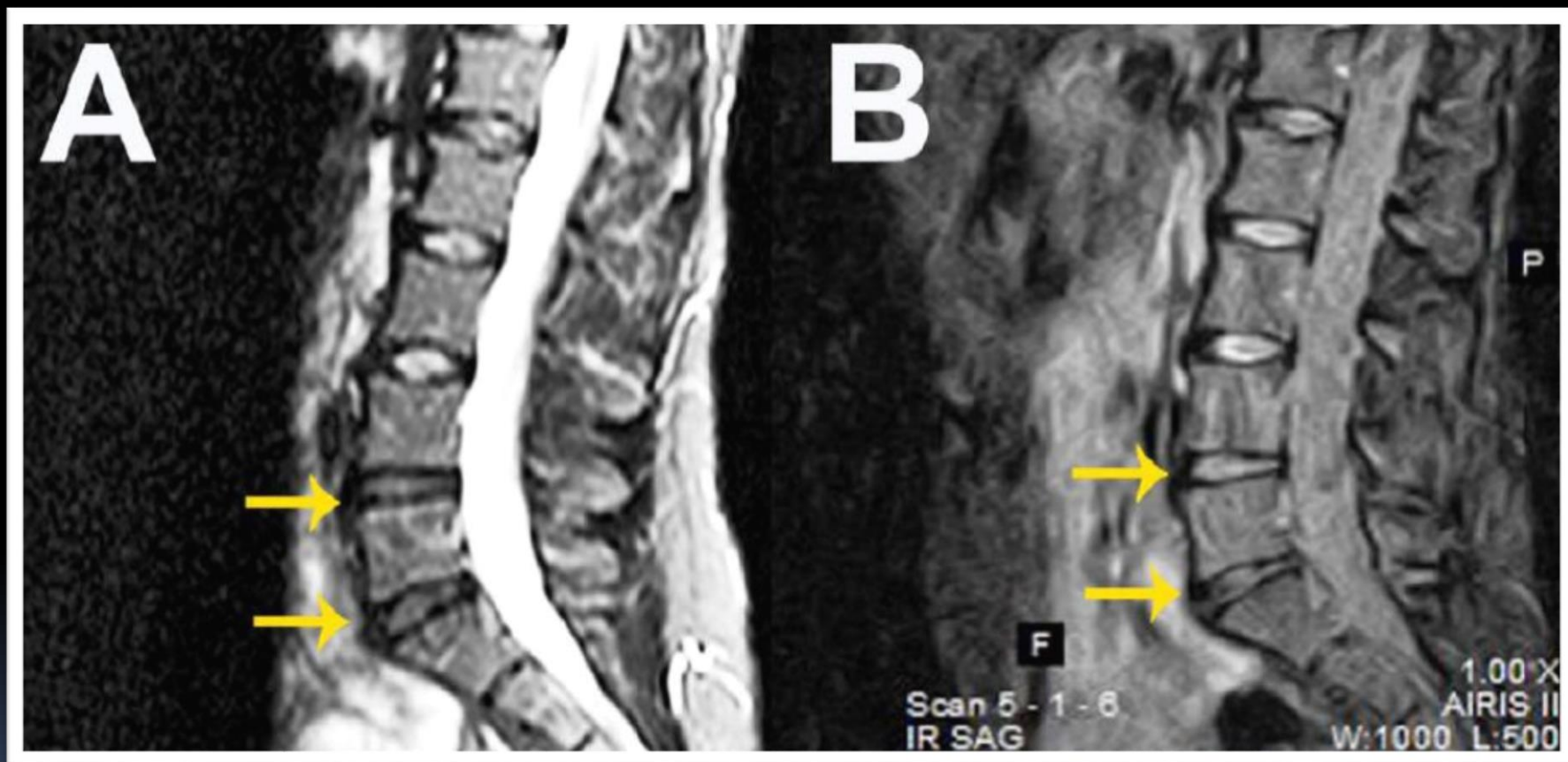
- Injection of the Stem Cells into the affected disc under X-ray fluoroscopic guidance





# Stem Cell Treatment for Degenerated Disc

Clinical evidence for Stem Cell Therapy – X-Ray



A Degenerated Disc  
Pre-treatment

B. Regenerated Disc  
Post Treatment


# Case Study – Only 3 Studies

## Case Study 1

- Yoshikawa et al., 2010
- Percutaneously grafted MSCs into degenerated IVDs in two women aged 67 and 70 years
- After two years, both individuals had alleviation of symptoms and radiographic changes



## Case Study 2

- Haufe and mork *et al.*, 2006
  - Intradiscal injection of hematopoietic stem cells into ten patients.
  - No improvement in the lower back after one year in 10 patients with DDD injected with Hematopoietic stem cells obtained from bone marrow
  - However authors did not perform any culture or expansion of stem cells prior to the injection into the degenerated discs.
- 

## Case Study 3

- Orozco *et al* performed injection of autologous MSC in 10 patients with confirmed DDD.
- Reported that, after the injection of MSC, the patient had a rapid improvement in pain and disability at 3 months
- These results are important, since intervention is simpler, more conservative, preserves normal bio mechanics, does not require patient hospitalization or surgery



# Conclusion

- IVD degeneration is a natural process throughout human life and it involves many changes in the composition of the disc structure.
  - The use of cell therapy for IVD degeneration has been studied as a potential treatment option for this condition.
  - The use of MSC is being widely studied and shows a great potential in the repopulation on the NP and regeneration of Discs.
  - so far there are few clinical studies measuring the effect of those cells in humans with degenerative disc disease. More clinical studies are need to evaluate the potential of MSC for the regeneration of Disc.
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