

FIT *FOR Life*



ENGINEERING *Prosthetic Socket Comfort*

With an amputee-centered approach, Quebec-based Ethnocare has innovated a prosthetic solution to manage residual limb volume fluctuation for better comfort, stability and limb health for lower extremity amputees. Thrive publisher Jeff Tiessen met with one of the company's founders – Louis-Philippe Garneau – to learn more about the product and what it means for Canada's leg amputee community.



Ethnocare Founders (l to r): Louis-Philippe Garneau, Marc-Antoine Malouin and Vincent Breton.

thrive: *Let's talk about the product first. What is it exactly?*

Louis-Philippe: It's called Overlay and it's a transtibial and transfemoral prosthetic device that uses air-based technology to adapt to residual limb volume changes throughout the day. It has a breathable fabric sleeve with an integrated air expansion system to allow users to adjust the fit of their prosthesis without removing it. It's very simple to use. Just press the pump and improve the fit in the socket.

thrive: *As a prosthetic option or solution, what problem is it solving?*

Louis-Philippe: The Overlay addresses one of the biggest challenges amputees face and that's maintaining a proper prosthetic fit throughout the day. As the residual limb's volume fluctuates, amputees often have to remove their prosthesis to add or remove socks multiple times a day. It's an uncomfortable and inconvenient process. But what Overlay does is improve socket fit by providing improved comfort and gait, and reducing the movement inside the prosthesis which reduces the risk of falls. So, it's offering comfort and stability. And we know that the fit of the socket is a main driver of activity.

thrive: *Where did the idea for the product come from?*

Louis-Philippe: Our first product is born out of a personal story. In 2012, my mom had a bilateral amputation, and I watched her struggle daily with discomfort related to her prosthetic sockets. I saw a massive unmet need and I started to research it at university. My team and I did ethnographic research in five rehab centres in Canada, with 30 healthcare professionals and patients. There's been amazing innovation in the foot and knee technologies and socket materials, but an underserving of technology related to the connection between the human and the bionic device. This is why we decided to find a solution to offer the user more comfort, a better fit... something that is better than prosthetic socks for managing limb volume.

thrive: *Does the prosthetist need to create the socket with your product in mind to make room for it?*

Louis-Philippe: It's a good question. There are a couple of ways you can use it. It's retrofitted. So, if you have at least one millimetre of room in the socket, you can use the product because it's about one millimetre in terms of thickness. But if you

want to create the socket so that you can use it at your maximum volume, the prosthetist can make the socket one mm bigger. It goes over the liner, and then into the socket, so we don't change the interface between the limb and the socket. So, you don't have to change the prosthesis or the liner. You're just done with socks. You don't have to use them anymore.

thrive: *What did the development or design process entail?*

Louis-Philippe: Ethnocare's user-centered design approach began with ethnographic research involving professionals and patients in rehabilitation centers. In university, I studied product design as an undergrad at Laval University, which is a distinct discipline, a mix of engineering and social science to research and better understand a defined problem. and then develop a solution. I'm one of three founders. With the results of the research being quite successful



Louis-Philippe Garneau and his mother Line, the first user of the Overlay.

we decided to create a company to make a real impact. You can have ideas. You can have a prototype, but if you don't put it in the market, if you don't develop something, it will always be just an idea. So, we decided to act on it and develop solutions for people.

thrive: *Did you need to seek financial support or investors?*

Louis-Philippe: Absolutely. In the beginning, what we were doing was mostly based on grants and bursaries. But we wanted to grow and actually produce the product. So, we raised funds. It was a seed round with venture capital firms and a private investor. It was a 2.5-million-dollar round of financing, including the Government of Quebec. We launched in 2022 and are now in more than 30 countries and on every continent except Antarctica.

thrive: *What kind of feedback are you getting from amputees?*

Louis-Philippe: The feedback is very good. We constantly hear that it's a "game changer." Volume fluctuation is an issue that is the same for amputees wherever they are in the world. Users consistently report improved comfort, increased confidence, and greater mobility. Many describe Overlay as transformative, giving them the ability to adjust on the go and stay active longer.

thrive: *Has there been any push-back or resistance to the product as there sometimes can be with innovative entries to any established industry?*

Louis-Philippe: For the profession, it's a seamless integration in the existing workflow and since it has a positive outcome for patients and clients, prosthetists are quite appreciative of it. And it's not expensive to try. You just put it over the liner and you have a real-time assessment. We developed it in collaboration with prosthetists and doctors, with their input, before putting it on the market. Feedback tells us that Overlay reduces follow-up visits related to fit issues.

We support prosthetists with the Ethnocare Academy which is an educational platform providing training, best practices, and updates on new technologies. The goal is to contribute to a knowledgeable, confident network of practitioners who deliver the best outcomes to users.

That said, at first, we were a bit naive when we decided to go into the health field, thinking every innovation is well received. What we found out is that there is a reimbursement system that is very strict and very hard to penetrate and very hard to have an impact on. You've got to be creative to put a product on the market in that type

of environment. In Canada, there's a different system in each province with different reimbursement codes. It's pretty complex, but we have a whole team working on that.

thrive: *Yet, there are clearly medical benefits associated with Overlay?*

Louis-Philippe: Of course. Volume fluctuation can cause a number of issues. A shift in the prosthesis can cause pressure points. Pistoning will induce shear forces that can increase the potential for skin injuries, discomfort, and pressure points in the socket. That can affect gait cycle because the body is compensating for pain, and also for the misalignment. This compensatory mechanism can cause a hip problem, or a knee problem, and then a back problem. Also, the stability of the socket is very important for prosthetic control. A poor fitting socket will increase the risk of a fall. All of those things are manageable when you have a solution for socket fit.

thrive: *What does the future look like as Ethnocare envisions it for itself and the amputee community?*

Louis-Philippe: Ethnocare envisions a future where prosthetics are intelligent, adaptive, and empowering. Overlay is just the beginning. The company is developing an ecosystem that integrates hardware and software, aiming to become a global leader in next-gen orthopedic solutions. Ethnocare isn't just a company. We believe in building a world where no physical limitation defines a person's potential. Through innovation, empathy, and collaboration, we're turning that vision into reality one step and one empowered user at a time. A lot of innovation from us is still to come for better mobility and better quality of life.

To learn more about the Overlay, visit ethnocare.ca.

