



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

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## **ORTHOTICS I**

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**2<sup>nd</sup> term – Lecture 5**

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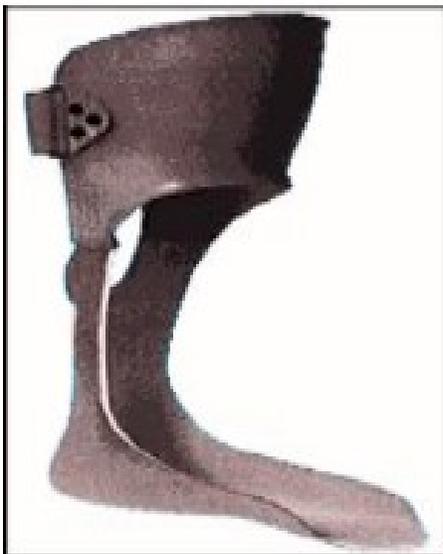
# AFO TYPES

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# ACCORDING TO THE FUNCTION

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- **Metal bars:** it is commonly used in specific scenarios like post – polio, neuropathic feet, ....etc.
- **Total contact:** it is usually made from thermoplastic material provides sleek, intimate fit, and total contact with leg to provide better control. Higher patient acceptance is achieved from wearing this type with light weight (150 – 200gm) but it is hotter in used.
- **Floor reaction:** it uses floor reaction force through toe aspect of foot plate to prevent forward tibial progression and subsequent knee collapse.
- **Un-weighting:** it uses prosthetic principles which may be patella tendon bearing (PTB), specific weight bearing, or total surface bearing (TSB).
- **Immobilizing:** it is commonly used with a lower extremity deficiency when ankle immobilization is desired.



# ACCORDING TO THE MATERIAL

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- An AFO is usually an orthosis that covers portion of the foot and the leg. It features a flat shoe sole for the foot, spans the ankle joint and covers the lower leg.
- An essential element of AFOs is an anterior strap located just below the knee which secures the leg against the posterior calf shell.



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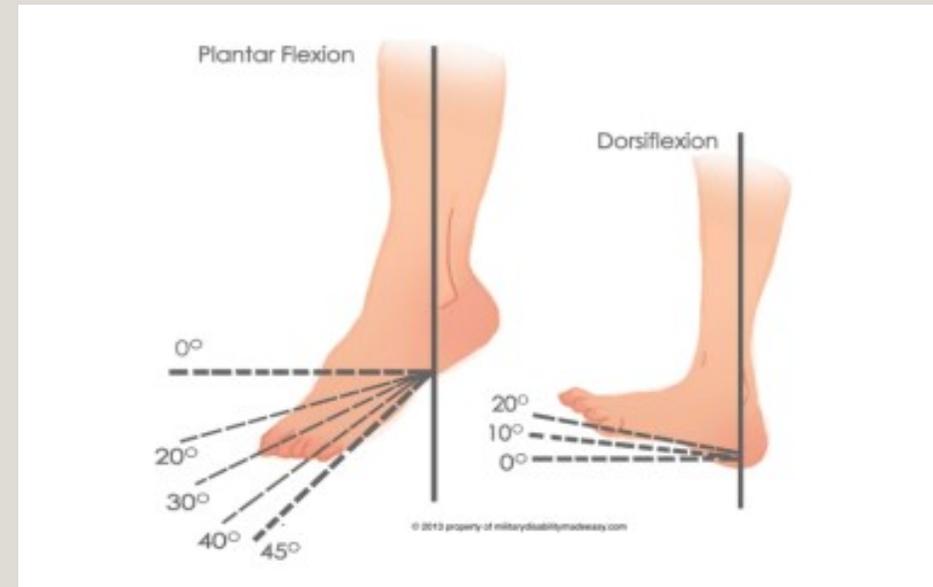
- AFOs are passive medical devices, i.e., they do not have any kind of energy supply.
- The term AFO should not be confused with AAFO that refers to an active ankle-foot orthosis.
- The AAFO consists of a generic AFO endowed of an electromechanical device that controls the ankle movements.
- The influence of the AFO in the patterns of muscular activity has been investigated in order to understand the neuromuscular adaptation associated with the use of the orthotic device .
- The contact forces and the pain pressure threshold In the orthosis/lower limb interface have also started to be explored to ensure the patient comfort. AFOs can be classified according to the material they are made of



# METAL AFOS

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- It consists of a shoe or foot attachment, an ankle joint, and two metal uprights (medial and lateral) with a calf band connected proximally.
- They are indicated for several specific pathologies, including the insensate foot, the foot with fluctuating edema, or when the need for adjustability or progressive changes in the device are indicated.
- There are two types of ankle joints used in metal AFOs:
  - Single-channel ankle joints, which provide dorsiflexion assistance and a plantarflexion stop.
  - Dual-channel ankle joints, which assist the foot both in the dorsiflexion and plantarflexion directions.



# PLASTIC AFOS

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- Plastic AFOS are the most common type of AFO. They are mostly made from a thermoplastic material, polypropylene (PP), for the structural components and Velcro straps for tightening.
- They can be fabricated from a cast or molding of the patient's limb. The first approach may be suitable for short-term use while the second one is better for durable use allowing choosing the plastic type, color and thickness.
- The general features of a plastic AFOS would include the trim lines (degree of rigidity), degrees of dorsiflexion, and foot plate design.
- The main characteristic of plastic AFOS is the posterior leaf spring (PLS) design.
- Posterior leaf spring (PLS) design is the most common form of AFO with a narrow calf shell and a narrow ankle trim line behind the malleoli.
- It is typically set in 5-7° of dorsiflexion with very low-profile three-quarters length footplate.
- The PLS is used for compensating flaccid foot drop by resisting ankle plantarflexion at heel strike and during swing phase.

# CONT.

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- Plastic AFOs can also incorporate a hinged joint at the ankle which will allow some dorsiflexion and a limited plantarflexion.
- However, hinged-AFOs are less adjustable than metal AFO joints.
- The footplate design can incorporate three-quarter length, which stops just before the metatarsal heads for easier access into shoes, or a full length footplate with padding, which is generally used for the most spastic or most vulnerable foot.
- There are also many variants of plastic AFOs designed for specific diseases

# CARBON AFOS

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- It have been widely used during the last decade.
- Carbon fiber is a material extremely lightweight, and durable, however it is not adjustable and does not fit perfectly in the limb.
- This style of AFO is best used for isolated foot drop.