WOMEN'S PAIN IS DIFFERENT FROM MEN'S—THE DRUGS COULD BE TOO

A. Men and women can't feel each other's pain. Literally, we have different biological pathways for chronic pain, which means pain-relieving drugs that work for one sex might fail in the other half of the population. So why don't we have pain medicines designed just for men or women? The reason is simple: Because no one has looked for them. Drug development begins with studies on rats and mice, and until three years ago, almost all that research used only male animals. As a result, women in particular may be left with unnecessary pain—but men might be too.

B. Now a study in the journal Brain reveals differences in the sensory nerves that enter the spinal cords of men and women with neuropathic pain, which is persistent shooting or burning pain. The first such study in humans, it provides the most compelling evidence yet that we need different drugs for men and women. "There's a huge amount of suffering that's happening that we could solve," says Ted Price, professor of neuroscience at the University of Texas, Dallas, and an author of the Brain article. "As a field, it would be awesome to start having some success stories."

C. Some 50 million people struggle with pain most days or every day, and chronic pain is the leading cause of long-term disability in the United States. Women are more likely than men to have a chronic pain condition, such as arthritis, fibromyalgia, or migraines. Meanwhile, pain medications are killing us. About 17,000 people die each year from prescribed opioids as clinicians write almost 200 million opioid prescriptions, or more than one for every two American adults.

D. The failure to include sex differences in the search for better pain relief stems in part from flawed but deep-seated beliefs. "Medical researchers made the assumption that men and women were absolutely identical in every respect, except their reproductive biology. If there were differences in how their drugs worked between men and women, they didn't want to hear about it" says Marianne Legato, a cardiologist who began sounding an alarm in the 1980s about differences in heart attack symptoms among women. She went on to pioneer a new field of gender-specific medicine.

E. The Brain study came about from a unique opportunity at M.D. Anderson Cancer Center in Houston. You can't take a biopsy of spinal tissue, but researchers were able to study clusters of sensory neurons in eight women and 18 men who had spinal tumors removed. The analysis included sequencing RNA to determine which genes are active in the neural cells. They compared men and women who had a history of chronic neuropathic pain to those who didn't. Their pain wasn't caused by the tumors themselves. Some patients had nerve compression causing neuropathic pain, while others didn't have neuropathic pain or chronic pain at all. In men who did have neuropathic pain, macrophages—cells of the immune system—were most active. In women, neuropeptides, which are protein-like substances released by neurons, were prominent. "This represents the first direct human evidence that pain seems to be as sex-dependent in its underlying biology in humans as we have been suggesting for a while

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now, based on experiments in mice," says Jeffrey Mogil, professor of pain studies at McGill University in Montreal and a leading researcher on sex differences in pain, who was not involved in the Brain study.

F. Tailoring new medicines to men or women would be revolutionary, particularly considering that it took many years for women (and female animals) to get included in pain research at all. Fearful of potential birth defects, in 1977 the FDA cautioned against including women of childbearing age in clinical trials, which meant women used drugs solely designed for men. By 1993, the thinking had changed, and Congress passed a law requiring the inclusion of women in clinical trials funded by the National Institutes of Health. Although clinical trials now include both men and women, they often don't report results by sex.

G. The acknowledgement of sex differences in pain could stir up the field and lead to new advances. Amid the promise of "personalized" medicine, with drugs tailored to patients based on genetic sequencing, developing pain medicines for half the population seems like a no-brainer. "Now there's a whole new frontier opening up in front of our eyes," Price says.

Questions 21-26

Complete the sentences below

Choose **NO MORE THAN TWO WORDS** from the passage for each answer

Write your answers in **boxes 21-26** on your answer sheet

21. Chronic pain is considered the root of .....in many people in the US.

22. It used to be assumed by medical researchers that .....was the only difference found in men and women.

23. The study at M.D. Anderson Cancer Center included participants whose ..... were cut off.

24. ..... were the cells that functioned most strongly in men having neuropathic pain.

25. The Brain study suggested that pain was likely to be .....in terms of the biology.

26. Women during the .....used to be refused to be included in medical experiments.

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