

## TransDRY® Cotton Fabric as a Textile Intervention to Reduce Abdominal Skin Infections and Surface Skin Temperature in Post-Bariatric Surgery Patients

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Annually, 250,000 bariatric surgeries are performed in the US, and have been shown to be extremely useful in the treatment of obesity and co-morbid diseases (Buchwald & Oien, 2013). There has been little research on health-related quality of life issues in post-bariatric patients (ASMBS, 2008). One issue relates to prevention of skin infections, recurrent problems for pre and post-bariatric patients. When rapid weight loss occurs, it can lead to excess skin folds around the body. These folds are warm from friction, moist from sweat and therefore an environment which leads to chronic infections, open wounds or rashes for many patients (Kanerva, 1999) who are reported to spend 25 billion USD annually on skin treatments (Sen, Gordillo, Roy, Kirsner, Lambert & Hunt, 2010; Adams, 2002). This rash can become infected with yeast or bacterial organisms in humid environments. Currently, no preventative measures are taken for skin infections among obese and post-bariatric patients. Steffen, Sarwer, Thompson, Mueller, Baker and Mitchell found that post-bariatric patients reported they were most concerned about excess skin, and likely to have plastic surgery skin removal. Operations can be effective for removing excess skin, but are not recommended these be performed until 12-18 months after the bariatric surgery (2012). This surgery can be quite costly, and is often not covered by insurance. Consequently, most obese and bariatric patients have life-long skin irritation, rashes and infections. Many of these infections can be prevented by providing proper undergarments that help separate the skin folds and keep the area cool and dry. However, most underwear design does not consider body shapes with skin folds and is often made of synthetic fabrics that retain heat and moisture, therefore providing ripe conditions for infections. Research continually suggests that natural fibers, such as cotton, provide more comfort during regular daily activities compared to synthetics such as polyester and nylon (Ciesielska, Mokwinski & Orłowska-Majdak, 2009; Purvis & Tunstall, 2004; Cotton Inc., 2002). Avoiding skin to skin contact, warmth and moisture could dramatically improve skin problems among post-bariatric patients. There are currently no products available that serve as a barrier between excess skin folds with material that promotes a reduction in warmth and bacterial growth.

**Objectives:** The primary goal of this study was to design, develop and test the efficacy of a unique type of underwear made with TransDRY® cotton that could alleviate skin related issues for obese and post-bariatric women. TransDRY®, from Cotton Inc.© provides moisture management, absorbs less perspiration and spreads moisture to dry quickly (Cotton Inc., 2002). Our goal was to evaluate infection frequency and thermal properties before and after wearing the cotton underwear.

**Methodology:** Underwear were manufactured with an antimicrobial finish for the experimental group, and the other half with no treatment for control group. Women (N=24) from a bariatric clinic in the Pacific Northwest were recruited. There were two groups, one in the spring, and one in the fall. Each group test lasted four months; the retention rate was 75% overall. At the beginning of the study women were between 3 -18 months' post-operative, with an average weight loss of 71±42lbs. Women were randomly assigned to either the control group or the experimental group. Each participant was supplied between 10-15 pairs of underwear and provided new sizes as weight loss continued. Women in both

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groups were asked to wear the garment exclusively for four months. They were given oral instructions about how to wear and wash the garment. Subsequent visits were scheduled every 4-5 weeks and included thermal imaging skin temperature (Tsk) and infection data collection.

Results: Over the four-month period, participants skin temperature reduced; they were up to 3° cooler. Infections were reported by 30% of the sample at the beginning of the trial but reduced to 8% at the end of the study, with 71% less infections reported at the end. This study identified a novel way to reduce and, over time, potentially eliminate many factors associated with skin infections for obese and post-bariatric patients. The uniquely designed underwear was effective on reducing frequency of skin infections and skin temperature. This novel, yet simple approach in prevention sciences is a non-invasive way to prevent or manage skin infections among post-bariatric patients.

#### References

Adams, B. (2002) Dermatologic Disorders of the Athlete. *Sports Medicine*, Vol. 32. No.5, pp. 309-321.

ASMBS - American Society for Metabolic & Bariatric Surgery. (2008). Bariatric surgery guidelines. Accessed March 2014 from <http://aace.metapress.com/content/u1w5l4261135n725/fulltext.pdf>

Buchwald, H., & Oien, D. M. (2013). Metabolic/bariatric surgery worldwide 2011. *Obesity surgery*, 23(4), 427-436.

Ciesielska, I., Mokwiński, M., and Orłowska-Majdak, M. (2009). Influence of different kind of clothing material on selected cardiovascular, respiratory and psychomotor parameters during moderate physical exercise. *International Journal of Occupational Medicine and Environmental Health*, 22(3), 215-226.

Cotton Inc. (2002). 100% Cotton Moisture Management, *Journal of Textile and Apparel, Technology and Management*, 2 (3), NC State University.

Kanerva L. Physical Causes. In: Adams RM, ed. *Adams Occupational Skin Disease*, 3rd edition. Philadelphia: WB Saunders Company; 1999: 35-58.

Light, D., Arvanitis, G. M., Abramson, D., & Glasberg, S. B. (2010). Effect of weight loss after bariatric surgery on skin and the extracellular matrix. *Plastic and reconstructive surgery*, 125(1), 343-351.

Purvis, A., & Tunstall, H. (2004). Effects of sock type on foot skin temperature and thermal demand during exercise. *Ergonomics*, 47(15), 1657-1668.

Sen, C. K., Gordillo, G. M., Roy, S., Kirsner, R., Lambert, L., Hunt, T. K., et al. (2010). Human Skin Wounds: A Major and Snowballing Threat to Public Health and the Economy. *Wound Repair and Regeneration*, 17(6), 763-771.

Steffen, K., Sarwer, D., Thompson, K., Mueller, A., Baker, A., Mitchell, J. (2012). Predictors of satisfaction with excess skin and desire for body contouring after bariatric surgery. *Surgery for Obesity and Related Diseases*, 8, 1.