

# Findings on bladder-brain link may point to better treatments for problems in sleep, attention

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Bladder problems may leave a mark on the brain, by changing patterns of brain activity, possibly contributing to disrupted sleep and problems with attention. For one in six Americans who have overactive bladder, the involuntary bladder contractions that often trigger more frequent urges to urinate, such mind-body connections may be of more than academic interest.

"We often tend to focus on just one organ, but here we see how an abnormal organ affects the whole organism," said behavioral scientist Rita J. Valentino, Ph.D., of The Children's Hospital of Philadelphia, who led the research describing how an overactive bladder altered nervous system activity in animals.

The study appeared in the July 21 online edition of the *Proceedings of the National Academy of Sciences*.

Overactive bladder, while it occurs in a variety of conditions in both adults and children, is especially prevalent among elderly men, in whom an enlarged prostate gland partially obstructs the flow of urine and makes bladder muscles contract involuntarily. Valentino's research team mimicked the condition in an animal model by surgically constricting the outlet of urine from rats' bladders.

Building on their previous investigations of the neural circuits between

the bladder and the brain, the researchers found that two small brain structures, the Barrington's nucleus and the locus ceruleus, developed abnormal activity as a result of the bladder obstruction. In particular, the locus ceruleus showed persistently high activity, and this resulted in an abnormal electroencephalogram (EEG) recorded from the cortex, the broad mass of the brain that governs higher-level functions. In people, abnormally high activity in the cortex may result in disordered sleep, anxiety and difficulty in concentrating.

Valentino said further studies are necessary to analyze the direct connections between heightened brain activity and specific behaviors, but added that the brain circuits involving the locus ceruleus might be a useful target for drugs to improve attention and sleep patterns in patients with bladder dysfunctions.

Furthermore, she added, in addition to overactive bladder, other visceral diseases, such as irritable bowel disorder, may also affect the same neural circuitry, with similar neurobehavioral consequences.

Source: Children's Hospital of Philadelphia

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