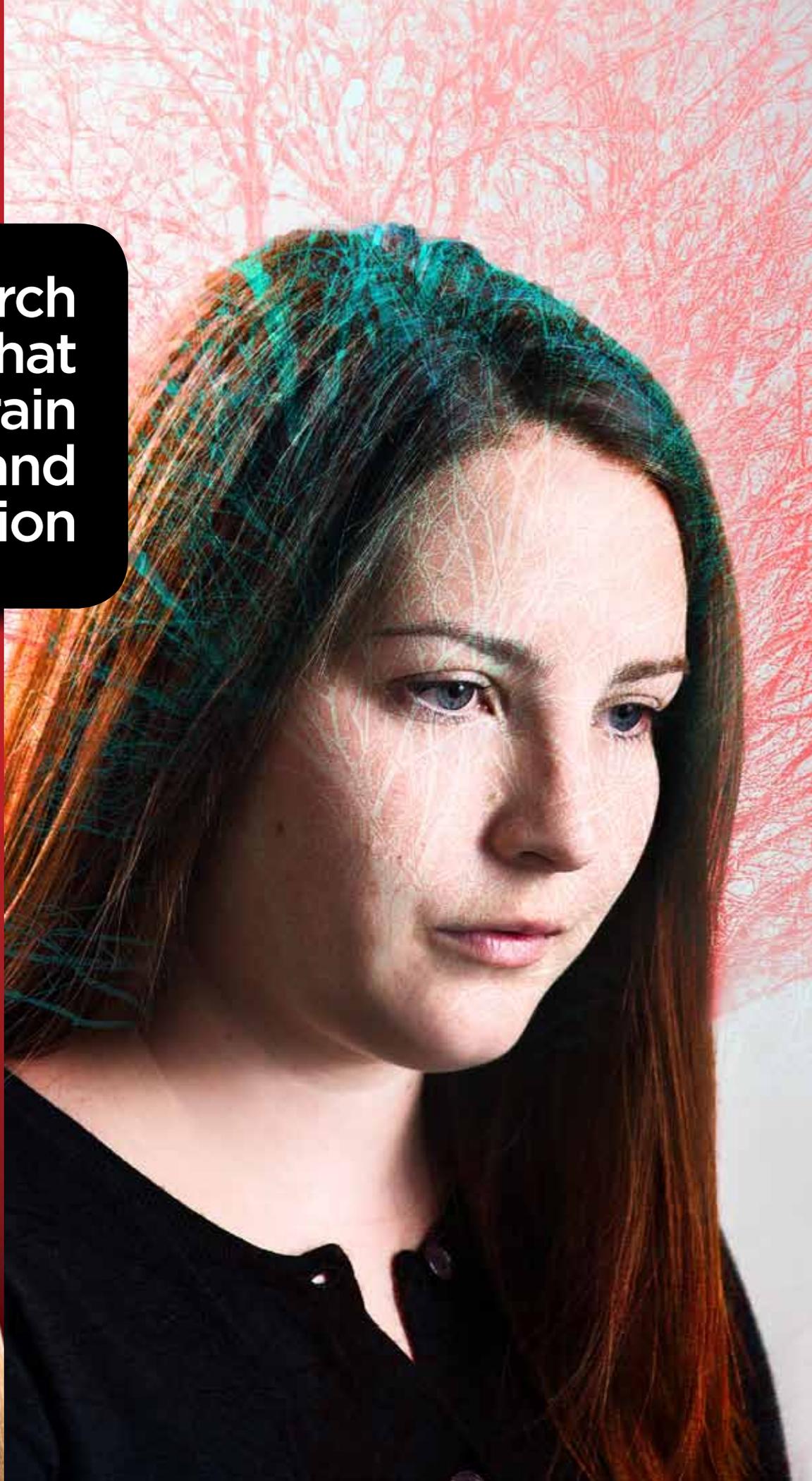


# Research into What Triggers Brain Repair and Regeneration

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# Natalina Salmaso Hunts for the Triggers that Help the Brain Repair and Regenerate

As a clinical psychologist, Natalina Salmaso discovered how resilience can vary greatly from one person to the next among mental health patients managing serious issues. A fresh direction in research took her to a complex new web of science encompassing the molecular, neurological and biological functions of the brain.

Salmaso's twin disciplines in psychology and neurobiology enables innovative research now in two areas of brain development and mental illness. One is development and growth resulting from enriched learning of new social, behavioral and other complex tasks. The other involves the protective capacity of the brain's system of housekeepers known as astroglial cells, which clear debris from the brain, nourish neurons needed to send signals all over the body, and ensure proper neuron function.

Salmaso's work expands on a growing field of research involving neuroplasticity, where it now is known that modifications occur in the internal structure of the brain with learning. Her laboratory work has focused on development in newborns, particularly very premature babies who frequently show developmental and cognitive disabilities, and in mental illnesses such as anxiety and mood disorders.

Very little research in this area involves an investigation specifically of neurobiological mechanisms in

the brain that enable environmental enrichment to improve recovery of cognitive disabilities. Her previous work has demonstrated that environmental enrichment in juveniles leads to an increase in the population of astroglial stems cells in the hippocampus, a brain region which is associated with memory and emotion regulation.

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**“Results from these studies will further help us to understand the relationship between environmental events during development, vulnerability to anxiety disorders and the potential for treatment. Much more work is needed but we want to find answers that will be beneficial to the mental health profession in years to come.”**

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Salmaso's research, however, also shows that the same astroglial response is not seen in adults, particularly older adults. Her investigation would examine molecular structure that might identify factors that could boost therapeutic methods in different age groups and possibly examine any potential gender differences.

One mystery that needs to be solved is why astroglia are not now repairing neurons that don't work. Unveiling the mechanisms involved in changes to astroglial cells will give science and medicine better tools to enhance regeneration and possibly provide protection against changes in the neural system in the aging or injured brain.

## THE RESEARCH

### What I do

Analyze behavioral, biological and molecular factors that can influence and improve cognitive and emotional outcomes among those with developmentally delayed or diminished neurological capability and mental illnesses.

### Why it matters

Advanced medicine has improved the survival rate among prematurely born children, the aged and people with brain injuries, however, their quality of life remains below average and plagued with psychological and neurological pathology. Research into the molecular and biological underpinnings of brain function will provide for therapies to improve cognitive impairment.

### What it will change

A rich, stimulating learning environment through behavioral, social and other complex tasks can improve developmental and cognitive disabilities, although the neurological and biological mechanisms are not yet understood. Neurobiological research could lead to improved methods and treatment for the aging and injured brain.

## THE RESEARCHER

2014 - Canada Foundation for Innovation grant to set up laboratory to study the role of astroglial cells in psychiatric illness and treatment.

2013 - The Brain & Behavior Research Foundation, Young Investigator Grant to study anxiety, Yale University.

## PARTNERS

Research affiliations include Yale University, and the Children's National Medical Center, Washington, D.C.

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**“We know that environmental enrichment through social, behavioral and other complex tasks can improve cognitive impairment in young children. Our experiments will build a data set to examine the responsiveness of astroglial cells—which aid in development, regeneration and repair of neurons—to environmental stimuli in the context of psychiatric illness.”**