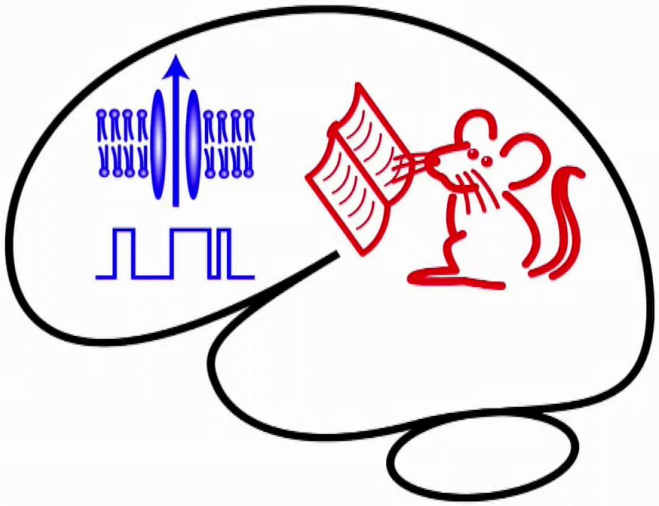
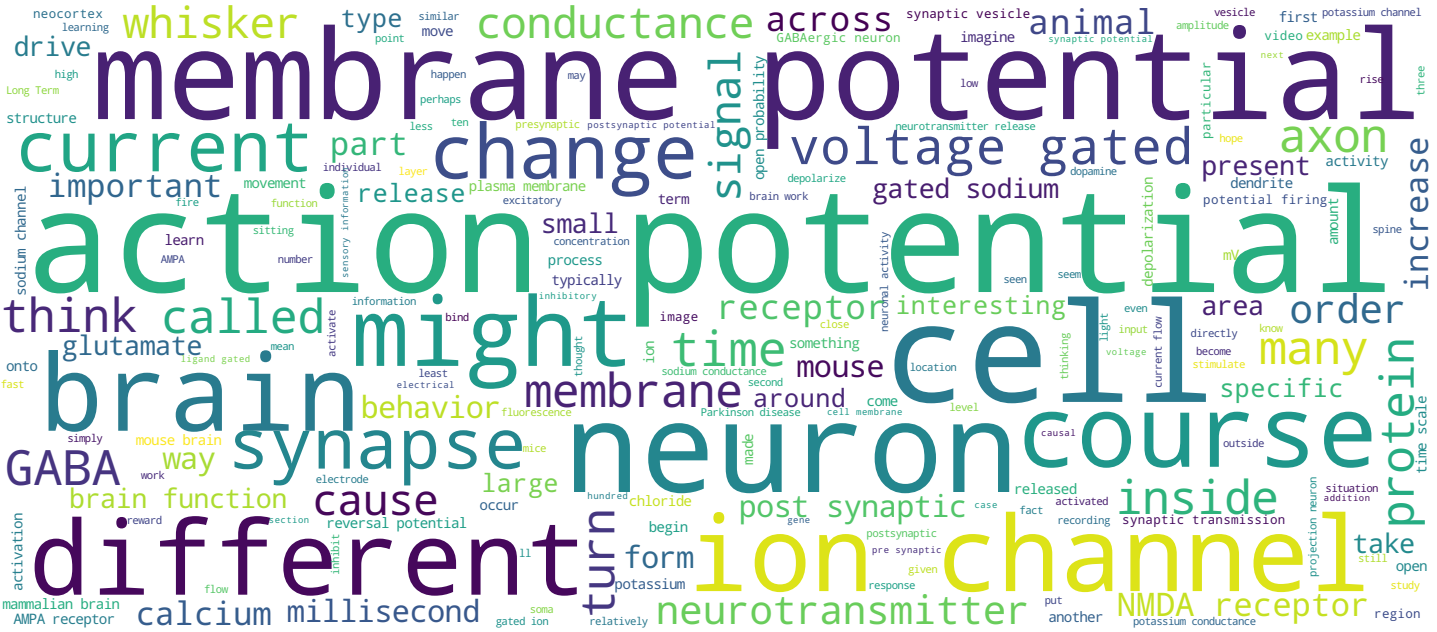
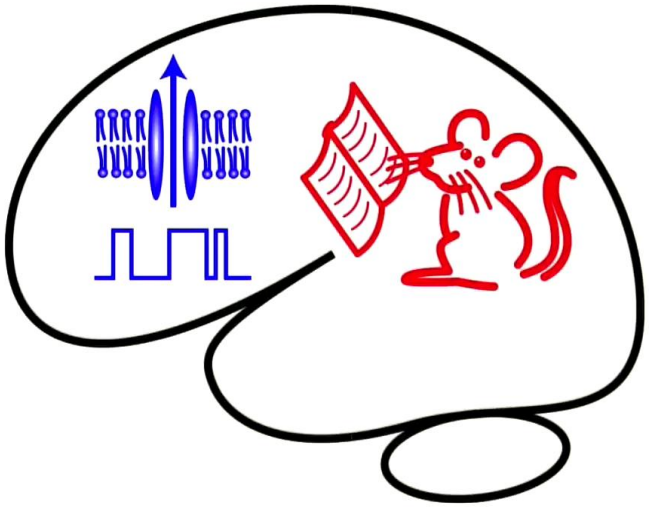


# 7.5 Concluding remarks

## Cellular Mechanisms of Brain Function

Prof. Carl Petersen



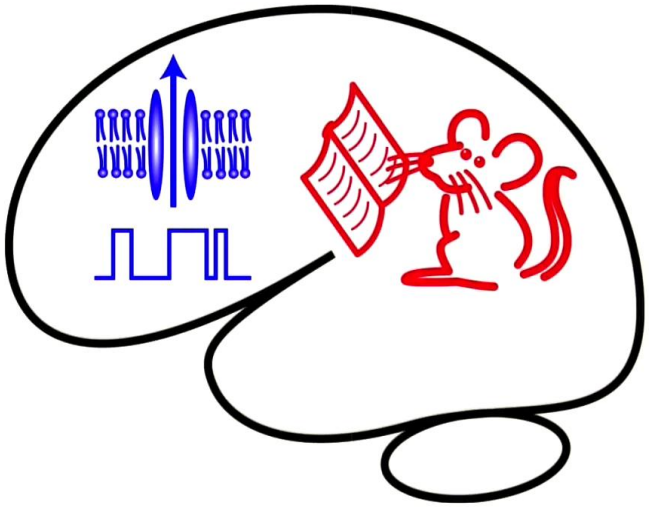



Welcome to the last video of this course. I hope you've enjoyed learning about the cellular mechanisms of brain function. Our goal in this course was to obtain a causal and mechanistic understanding of how the mammalian brain works. Because the brain is made of cells, in any mechanistic explanation of brain function, it's essential to think about the activity of individual neurons and their synaptic interactions. The brain is a very large synaptically connected neuronal network and the complexity is bewildering. We're only at the beginning of a great adventure. And clearly we still have much to learn for further neuroscience research. However, as we've seen, modern neuroscience is beginning to provide answers about the causal mechanisms underlying simple behaviors, at least in mice. And much of what we learn from studying mice, will have direct implications for understanding human brain function and dysfunction, and will likely give rise to novel therapies for various brain disorders. This course has focused on the biophysics of brain function seeking to explain the miliscecond by milisecond processing of sensory motor information by neurons, synapses, and neuronal circuits during behavior.

Notes

Summary

0m 05s




We've tried to bridge different spatial temporal scales of analysis of the mammalian brain. From nanometer-sized ion channels transitioning between closed and open states on the microsecond time scale, ranging to the investigation of intact sensory motor neuronal circuits, spanning a centimeter or so in the mouse brain, and operating on behaviorally relevant time scales from milliseconds to days during the learning of behavioral tasks. Remarkable technological advances are driving the discovery of new aspects of brain function through measurement and perturbations with increasing specificity in behaving mice. It now seems quite likely that in the next 50 years or so, we'll have a very good understanding of how the mouse brain works.

Notes

Summary

1m 39s

# Cellular mechanisms of brain function

- This course has focused on the biophysics of brain function.
- There are many other important perspectives on the brain :

*Developmental and comparative*
*Molecular biology and genetics*
*Brain dysfunction and therapy*
*Computation and theory*

Cellular Mechanisms of Brain Function

Obviously, in a short course of seven weeks, it's only possible to cover some selected topics. I hope this course has provided you with a good foundation allowing you to think further about how the brain works. And I hope this course has wet your appetite to learn more. Here we've taken a biophysical, bottom up approach to studying the mammalian brain. But there are many other important perspectives, many of which we've barely touched upon in this course. For example, developmental studies and comparative studies across species will help us understand the logic of how the nervous system is put together, giving important information about general, organizing principles. We only briefly mentioned some aspects of molecular biology and genetics. And there's much more to learn about molecular neuroscience both in terms of providing sophisticated tools for studying the functioning of the mammalian brain, but also in terms of modeling human genetic brain disorders in mice with the hope of better understanding brain diseases in order to provide rational treatments.

Notes

Summary

2m 36s

# Cellular mechanisms of brain function

- This course has focused on the biophysics of brain function.
- There are many other important perspectives on the brain :

  *Developmental and comparative*
  *Molecular biology and genetics*
  *Brain dysfunction and therapy*
  *Computation and theory*

Cellular Mechanisms of Brain Function

Finally, as we obtain increasingly detailed information on how the brain works, it will become more and more important to quantitatively test these hypotheses from computational modeling and it is therefore important for the modern neuroscientist to be intimately familiar with mathematical modeling methods So I also encourage you to spend time studying computational and theoretical neuroscience. With these last thoughts in mind, I'd like to thank you for your participation in this course and to wish you all the best for the future.

Notes

Summary

3m 50s