Tracing Melanin Concentrating Hormone in Mouse Olfactory Bulbs

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Introduction

The tracing of orexin within the olfactory bulb has led to further knowledge of how olfaction is essential to hunger and satiation. Although a further understanding of orexin is important, it should also be noted that there are large numbers of neuropeptides with little to no research background on their location or function. Melanin Concentrating Hormone (MCH) is associated with eating behaviors and energy maintenance through hypothalamic pathways (Qu et al, 1996). Additionally, MCH has been shown to have normalizing effects on olfaction in maternal mice (Alhassen et al, 2019). Despite this, researchers have yet to conduct prior studies mapping MCH's location throughout the olfactory bulb and it is undetermined whether it was present in significant amounts across olfaction pathways. Tracing MCH across the olfactory bulb is crucial in specifying the role of MCH in scent perception and in communicating this sensory information to other parts of the brain. Understanding the role of various neuropeptides, as well as their interactions leads to increased control over this mechanism, especially when it comes to eating. On a larger scale, MCH may have a role in body weight regulation and nutritional homeostasis in conjunction with hypothalamic pathways and manipulation of MCH could lead to further knowledge of the processes of hunger and satiation. (Daqing, et al, 1996).

FEEDING	OREXIN	MCH
Neuronal Stimulation	↑ Palatable food intake	↑ Non-caloric food intake
Neuropeptide Stimulation	↓ Obesity & hyperglycaemia	↑ Food Intake
Neuronal Inhibition	↑ Body weight (narcolepsy)	↓ hyper-glycaemia
Neuropeptide Inhibition	Palatable food causes cataplexy	↑ Metabolic Rate

L. Oleary. (2014)

Methods

Sections of olfactory tissue were sliced to 40 micrometers utilizing a vibratome. Slices were cut in agarose for increased stability. These tissue were subjected to fluorescent immunohistochemistry in which antibodies readiolabled using Green Fluorescent Protein (GFP) so that pathways containing MCH receptors would be visible. Each section was then analyzed and the pathways of MCH were plotted via ImageJ software.

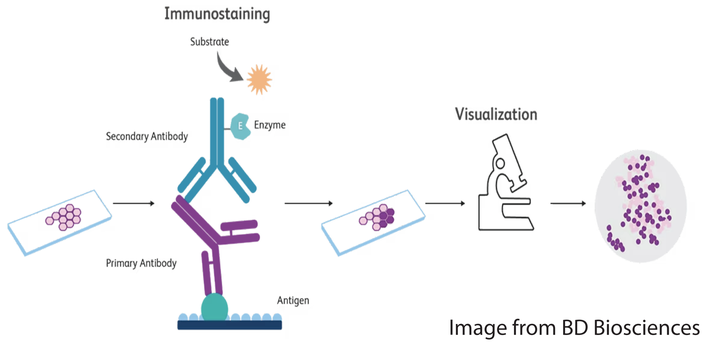
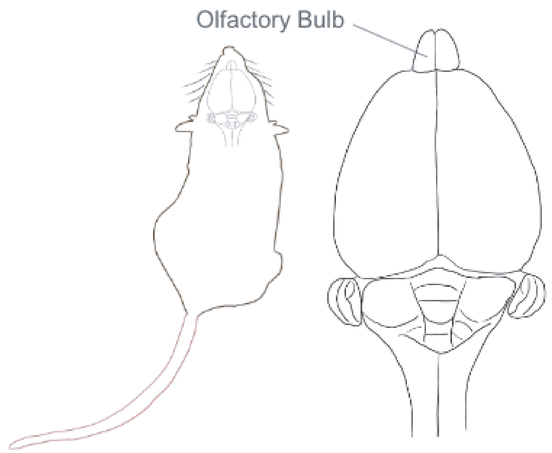


Image from BD Biosciences

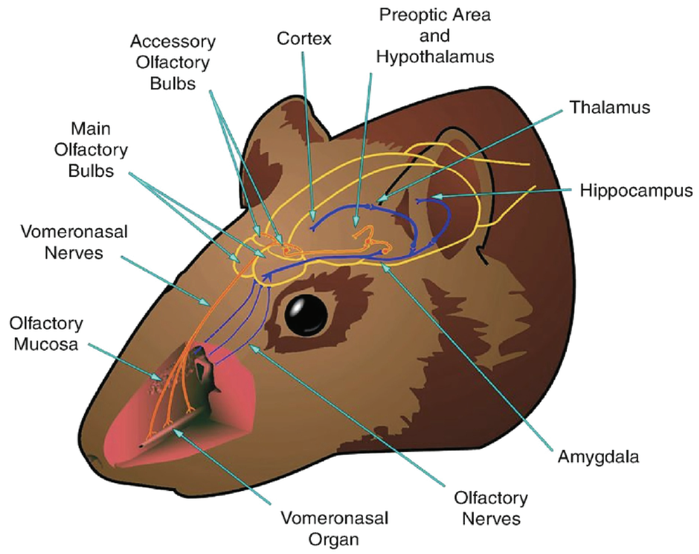
Results

Currently, results for this experiment are still in progress. Researchers are currently continuing the process of staining the olfactory slices with antibodies to determine whether MCH is present. Preliminary results indicate that MCH is present in the olfactory bulb and these results would be confirmed through further replication of curretnt methods.



Conclusions

If preliminary results regarding presence of MCH throughout the olfactory bulb are confirmed, a more direct relationship between MCH and olfaction could be hypothesized. Due to the previous research indicating interactions between olfactory neuropeptides and eating behavior, continued tracing of MCH could be utilized for increased understanding of how olfaction interacts with hunger and satiation. It is possible that these relationships could be similar in humans and may allow for additional medical treatment paradigms.



J. Baker, et al (2019).

References

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