

**Use of Silver Incorporated Fabrics in Children with
Skin Breakdown Due to Long-term Wear of Orthopedic Devices
Philip E. Gates, MD and Justina Smith, CO
Shriners Hospitals for Children, Shreveport, Louisiana**

**This study was conducted under an approved protocol by the
Louisiana State University Health Sciences Center in
Shreveport Institutional Review Board.**

IRB Approval # H07-027.

OBJECTIVE: The objective of this study is to evaluate the effects of silver incorporated fabrics in pediatric patients who are required to wear plastic devices (braces) for 10 hours or more in a 24 hour period and who exhibit visible skin irritation and/or skin breakdown due to the extended brace wear.

METHODS: Children, ages 10-18 years, who wear plastic ankle foot Orthosis (AFO) for at least 10 hours a day and are experiencing visible skin irritation will be identified as possible participants in this study. After obtaining appropriate informed consent and brace adjustment, if needed, the orthotist will fit the child with silver incorporated socks. Parents will be instructed as to care of the skin and of the socks. The child will return in 4 weeks for the evaluation of the skin. Photographs and measurements of the skin irritations will be made before use of the silver incorporated socks and at the end of 4 weeks in order to compare the amount of skin irritation. If the skin irritation/breakdown does not show improvement at this time, the child will be removed from the study and appropriate medical treatment will be given.

DISCUSSION: The use of Silver for its antimicrobial and therapeutic qualities has been documented in the Orthotics & Prosthetics community. In recent years, the Orthotics & Prosthetics community has utilized silver incorporated material in its use with diabetic feet and amputees. However, little research has been done as to its benefit in pediatric patients who may be required to wear plastic devices for over 10 hours a day and experience skin irritation or breakdown. Excessive heat, moisture, and presence of bacteria become a reality with the use of long term wearing of orthotic devices. The use of silver for its antimicrobial properties in health care products has long been documented. Silver-coated thread, licensed for use in textile products, X-Static, has been tested for bactericidal, moisture management, and conductivity for heat. X-Static retains the traditional characteristics of a textile, yet offers the antimicrobial, odor-repellent, thermodynamic, antistatic and therapeutic properties associated with silver. The main benefits to wearing O & P garments containing X-Static are odor reduction, because of the yarn's ability to kill bacteria, and healthier skin, because of reduced skin abrasion and irritation. Heat transfer also occurs because the silver helps conducts heat. Pain reduction has also been reported with some patients.

CONCLUSIONS: In conclusion, the small group that we have been able to study have all had success with the silver impregnated socks. Each patient has expressed satisfaction with the results that were obtained. The socks have successfully improved the skin condition of each study patient who was compliant with study guidelines. It is our intention to continue to monitor patients with compromised skin and the effects of wearing the silver socks. The study may also be expanded to include pediatric amputees and a wider age range of children. We have concluded that the benefits of wearing the socks are beneficial enough to continue to prescribe them.

FUTURE IMPLICATIONS: We hope to continue to receive positive feedback on the use of silver socks. We currently have 13 patients in silver socks. As these patients return, we will document results. We have expanded our study to include silver impregnated under shirts for TLSO's. The silver socks have, to this point, been more successful for patients than any kind of medication, lotion, or other treatment for their dermatitis problems. Many of the patients have tried foot fungal creams as well as other lotions and powders with little or no success. Our physicians have been satisfied with the results of the garments and will continue to prescribe them at this facility. To this date, there have been no adverse skin reactions due to the socks.

REFERENCES

- Jerrell, Mary, "New and Innovative Materials and Fabrics in O & P".
O&P Business News, July 15, 2004.26-32.
- Smith, Mark. "Sliver Linings for O & P Devices".
American Academy of Orthotists and Prosthetics. October, 2005.Vol.1, No. 4.
- Sturgis, Sue. "Precious Metal-Foot Care Takes a Shine to Silver".
Biomechanics. February, 2005. 27-32.

Patient A BEFORE treatment with Silver Socks



Patient A AFTER treatment with Silver Socks



Subject	Extremity Involvement	Skin Description	Skin Irritation Size	Length of treatment	Compliance	Results
A	Both Lower	Chronic irritation with eczema dermatitis	Entire foot; heel, between toes, bottom of foot	29 days	100%	Completely clear
B	Both Lower	Athletes foot on both feet	On toes, ¼ to ½" in 3 different areas	46 days	100%	Completely clear
C	Both Lower	Chronic irritation; eczema; Athlete's foot; bites	Entire bottom of foot - 13"	92 days	50%	Slight improvement less red, 10" irritation on foot bottom
D	Both Lower	Chronic irritation; eczema; Athlete's foot	Entire foot	34 days	100%	75% improvement; 1/2" irritation remains on heel