



Al-Mustaqbal University  
Collage of Engineering  
Prosthetics and Orthotics Engineering  
Second Stage

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## **ORTHOTICS I**

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# INTRODUCTION TO ORTHOSIS

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ENG. HUSSEIN D. HUSSEIN

# WHAT IS ORTHOSIS

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- An orthosis is an externally applied device that supports, aligns, prevents, or corrects deformities, or improves function of a body part.
- Orthotics: The clinical and technical field focused on the assessment, design, fabrication, fitting, and follow-up of orthoses.
- Orthotist: A healthcare professional who evaluates patients and designs, fabricates (or oversees fabrication), fits, and reviews orthoses to improve function and safety.

# ORTHOSIS FUNCTIONS

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- Improve stability (standing & walking)
- Control joint motion / correct alignment
- Reduce pain and excessive loading
- Prevent deformity progression
- Assist weak muscles and improve gait efficiency

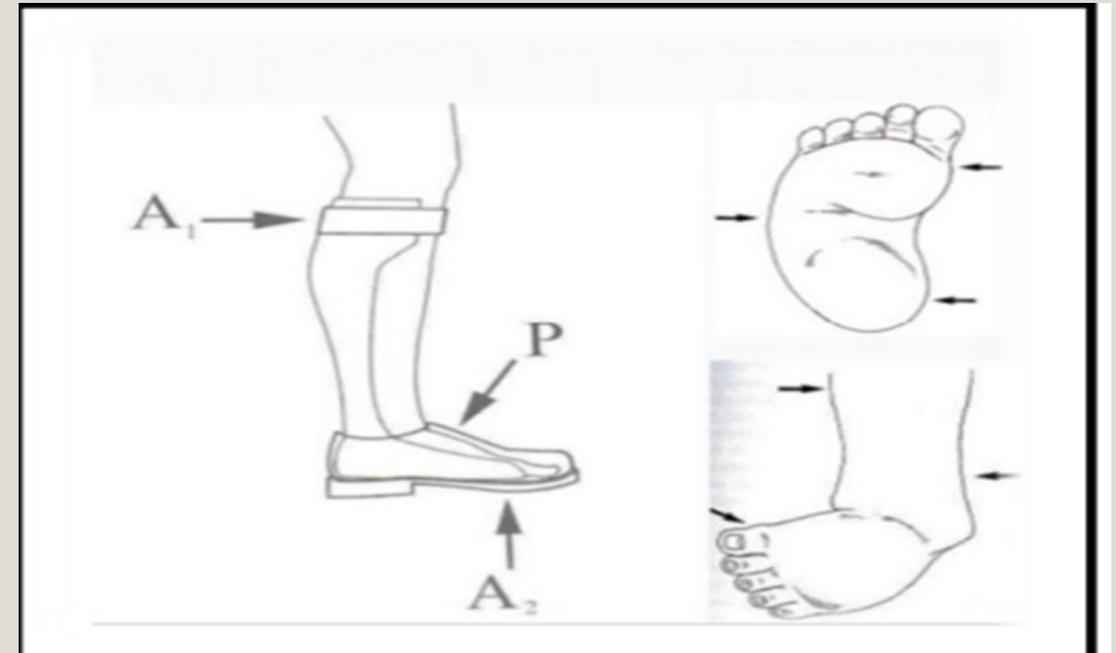
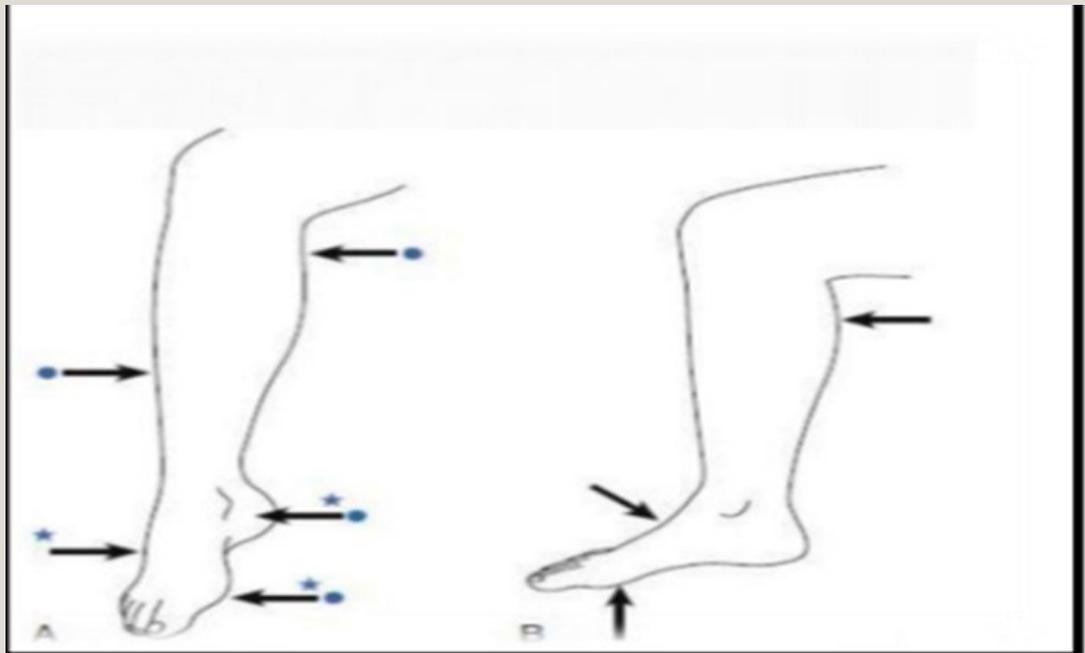
# ORTHOTIC BIOMECHANICS

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- Forces + moments: orthoses create external moments to counter unwanted motion.
- Lever arms: longer lever arms reduce required pressure for the same corrective moment.
- Interface matters: pressure distribution, comfort, and skin protection are design-critical.
- Most orthoses use a minimum of three forces to control motion in a plane: One main corrective force + two opposing forces (counterforces).
- Creates a stabilizing/corrective moment

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# CLASSIFICATION OF ORTHOSES

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- By region: upper limb, spinal/trunk, lower limb
- By function:
  - Static: hold position / immobilize
  - Dynamic: allow controlled motion / assist movement
  - Accommodative: redistribute pressure, relieve pain (e.g., diabetic footwear/insoles)

# DRAWBACKS OF ORTHOSIS

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- Skin irritation/pressure sores (bony prominences, straps, trimlines)
- Poor alignment → worsened gait mechanics, pain
- Reduced ROM with prolonged rigid bracing
- Compliance issues (comfort, heat, weight, appearance)

# LOWER LIMB ORTHOSIS

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- Lower-limb orthoses may be used to:
  - Assist gait, improve stability, reduce pain
  - Reduce weight-bearing in painful joints
  - Control motion and minimize deformity progression

# MAIN CATEGORIES (LOWER LIMB)

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- Foot orthoses (FO) & therapeutic footwear
- Ankle–Foot Orthoses (AFO)
- Knee orthoses (KO)
- Knee–Ankle–Foot Orthoses (KAFO)
- Hip–Knee–Ankle–Foot Orthoses (HKAFO)  
(more complex, limited indications)

CONT.



(A)

(B)

