Two studies pave way for trauma, diabetes remedy

Scientists Find Why People Fear Small Things Long After Bad Experiences

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Once bitten, twice shy. How do people start getting scared of a harmless thing because it was once associated with a traumatic incident long ago? Two city researchers, who have found the answer, say certain processes in the brain may cause this.

Their discovery could lead to remedies for Post-Traumatic Stress Disorder (PTSD), a condition commonly reported among soldiers, victims of sexual violence, accidents, natural disasters and terrorism.

The researchers from the National Centre for Biological Sciences (NCBS) have explained their discovery in a paper published in the latest issue of the journal Nature Neuroscience.

Sumantra Chattarji, a professor of neurobiology, and his student Supriya Ghosh have thrown light on the brain's ability to distinguish safe from dangerous stimuli, and how it can go badly wrong leading to a state of generalized fear.

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"Remembering what is dangerous is important – in this sense fear is essential for survival. But sometimes, it is transformed into generalized fear and we become afraid when we shouldn't be!"

Chattarji cited the case of a Vietnam war veteran suffering from PTSD. He saw his friend's beheaded body on a bamboo mat during monsoon has intense flashbacks of his decapitated friend whenever he hears a clap of thunder or touches a bamboo mat. Although the incident happened decades ago, the vivid memories continue to produce a state of hyperarousal and intense fear. "How did that specific trauma morph into a state of generalized fear and anxiety? This is what we explored," explained Chattarji.

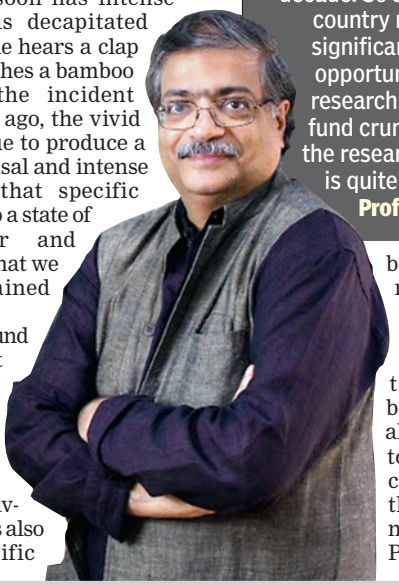
The research found that an aberrant electrical signaling in single neurons in a brain region called amygdala can give rise to abnormally high activity. The researchers also identified a specific biochemical signaling mechanism inside amygdala neurons that results in generalized fear.

"Since our results identify mechanisms in the brain that underlie generalized fear, the next step is to study how these effects can be reversed. We hope that this will help devise new strategies for treating PTSD," he said.

WHAT STUDY FOUND

- Rats were exposed to two distinctly different sounds. **One was paired with a mild electric shock.** Thus, one of the tones predicted danger. The rats quickly learned to discriminate between the two tones by showing big fear to one
- **Electrical signals in a majority** of amygdala neurons fired more in response to the tone paired with shock
- Later, the shock was made stronger. Then, the same **animals lost their ability to discriminate between the two tones** and began showing a greater fear response to the safe tone too
- **In animals that started fearing the safe tone, there was a significant shift in the electrical activity of amygdala neurons.** Almost five to six times as many neurons in the amygdala responded to both the safe and dangerous tones
- **A much larger proportion of amygdala neurons** lost their ability to discriminate between the safe and dangerous stimuli — causing the observed fearful behaviour in the rats
- Thus, faced with the potential **for greater danger, neurons in the amygdala** reflect the animal's tendency to play it safe

> Many talented scientists are now returning to India. Funding for research has been increasing steadily over the past decade. So scientists across the country now have access to significant resources and better opportunities to do basic research. Compared to the fund crunch in the US and Europe, the research atmosphere in India is quite positive
>
> **Prof Sumantra Chattarji**



Nano discovery promises to help prevent ageing

TIMES NEWS NETWORK

It's a discovery that promises to revolutionize healthcare by helping to prevent ageing and cardiac disorders, besides cancer and diabetes. A team of scientists from the Indian Institute of Science has found that nanowires made of a specific compound (vanadia) can reduce cell damage in the human body, which leads to disorders.

The discovery can help develop drugs that prevent ageing, cardiac disorders, and several neurological diseases like the Parkinson's and Alzheimer's.

Our body produces something called reactive oxygen species (ROS) during normal cellular metabolism and an increase in ROS level results in damage of cellular components. This is responsible for various conditions ranging from premature greying of hair to diseases like cancer, diabetes, arthritis and kidney disorders.

While there are drugs to control ROS, even they produce ROS in small proportions. This led the IISc team, led by Professors G Mugesh and Patrick D'Silva, to initiate research to find if they could concentrate on a mechanism that can mimic natural detoxification pathways to control ROS.

In a paper published in Nature Communications, they have shown that vanadia nanowires actually mimic a natural antioxidant enzyme. The team demonstrated that vandia nanowires can control ROS accumulation and stop the resulting cell damage.

Stressing that entry of nanowires inside the cells is crucial, the researchers said they treated human cells from different organs and made sure that the nanowires could efficiently enter the cells. This shows that vanadia nanowires possess detoxifying abilities for a variety of cells. Interestingly, vanadia in bulk and foam form do the exact opposite: they enhance ROS levels; hence the nano size of vanadia is critical for its function.