McGowan Institute for Regenerative Medicine
A program of the University of Pittsburgh and UPMC

New Processes Could Provide Personalized Pain Treatment

As reported by Karen Ferrick-Roman, *Duquesne University Fall 2014 Magazine*, pain costs Americans up to $635 billion each year for medical treatment and in lost productivity, says the Institute of Medicine of the National Academies. That hefty price tag is equivalent to the first 10 years of spending for homeland security, illustrating a nationwide problem of giant proportions. Today, an estimated 116 million Americans live with chronic pain.

With the goal to introduce new ideas into pain research and bring people together across disciplines who typically would not work on pain or even collaborate, the Chronic Pain Research Consortium was co-founded on May 16, 2011, at Duquesne University by McGowan Institute for Regenerative Medicine affiliated faculty members Jelena Janjic, PhD, Assistant Professor of Pharmaceutics in the Graduate School of Pharmaceutical Sciences and Mylan School of Pharmacy at Duquesne University, and John Pollock, PhD, Full Professor of Biological Science at Duquesne University, out of love and passion for patient care, multidisciplinary science, and a holistic view of life and medicine. Since that time, Duquesne University scientists study all aspects of chronic pain, from molecular mechanisms to mind-body interaction and psychological impact of pain on relationships and quality of life. The team includes pharmacists, nurses, physical and occupational therapists, neurobiologists, neuropharmacologists, molecular biologists, medicinal chemists, and pharmacuetical scientists.

Most pain studies focus only on biology or behavior, drug delivery or microscopic cell anatomy, but the research of Drs. Janjic and Pollock incorporates each of these areas to personalize pain treatment. Their methods could enable doctors to pinpoint where pain is originating, then provide medication to that precise location—allowing a smaller dose of medication to be effective in curtailing pain while creating few side effects. This could be a breakthrough for treating pain, Dr. Pollock explains, because soreness in one location might actually be caused by a pinched nerve or issue elsewhere.

“The process relies on the interplay between the immune system and the nervous system to work,” he says.

The first step is to envision the pain with Drs. Janjic and Pollock’s non-invasive fluorescence imaging and MRI imaging achieved in collaboration with Carnegie Mellon University, pinpointing the origins of pain-inducing inflammation. Next, researchers specifically locate the immune cells involved in pain, then target them with medication.

Dr. Janjic has pioneered targeted drug delivery to treat pain, developing nanodroplets that, when injected intravenously, accumulate at the inflamed areas. This process could have a huge impact for people with inflammation-related pain, including osteoporosis and arthritis.

“We’re helping to fulfill a completely unmet need in pain research,” says Dr. Janjic.

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