MEDICAL BREAKTHROUGHS
RESEARCH SUMMARY

TOPIC: NEXT GENERATION OF PROSTHETICS: THE ARTIFICIAL HAND THAT FEELS
REPORT: **MB #4784**

BACKGROUND: There are currently two million Americans living with the loss of a limb. One of the main reasons, about 55 percent, for limb loss is a range of diseases like vascular disease, cancer, diabetes, and peripheral arterial disease. However, the other 45 percent is the result of trauma. In fact, about 75 percent of upper extremity amputations are the result of traumatic incidences. And, in developed countries, the main cause of lower limb amputation is circulatory dysfunction. There are 185,000 amputations done in the U.S. each year and Black Americans are up to four times more likely to have an amputation than white Americans. After amputation, patients have to undergo extraneous rehabilitation. This rehabilitation is to improve the overall quality of life for the patient physically, emotionally, and socially. Rehabilitation can include treatments for wound healing and care, activities to improve motor function, and restore the ability to accomplish tasks of daily living, strength, and endurance, fittings of prosthetics, pain management, emotional support, counseling, and at-home environmental safety adaptations. (Source: https://www.amputee-coalition.org/resources/limb-loss-statistics/#:~:text=There%20are%20nearly%202%20million,than%202%25)%20(1).

CURRENT PROSTHETICS: Many amputees opt for the use of an artificial limb also called a prosthetic. While prosthesis advance and improve quality of life for many patients, for years artificial limbs have been uncomfortable, inefficient, and hard to emotionally connect with—a big mental hurdle for patients. While current technology has made advancements in these areas, particularly lifelike qualities, future innovations will be based on three primary factors. These factors are the demands of the amputees, technological advancements in surgery and engineering, and sufficient and sustainable healthcare funding. Prosthetic technology has made massive leaps in the past two decades allowing otherwise healthy individuals to participate in the full range of normal life responsibilities and activities. The most complex part of a prosthesis is the interface between stump, the limb remnant, and socket, the artificial limb. This contact is the main source of patient comfort and the ability to control the prosthetic.
(Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1121287/)

NEW TECHNOLOGY: A remaining problem for amputees using prosthetics is the inability to feel the world around them. This lost sense of touch in the artificial limb doesn't just affect the patient's ability to feel texture or temperature, it deprives them of all feedback information. Patients using prosthetics often don't know when the artificial limb has made contact with another object, how much strength they are using to touch that object. Now researchers at CU Boulder, Case Western Reserve, And the Cleveland VA Medical Center are working to understand the systems that are still at play and can be manipulated in amputees. "We're tapping into that wire before it gets to the brain, and then the brain can't tell whether it's coming from the finger or from our artificial system," said Tyler, a professor at Case Western and a VA researcher. These new prosthetics will hopefully lead to a much greater quality of life for amputees.
(Source: https://www.colorado.edu/today/2020/05/21/prosthetics-can-feel-now-closer-reality_

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If this story or any other Ivanhoe story has impacted your life or prompted you or someone you know to seek or change treatments, please let us know by contacting Marjorie Bekaert Thomas at mthomas@ivanhoe.com