Identifying the genetic determinants of postoperative pain

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Video Abstract

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Abstract

Going in for surgery? It's possible the level of pain you'll experience during recovery is encoded in your DNA. This conclusion draws from the work of an international collaboration of researchers. By looking at the outcomes of over 1000 patients, they pinpointed factors linked to ongoing postsurgical pain. They found that one important determinant is the code of a single gene – the brain-derived neurotrophic factor, or BDNF, gene – opening new avenues for how we understand, and treat, chronic pain. Nearly all surgical patients experience some degree of postoperative pain, but it's usually resolved as they heal. For many, however, it can last for months or even years – a condition referred to as chronic postsurgical pain. Although some elements that lead to this condition are known – nerve injury during surgery, for example, is one common cause – there's often no easily identifiable culprit. Enter genetics. DNA has previously been linked to pain perception – for instance, there are genes that lower pain threshold. But its role in postsurgical pain is less clear. To better understand this relationship, the researchers compared patients' self-reported pain and quality of life scores before and 12 months after surgery against their genetic make-up, obtained using DNA sequencing. They specifically focused on changes in single nucleotides, known as single-nucleotide polymorphisms or SNPs. By narrowing down an initial pool of 638 SNPs from 54 pain-related genes, they identified a single spot in the BDNF gene that correlates with postoperative pain. Whether a person carries a normal or variant allele seems to directly affect their experience of postsurgical pain, with the variant allele making it more likely that the pain becomes chronic. This also held true for mice: they, too, were more likely to experience pain after a simulated surgery if they carried the variant allele. Perhaps most importantly, the variant allele was tied to the occurrence of chronic postsurgical pain regardless of surgery type, anesthesia used, or lifestyle factors, indicating just how strongly genetic make-up can influence recovery. Although exactly how this allele intensifies pain isn't known, preoperative screening for this genotype may lead to better postoperative management of pain, and potentially a better quality of life, for surgical patients.