Prosthetic Liners for Lower Limb Amputees: A Review of the Literature

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Background: Prosthetic liners exist to improve amputee safety and comfort by adding a cushioning layer between the residual limb and the prosthetic socket. Many choices in liner technology are available, and clinicians often rely on personal intuition and experience to choose which liners are appropriate for which patients.

Objectives: The purpose of this study was to examine the literature to find what scientific evidence exists to inform prescription practices.

Criteria for selecting studies for this review:

Types of studies: randomized crossover trial and others not specified

Types of participants: Transtibial amputation

Types of interventions and outcome measures:

- Spenco, Poron vs.silicone vs.soft Pelite vs.medium Pelite vs. firm Plastazote vs.regular Plastazote vs. Nickelplast: compressive stiffness, coefficient of friction,
- Bock-Lite vs.Pedilin vs.silicone vs. polyurethane: cyclic compressive loading, cyclic shear abrasive loading, and frictional loading
- ICEROSS (a urethane liner) vs. Alps Easy Liner(a thermoplastic elastomer liner): geometric constraints and different loading rates
- (15 liners including) silicone elastomer vs. silicone gel vs.urethane: compression, friction, tension, and shear
- Silicone liner va. ICEROSS liner vs. Degaplast plastic vs. Pelite vs. sample of poplar from a wooden socket: .moisture permeability properties of liner and socket materials were measured
- (Twenty-three liners) carbon fiber laminate vs. thermoplastic socket materials: thermal conductivity of prosthetic socket and liner materials
- (Three liner conditions) no liner vs.a soft insert called Kem-Blo vs. a silicone liner: effect of liner materials on interface pressures at four sites on the sockets of 26 persons with lower limb amputation
- Pelite liner vs. polypropylene socket liner: residual limb pain threshold and tolerance
- ICEROSS liner: survey about outcomes done by physicians and prosthetics
- Silicone vs. Pelite liners: Surveyed transtibial amputees
- Mineral oil gel liners with locking pin suspensions vs. Pelite liners vs. neoprene suspension sleeves: survey preference outcome
- Silicone liners: relationship between hand function and residual limb skin problems

Search strategy for identification of studies: 'Prosthetic liner' was used as a search term in the Web of Science and PubMed research databases.

Conclusion: The results of this paper suggest that there is little scientific evidence to inform the prescription practices of prosthetic liners. Research has shown that liners can help distribute loading and reduce pain, but research discerning differences between liners to aid with clinical choices is lacking. While the material properties of prosthetic liners have been well studied, how those properties affect function in vivo is not well understood. Additionally, new technology is constantly being introduced that promises improved function but often at a higher cost. Research focused at quantifying a cost:benefit ratio could be a great aid for prescription practices aimed at cost savings. Plenty of opportunities remain to make research impacts regarding prosthetic liners.