The Exeter College Summer Programme
at Exeter College in the University of Oxford

Stress and Trauma: The Road to Mental Illness and Back to Health

Course Description

What is stress? What is the difference between "good stress" and "bad stress"? How does the brain and the body communicate with each other to respond to stress? Can a major trauma really turn your hair grey overnight? What happens to our memory when we are stressed? Can stress lead to mental illness? What does bacteria in our gut have to do with the brain on stress? Why do we respond to stress and trauma so differently? How does racial discrimination get "under your skin"? How to build resilience to stress and trauma?

It has been shown that stress of our everyday life and major traumas impact the development and functioning of the nervous system. The link between stressful life events and traumas of different kind with mental illness is well established. We are at the beginning to decipher how the different systems in our body, including the nervous system, the immune system, hormones and the gut microbiome interact with each other to influence our body and our brain. This course will lay the biological foundation of stress and mental health in an integrative manner, taking into account new discoveries that emphasise mental illness as multi-system disorders.

Students will learn the foundations of neurobiology and neuropharmacology as it relates to stress, trauma and mental illness. You will learn about cutting edge discoveries such as the impact of stress on epigenetics and the length of the telomeres causing early aging. Importantly, this course will introduce you to the exciting debate of whether genetic or environmental factors shape our mental health and contribute to mental illness. Different approaches, including pharmacological and non-pharmacological (dietary, meditation, gut microbiome-based) will feature as ways to mitigate the negative impact of stress on brain function. Furthermore, the course will introduce students to the up-to-date scientific literature and will give them an opportunity in the seminars to obtain skills to critically read and comment primary scientific literature. They will learn how to "translate" complex scientific findings as they relate to the impact of stress and trauma to laymen's term and communicate them to wide audience through media as well as to policy-makers to instigate change.

Through 12 lectures, 6 seminars, 4 tutorials and required reading students will gain an understanding of the changes that occur in our brain and our body in response to stress and trauma. The course will help you to sharpen your analytical skills,

improve your abilities to critically interpret primary scientific data, improve your confidence in academic debate, and develop your presentation skills. It will also give you a chance to learn to write clearly and concisely about complex scientific matters as they relate to health, in the form of extended essays and examination answers.

The course is suitable for students of all disciplines who have a strong interest in the workings of the brain. Those with an interest in mental health and the biology of mental illness may find this material particularly stimulating.

There are no prerequisites, and no previous knowledge of neuroscience is necessary, but some knowledge of human biology would be an advantage.

Teaching Methods and Assessment

- 12 x 1.25hr Lectures (15hrs)
- 6 x 1.25hr Seminars (7.5hrs)
- 4 x 1.25hr Tutorials (5hrs)

Twice weekly lectures will present the key phases of the topic under study in their specificity and their relationship to the central concerns of the course. Students will be expected to have completed the readings before the relevant lecture. A weekly seminar will focus in-depth study of lecture themes and provide opportunities to read, interpret, discuss and critique primary scientific literature. In addition, students will be expected to give a short oral presentation on a particular primary research article relevant to the central theme of the course.

Final assessment: An essay of no more than 3,000 words (40%), a final three-hour written examination (40%), oral presentation (10%) and participation in seminar discussion (10%).

Lecture Schedule

1. The stress concept and introduction to basic neuroscience for stress research
2. Fundamentals of the biological stress response: the body and the brain
3. “Good” Stress versus “Bad” Stress
4. The impact of stress and trauma on the brain: shrinking brain and losing marbles
5. Genetics and environment in stress and trauma
6. Transgenerational trauma and epigenetics
7. The life-long shadow of early childhood adversity and trauma
8. Can stress kill us? The tale of the telomere
9. Stress and addiction
10. War and disaster: the road to post-traumatic stress disorder (PTSD)
11. The stress neurobiology of social disadvantage and discrimination
12. Building stress resilience and mitigate the impact of trauma

Reading List

Required pre-arrival reading (This is great fun!)

- Robert M. Sapolsky, *Why Zebras Don't Get Ulcer*, 3rd Rep. Ed. 2004; ISBN 0-8050-7369-8

Recommended pre-arrival reading (Don't worry if you find these a bit dense, these will be covered in-depth during the course)

- Bruce S. McEwen, *Physiology and neurobiology of stress and adaptation: central role of the brain.* Physiological Reviews, 2007 87:873-904.
- Jan M. Deussing and Alon Chen, The corticotropin-releasing factor family: physiology of the stress response. Physiological Reviews, 2018 98:2225-2286.