Evolving perspectives on neurohormonal modulation of social-emotional networks

Tuesday, Jun 19: 2:45 PM - 4:00 PM
1642
Symposium
Tuesday - Symposia PM
Network perspectives on brain function have revolutionized our understanding of cognitive and emotional behavior. During the last decade it has become increasingly clear that social-emotional behaviors emerge from an interplay between evolutionary highly conserved brain regions, that variations in these networks shape social-emotional behavior and that their dysregulation contributes considerably to social-emotional deficits in mental disorders.

Converging evidence suggests that neurohormones such as oxytocin regulate regional-specific activity in core nodes within these conserved networks, with accumulating evidence suggesting particularly strong modulatory influences on the synchronicity between neural systems. Evidence is growing rapidly for modulatory influences of oxytocin on the network level from both animal models and human studies that combine oxytocin administration in healthy subjects and patient populations with functional neuroimaging. However, overarching perspectives that integrate oxytocin's regulatory effects on the network level with its physiological properties, behavioral effects and interactions with personal and contextual factors are currently missing.

With the rapid growth of exciting findings on oxytocin's modulation of social-emotional behavior across species, and initial clinical trials indicating that targeting the oxytocinergic system might represent an innovative strategy to normalize social-emotional deficits in mental disorders, it is now an opportune time to critically evaluate how we can progress to a synergistic framework which integrates findings from molecular to network levels. Such a framework could help to facilitate the translation of oxytocin research into it's clinical application as an innovative strategy to target social-emotional dysfunctions in mental disorders.
Objective

(1) how can we relate network level modulation with social emotional behavior (2) which role play neurohormones as network level modulators (in this case oxytocin)
(3) how to translate preclinical findings on neurohormonal network modulation into innovative treatments for psychiatric disorders
Target Audience

Researchers interested in network level modulation, pharmacological research, social emotional behavior and development of innovative treatments for psychiatric disorders.
Co Organizer

Richard Bethlehem, Autism Research Centre, Department of Psychiatry, University of Cambridge
Organizer

Benjamin Becker, University of Electronic Science & Technology of China

Presentations

Oxytocin and social salience networks (index.cfm?do=ev.viewEv&ev=1641)

One of the most consistent findings on the functional effects of the hypothalamic neuropeptide oxytocin is that it can increase attention to salient social cues. Importantly, what is considered to be socially salient is influenced by both context and an individual's sex and behavioral traits, and there is strong evidence that oxytocin tends to enhance the

impact of whatever cues are most salient in a person- and context-dependent manner. In my talk I will discuss evidence for both sex and context-dependent and independent effects of intranasal oxytocin treatment humans on different functional domains and the neural mechanisms and networks involved, most notably the interplay between social salience and interoception (anterior cingulate and insula), emotional (amygdala) and reward networks. In addition, I will consider contributions of oxytocin receptor genotype and behavioral traits associated with social and emotional disorders.

Presenter

Keith Kendrick, PhD, UESTC

Neuromodulatory effects of intranasal oxytocin on task-dependent prefrontal cortex functional connectivity (index.cfm?do=ev.viewEv&ev=1642)

The hypothalamic peptide oxytocin has been implicated in mediating both prosocial and nonprosocial effects. In fact, mounting evidence indicates that various context- and person-dependent variables affect the precise social outcome of intranasal oxytocin administration. Surprisingly little is known about the neural mechanisms underlying the shift from anxiogenic to anxiolytic effects of intranasal oxytocin. In my talk, I will present latest findings of task-dependent connectivity changes from studies involving visual, tactile and olfactory social stimuli. Across sensory modalities, prosocial and anxiolytic effects of intranasal oxytocin were accompanied by a strengthening of functional connectivity between regulatory areas in prefrontal cortex and limbic (e.g. amygdala) and nonlimbic (e.g. fusiform face area) target regions. Given this empirical background, I will discuss the opportunities and potential risks of translating current oxytocin neuroscience to the clinic.

Presenter

René Hurlemann, University of Bonn

Intrinsic network modulation of intranasal oxytocin in humans (index.cfm?do=ev.viewEv&ev=1643)

Oxytocin as a neuropeptide has been shown to influence a wide array of socio-emotional behaviours. Correspondingly, there are several mechanisms by which oxytocin has been hypothesised to affect the brain which largely suggest that oxytocin has the potential to alter processing not just in specific regions but at a network level. In the absence of a PET radioligand to assess oxytocins effects in vivo in humans, our next best option is to analyse its effects on intrinsic resting-state networks. In my talk I will outline some of the potential mechanisms that have been hypothesised to underlie oxytocin effects on brain and behaviour. In addition, I will present state-of-the-art resting-state data on the effect of intranasal oxytocin on intrinsic network connectivity and its potential implications for therapeutic use in autism.

Presenter

Richard Bethlehem, Autism Research Centre, Department of Psychiatry, University of Cambridge

Mapping the oxytocin networks in rhesus macaques: implications for clinical translation (index.cfm?do=ev.viewEv&ev=1644)

In humans, accumulating evidence has demonstrated that oxytocin affects a wide range of social behavior and may serve as a treatment for various disorders with dysfunctional social behavior. Because of the limitation of experimental approaches with human subjects, animal models are essential not only for investigating the neural mechanisms underlying the effects of oxytocin but also for exploring oxytocin-based therapeutic strategies for individuals with dysfunctional social behavior. Given the similarities between monkeys and humans in the neural circuitry underlying social cognition, the rhesus macaque could be an ideal animal model for the above purposes. Though a few studies have investigated the behavioral consequences of oxytocin administration in monkeys, how oxytocin exerts its effects on brain activity in monkeys remains unclear. In my talk, I will present the data on the effects of oxytocin on brain activity during the perception of facial expressions, an effect mainly studied in humans thus far, and functional coupling among brain regions involved in processing facial expressions. In addition, I will compare homologies between humans and monkeys in the neural circuits mediating the effects of oxytocin.

Presenter

Ning Liu, Chinese Acadademy of Sciences - Institue of Biophysics