Sensitivity attributable to pain found transferable to other mice

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(Medical Xpress)—A team of researchers with Oregon Health and Science University has found that pain sensitivity in mice is transferable

to other mice. In their paper published in the journal *Science Advances*, the team describes the studies they carried out with mice, what they found and possible reasons for what they observed.

The researchers note that their original research effort was aimed at learning more about what happens with mice suffering withdrawal symptoms from alcohol and cocaine after being caused to become addicted to them—withdrawal symptoms in mice, as in humans, can be quite painful. As the study continued, the researchers discovered that other mice kept in the same lab that were not part of the study also became sensitive to the same type of pain as the withdrawing mice. Intrigued, the researchers set up some experiments to discover if the pain experienced by one group of mice was truly having an impact on another.

The experiments consisted of separating mice into three groups—the unlucky group was subjected to different types of pain; another group was kept in the same room but was not subjected to pain, and a third group was kept in another location and also experienced no pain—they served as the control. The mice subjected to pain were those undergoing withdrawal symptoms and some others that had an irritating chemical injected into a paw. The researchers then tested sensitivity to the pain in all three groups by dipping tails in warm water, tickling paws with fine hairs, etc.

The researchers found that the mice held in the same room as the mice undergoing actual pain from withdrawal developed the same degree of sensitivity to it. They also found that mice near those having chemicals injected to their feet experienced approximately half the increased sensitivity as those actually feeling the pain. In both cases, the control mice showed no increase in sensitivity.

Suspecting that the sensitivity was being transferred by odor, the

researchers moved some of the straw lining the cage bottoms of pain-experiencing mice and put it into cages of mice held in another room and found that doing so caused the same sorts of increased sensitivity they had measured earlier. This finding, the team suggests, indicates that the sensitivity is transferred somehow through odors. To make sure it was, indeed, pain sensitivity that was being passed, the researchers ran similar experiments where mice were stressed rather than caused to feel pain and found no transfer of sensitivity.

More information: M. L. Smith et al. Social transfer of pain in mice, *Science Advances* (2016). DOI: 10.1126/sciadv.1600855

Abstract
A complex relationship exists between the psychosocial environment and the perception and experience of pain, and the mechanisms of the social communication of pain have yet to be elucidated. The present study examined the social communication of pain and demonstrates that "bystander" mice housed and tested in the same room as mice subjected to inflammatory pain or withdrawal from morphine or alcohol develop corresponding hyperalgesia. Olfactory cues mediate the transfer of hyperalgesia to the bystander mice, which can be measured using mechanical, thermal, and chemical tests. Hyperalgesia in bystanders does not co-occur with anxiety or changes in corticosterone and cannot be explained by visually dependent emotional contagion or stress-induced hyperalgesia. These experiments reveal the multifaceted relationship between the social environment and pain behavior and support the use of mice as a model system for investigating these factors. In addition, these experiments highlight the need for proper consideration of how experimental animals are housed and tested.