University of Pittsburgh

ID: 3278

Featured Inventors: Esteban Ruiz; David Brienza, PhD

Moisture Permeable Prosthetic Liner

Value Proposition

For amputees experiencing excessive moisture accumulation inside their prosthetic limb as a result of normal sweating who want to improve walking stability, and comfort, the Aquapore Tissue Interface is a prosthetic liner which actively transports moisture out of the prosthetic limb by using new biomaterials and vacuum pumps. Unlike the Alpha liner Smart Temp, the Aquapore T.I. removes any sweat that builds up as a result of inevitable and healthy limb perspiration, instead of trying to prevent the perspiration in the first place by cooling the limb.

Market Opportunity

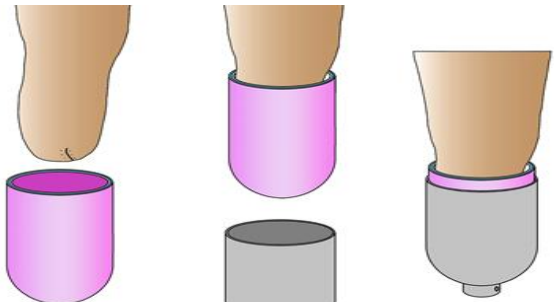
Our major competitors are Ottobock, Ossur, WillowWood and Alps.

The increase in the number of amputees is driving the market. The global market for all prosthetics in 2014 was 1.1 Billion. The market in The US market for liners alone is about 55 Million annually. And as you can see the market has doubled in the past ten years thanks to a steady growth rate of between 5-8% annually.

Competitive Landscape

Current state of the art products use a silicone or thermoplastic gel layer as a prosthetic liner. These materials are soft enough to be comfortable but do not allow any moisture to pass through. As a result active users, users in warm climates or anyone unhappy with their level or perspiration suffer from chronic moisture accumulation in their prosthetic limbs which can lead to sores pain and infections.

Our product uses an advanced biomaterial membrane to act as a moisture permeable layer which allows water to pass through when acted upon by a pressure gradient. The vacuum suction is supplied by commercially available prosthetic vacuums which are currently prescribed to improve the fit of the prosthetic limb.



Prosthetic liners grip the limb and cushion it from bumps

Technology

Making use of new cutting edge biomaterials from the field of bioengineering, the Aquapore Tissue Interface is the world's first moisture permeable prosthetic liner for use with a vacuum linkage system. Using a moisture permeable but airtight material allows us to achieve the best linkage possible together with the removal of sweat.

Stage of Development

We are currently working on validating our key enabling technology, the super tough thin hydrogel membrane. Testing includes toughness as well as permeability testing.

IP Landscape

We have a PCT application (PCT/US2016/055853) submitted through the University of Pittsburgh.

Funding

We have been awarded $21,000 from the Innovation Institute at the University of Pittsburgh as a part of the First and Second Gear accelerator programs offered through the Blast Furnace.

Additionally we were awarded $25,000 from The Idea Foundry through their Life Science Start-Up Accelerator program. under $100k

FEATURED INVENTORS:

Esteban Ruiz

Esteban graduated from UCLA with a degree in bioengineering and a specialization in biomaterials. Esteban Came to Pitt in 2012 in order to use bioengineering design principles to solve long standing problems in prosthetics and is committed to making advances in the laboratory available to consumers.

Education

B.S. UCLA 2012

Publications

1. Ruiz E, (2015) *User Needs and Requirements for the Development of a Moisture Permeable Prosthetic Interface.* Paper presented at The Rehabilitation Engineering Society of America Annual Conference, Denver, CO, 15 June

David Brienza, PhD

Dr. David Brienza is Professor in the Department of Rehabilitation Science and Technology with additional professorial appointments in the Dept. of Bioengineering and the McGowan Institute for Regenerative Medicine at the University of Pittsburgh.

Education

BS, Electrical Engineering, University of Notre Dame, 1986

MS, Electrical Engineering, University of Virginia, 1988

PhD, Electrical Engineering, University of Virginia, 1991

Publications

1. Brienza D , Antokal S, Herbe L, et al. Friction-induced skin injuries - Are they pressure ulcers? An updated NPUAP white paper. Journal of Wound, Ostomy and Continence Nursing. 2014;42(1):62-64.
2. C. Ziraldo, A. Solovyev, A. Allegretti, S. Krishnan, M.K. Henzel, G.A. Sowa, D. Brienza, G. An, Q. Mi, Y. Vodovotz (2013) A computational, tissue-realistic model of pressure ulcer formation in individuals with spinal cord injury. Journal of Critical Care. 02/2013; 28(1):e23.
3. Yi-Ting Tzen; David M. Brienza ; Patricia E. Karg; Patrick J. Loughlin. (2013) Effectiveness of local cooling for enhancing tissue ischemia tolerance in people with spinal cord injury. Journal of Spinal Cord Medicine, 36(4) pp. 357-364. DOI: http://dx.doi.org/10.1179/2045772312Y.0000000085
4. Solovyev A, Mi Q, Tzen Y-T, Brienza D, Vodovotz Y (2013) Hybrid Equation/Agent-Based Model of Ischemia-Induced Hyperemia and Pressure Ulcer Formation Predicts Greater Propensity to Ulcerate in Subjects with Spinal Cord Injury. PLoS Comput Biol 9(5): e1003070. doi:10.1371/journal.pcbi.1003070
5. Charlie Lachenbruch, PhD; Yi-Ting Tzen, PhD; Dave M. Brienza, PhD ; Patricia E. Karg, MS; and Peter Anthony Lachenbruch, PhD. (2013) The Relative Effects of Interface Pressure, Shear Stress, and Temperature of Tissue Ischemia: a Cross-sectional Pilot Study. Ostomy Wound Manage. 2013;59(3):25-34.

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