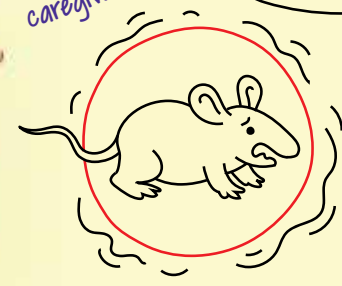


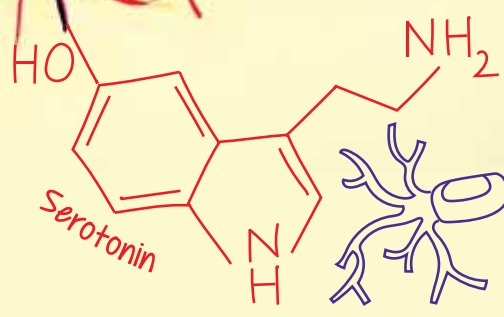
Baby mice separated from caregiver, showed anxiety!



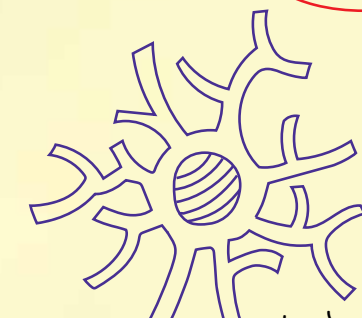
Serotonin increases mitochondrial function



Stress affects physical and mental health



Serotonin is a neurotransmitter, a chemical that acts as a messenger between the brain and the rest of the body



More than a feeling

A few years ago, the National Health Service in the UK started 'social prescribing' to improve health. Social prescribing encouraged patients to be out and about and be involved in their communities. Activities such as gardening, forest bathing, a game of bingo were all part of social prescribing. This was official recognition that health (mental and physical) is affected by several factors including social isolation. Evolution has ensured that our brains are wired to respond to our environments in specific ways. And those responses have effects on mind and body.

At this point we are all familiar with the many terrible ways that stress can affect physical and mental health. Prof. Vidita Vaidya believes that how we cope with stress will determine how we live and how we will die. The chemical we now call serotonin has been known to scientists for more than a century. In the 1950s, scientists discovered the presence of serotonin in the human central nervous system. Serotonin is a neurotransmitter, a chemical that acts as a messenger between the brain and the rest of the body. It is responsible for mood modulation, learning, memory, and several biological functions in the human body. And serotonin production is boosted by many of the activities relating to social prescribing. The role of serotonin on brain function and behavior has been known since the 1950s. But how and what that role was on brain mechanisms was unclear — until now.

Prof. Vaidya's work involves studying the brain mechanisms that lie behind changes in emotional behaviors and mood disorders, and how serotonin determines these behaviors.

Using mice, Vaidya and her team, determined that early life stress has a role to play in mental health disorders such as anxiety and depression in adults. How they did this was by separating baby mice from their mothers and then studying their behavior over time. Many of the babies in later life exhibited anxiety-like behavior. The team discovered that the behavioral change is because of changes to serotonin receptor function in the brain. They then tweaked serotonin receptors in the baby mice using a genetic toolkit to see what would happen. Sure enough, they saw changes in behavior in the mice.

Importantly, the team also made a discovery about serotonin's role in energy production in nerve cells or neurons. Neurons are some of the longest lived cells in the human body and they consume a lot of energy. About 20% of energy produced by the body is used up by the brain. Energy production in all cells in our body is controlled by tiny organelles in the cells called mitochondria. Prof. Vaidya and her collaborators discovered that mitochondrial function is regulated by serotonin. Increased serotonin meant increased mitochondrial function, boosting energy production in the neurons.

Prof. Vaidya's discoveries have enormous clinical implications. The function of serotonin in boosting energy production has particular relevance for the aging brain and in neurodegenerative disorders. Vaidya's findings about how early stress affects mental health in adults has implications in how we understand and treat mental health disorders such as anxiety and depression.