





Will Stritzel

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ABSTRACT

Daily cycles in behavior and physiology, called circadian rhythms, have profound effects on health and well-being. Circadian rhythms emerging from local molecular clocks in the prefrontal cortex regulate learning and memory. My goal in this study was to determine if genetically encoded fluorescent proteins can produce sufficient signal in dendritic arbors and spines to measure and characterize dendritic spines accurately and reliably. I also aimed to link dendritic spine morphology with time-of-day differences in the learning and recall of cued conditioned fear extinction. Neurons were labeled using an intersectional viral strategy, and dendritic segments were imaged using confocal microscopy. Apical dendritic segments and spines were analyzed with Imaris image analysis software. My results show that fluorescent protein signals can indeed be used to measure dendritic spines in select cases. In addition, the data suggest that circadian rhythms in fear extinction behavior may be driven, in part, by time-of-day differences in distal apical dendritic spine density. My work provides evidence that dendritic spine analysis can be accomplished using widely available transgenic techniques and points to one mechanism by which circadian rhythms regulate extinction behavior.

LAY SUMMARY

Circadian rhythms are daily patterns in behavior and physiology. The timing of when to sleep, eat, exercise, and many more behaviors, is



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ABSTRACT



Aaron Mutchler

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ABSTRACT

The Deep Underground Neutrino Experiment (DUNE) is a new cutting-edge experiment that will be fundamental in the study of neutrino oscillations and physics beyond the standard model. DUNE will be the flagship neutrino experiment, with the longest neutrino beamline of 1300 kilometers, using state-of-the-art near and far detectors to measure neutrino flavor at the start and end of the beam. In the near

LAY SUMMARY



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ABSTRACT

The focus of this thesis is surface area isotherms obtained using a Langmuir-Blodgett trough which are used to qualitatively determine



the 1990s, the number of people in the UK who are employed in the public sector has increased from 10.5 million to 12.5 million, and the number of people in the public sector who are employed in health care has increased from 2.5 million to 3.5 million (Department of Health 2000).

There are a number of reasons for this increase. One of the main reasons is the increasing demand for health care services. The population of the UK is ageing, and there is a growing number of people with chronic conditions such as heart disease, diabetes, and asthma. This has led to an increase in the number of people who need to be treated in hospitals and other health care settings.

Another reason for the increase is the expansion of the public sector. The government has invested heavily in health care over the past few decades, and this has led to the creation of new jobs in the public sector. For example, the number of people employed in the NHS has increased from 2.5 million in 1990 to 3.5 million in 2000.

There are also a number of other factors that have contributed to the increase in the number of people employed in the public sector. For example, the number of people who are employed in the public sector has increased because of the increasing number of people who are employed in the public sector who are employed in health care. This is because the number of people who are employed in the public sector who are employed in health care has increased from 2.5 million in 1990 to 3.5 million in 2000.

There are a number of challenges that the public sector faces in the future. One of the main challenges is the increasing demand for health care services. The population of the UK is ageing, and there is a growing number of people with chronic conditions such as heart disease, diabetes, and asthma. This has led to an increase in the number of people who need to be treated in hospitals and other health care settings.

Another challenge is the expansion of the public sector. The government has invested heavily in health care over the past few decades, and this has led to the creation of new jobs in the public sector. For example, the number of people employed in the NHS has increased from 2.5 million in 1990 to 3.5 million in 2000.

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ABSTRACT

The medial gastrocnemius, an important calf muscle, plays a role when dancers seek to maintain balance. In order to balance, the somatosensory, visual, and vestibular systems work in conjunction to control muscle activity. The activation of skeletal muscles can be

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