Neglect your back to control your pain?

Chronic low back pain (cLBP) is among the most common disorders leading to inability to work in industrialized countries, despite (or because of?) an armada of doctors trying to treat it. Ten years ago, anyone saying that these patients “neglect” the back would have been considered crazy; we were convinced that the opposite was the case, that they concentrate on their back and are highly aware of their pain.

In this issue of Neurology®, Moseley et al. explain that sensory neglect and back pain must not be a contradiction; they rather have a so far neglected connection. In order to understand this relationship, we should first move away from the back to the limbs. For basic limb functions, such as intentionally grasping a pencil, we need an intact body perception (body scheme). Our brain must integrate proprioceptive input from the hand with visual recognition of where and how the pencil is positioned and the memory that a pencil has 50 g weight; this translates to motor output to the various arm muscles, all within milliseconds. If pain occurs during the movement itself, this finely tuned concert of neuronal action may be disrupted, leading to impaired motor efficiency. If pain is permanent and intense, it also reduces the awareness of nonpainful signals from the painful limb leading to functional sensory deficit, and distorted visual awareness. In order to overcome this disruption of the unconscious intrinsic body reference scheme during grasping the pencil, the patient must now shift the conscious attention toward the painful hand, which might increase the pain.

Moseley et al. now show that such phenomena might not only exist for the limbs, which have a large representation in primary somatosensory cortex (S1), but also for the lower back, which is grossly without differentiated voluntary muscle control and much less represented in S1. The authors perform experiments with pairs of vibro-tactile stimuli delivered to both sides of the back and both hands in different chronological sequences. In order to perceive the stimuli as simultaneous, they must be delivered earlier to the painful back, but also to the ipsilateral hand when it is held close to the painful back (pain space). Stimuli delivered to the upper back or to both hands held away from the painful back were recognized simultaneously. Interestingly, the magnitude of delayed recognition of these nonpainful stimuli was related to duration of pain, not the magnitude. That is, back pain patients process non-noxious vibrotactile stimuli from the pain space more slowly and prioritize input from nonpainful spaces indicating sensory extinction and neglect.

One might argue that in cLBP patients subclinical lesions to the dorsal nerve roots could be responsible for decreased awareness of vibration on the pain side (not addressed in this article), or that pain suppresses nonpainful afferent input from the respective body region. However, such assumptions would not explain the results from the hands. Studies in which the body scheme is intentionally disrupted show that sensory perception and even vegetative outputs to the affected area might be compromised. The brain regions that are responsible for multisensory integration of body signals are the prefrontal, the parietal cortex, and the basal ganglia. However, the subjects in the present study did not intentionally disrupt their body scheme—the pain did. Chronic limb pain changes the representation of limbs in S1 and the motor hand control in the parietal and frontal cortices, but we still have no imaging data reporting how pain induces spatial neglect. Such studies are needed. Otherwise we will never know whether the neglect as reported in this study is the consequence of pain-induced brain neuroplasticity, or whether it really serves as a “defensive wall” preventing spreading or excruciating pain as suggested by the authors.

There are limitations in this study. The investigators were not blinded and have a clearly predefined hypothesis. Psychophysical and cognitive experiments are subject to influence by the investigators. It is not clear whether results from sophisticated exper-
imental settings can be applied to “real-world” implementation. For instance, a recent report questions the efficacy of graded motor imagery for complex regional pain syndrome in the clinical setting, despite the encouraging results of controlled trials.\(^{10}\) Therefore, as cLBP is clinically heterogeneous with substantial psychosocial associations, the present study has to be followed by multicenter trials which will help to avoid investigator bias.

Nevertheless, the present results are conclusive, the study is well-controlled, and the results fit nicely with the sometimes peculiar descriptions of the painful body region from our patients. One major goal must now be to show how body and mind have to be rearranged to tune down chronic pain—by intensifying or by shutting down the neglect of the back? This would not only foster our understanding of pain, it would help to design tailored neurorehabilitation programs for patients with chronic low back pain.

**DISCLOSURE**

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**REFERENCES**