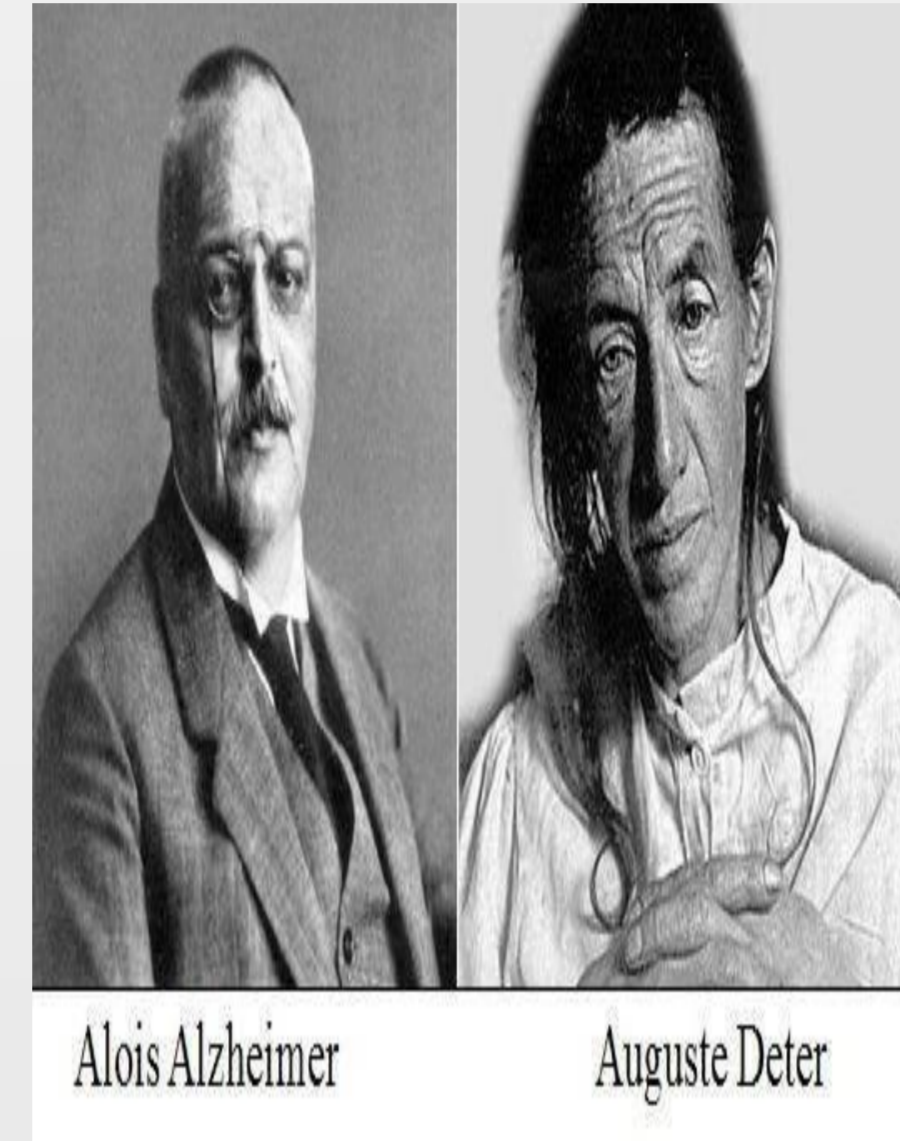
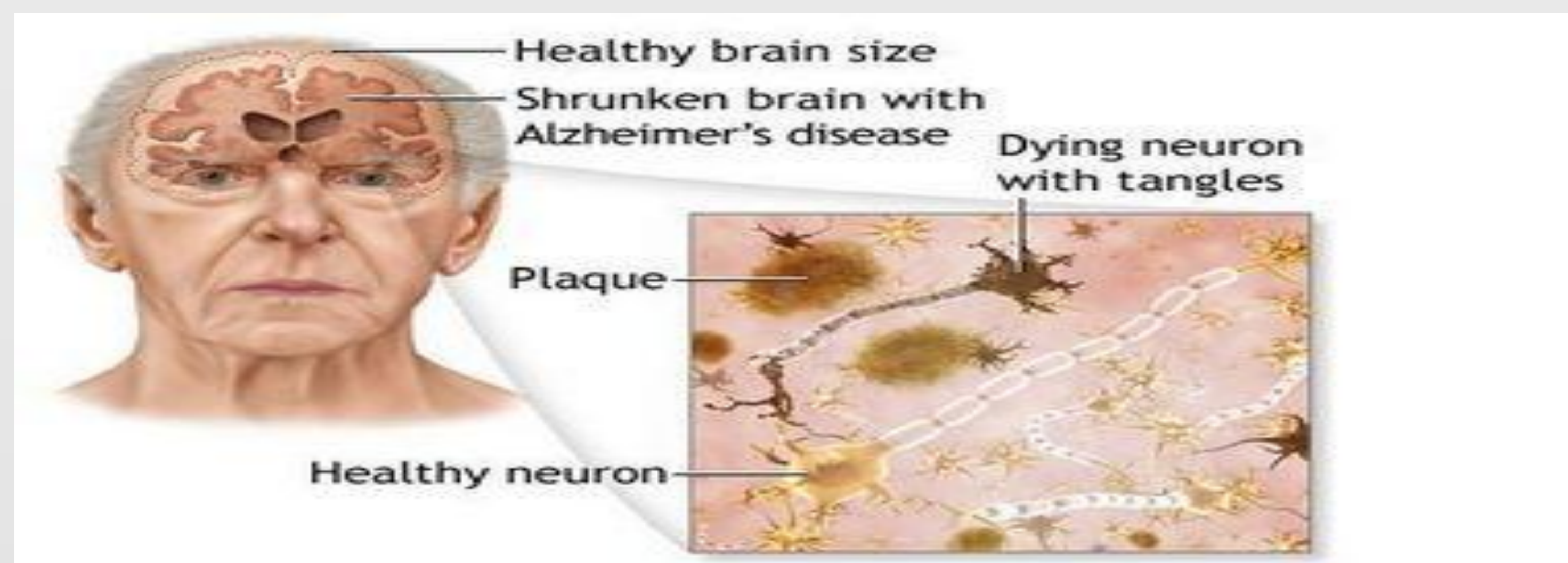


### Introduction

- The Alzheimer's disease (AD) is a chronic neurodegenerative disease that usually starts slowly and worsens over time. It is the cause of 60% to 70% of cases of dementia.
- It is named after Dr. Alois Alzheimer, In 1906.

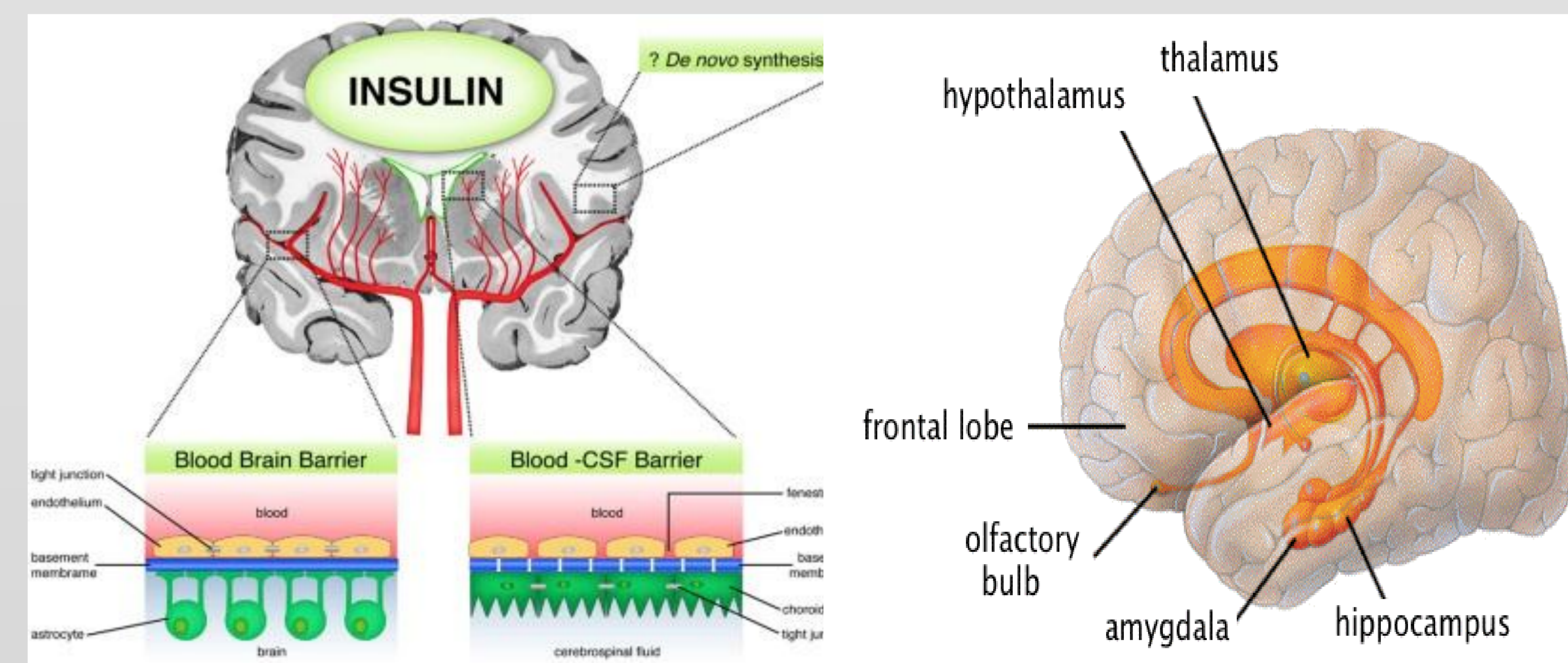


- Recently researchers proposed the term "Type-3-Diabetes" for Alzheimer disease. Because of the shared molecular and cellular features Type 2 diabetes and insulin resistance associated with memory deficits and cognitive decline in elderly individuals.
- During the course of the disease, proteins build up in the brain to form structures called 'plaques' and 'tangles'. This leads to the loss of connections between nerve cells, and eventually to the death of nerve cells and loss of brain tissue.



what's the insulin and what's the relation between it and the brain?

Insulin is a peptide hormone produced by beta cells of the pancreatic islets, and it is considered to be the main anabolic hormone of the body. (1,2)



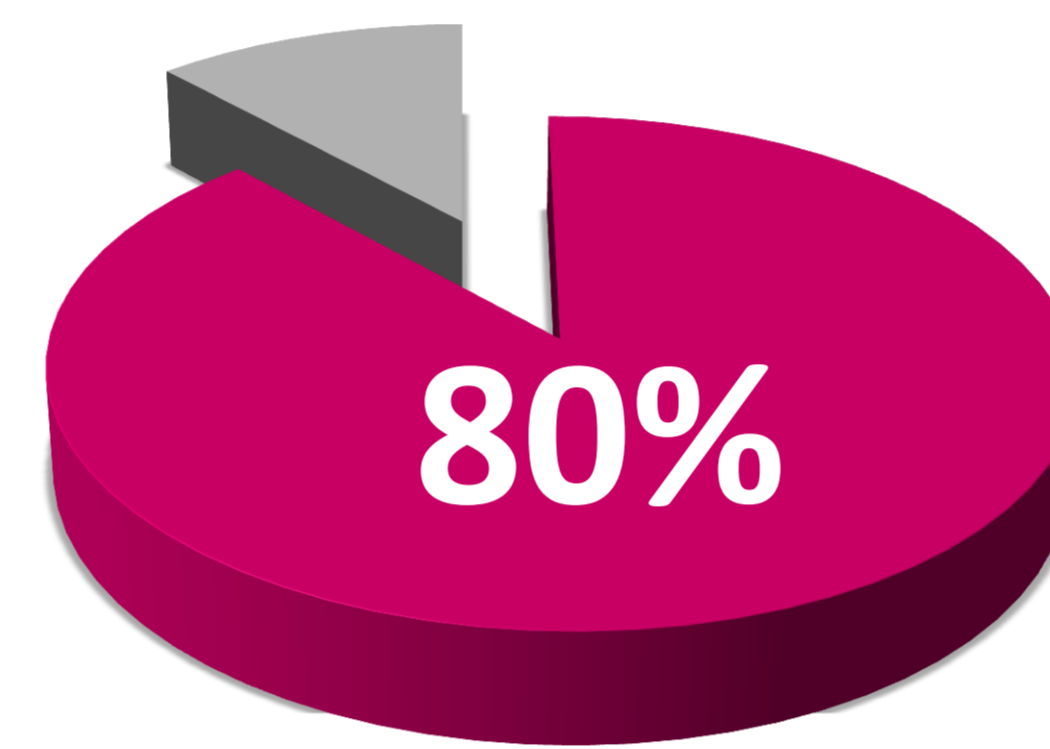
### Materials and Methods

In this poster i was collected three different studies:

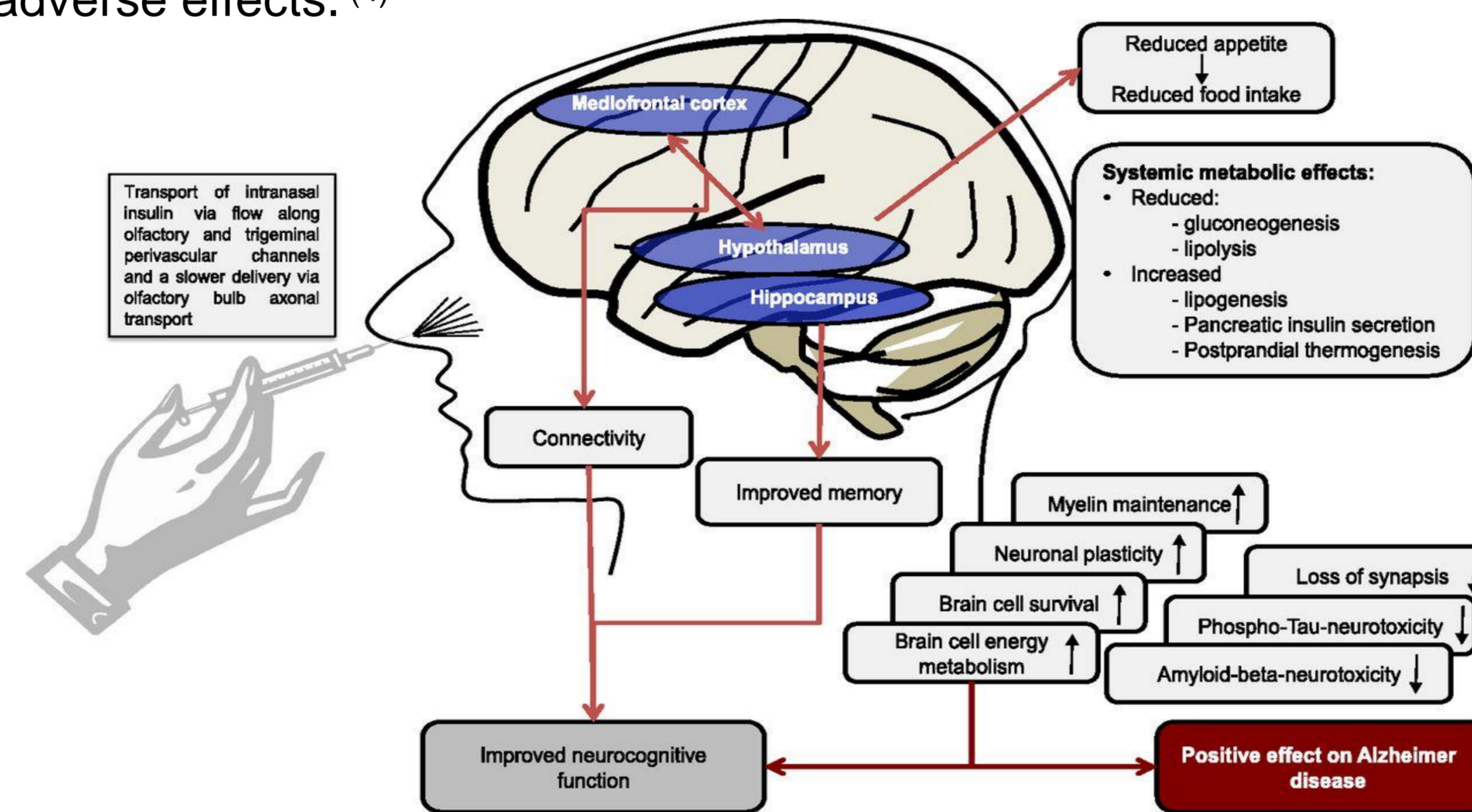
- The first one was performed on postmortem brains of patients with AD.
- The second was about the effect of intranasal insulin therapy on memory and cognitive function and improvement symptoms of patients with AD.
- And the third one was about the role of intracerebroventricular insulin in enhancement of cognition and memory.

### Results and Discussion

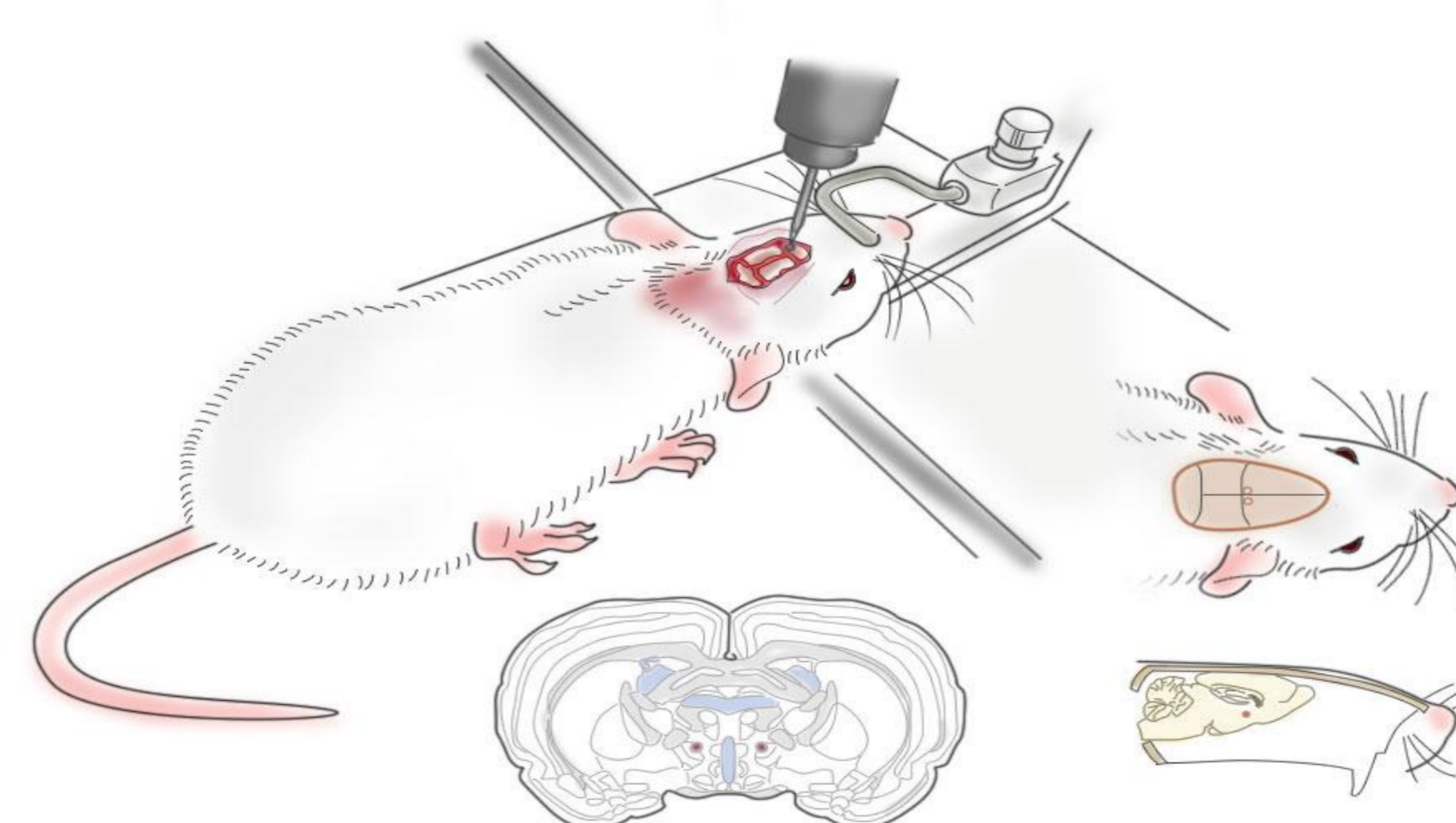
- The brain of patients with Alzheimer disease (AD) showed the evidence of reduced expression of insulin and neuronal insulin receptors, as compared with those of age-matched controls. This event gradually and certainly leads to a breakdown of the entire insulin-signaling pathway, which manifests insulin resistance. This in turn affects brain metabolism and cognitive functions, which are the best-documented abnormalities in AD.
- Suzanne de la Monte, Professor of Pathology and Medicine and neuropathologist at Brown Medical School, and her team analyzed 45 postmortem brains of patients of varying stages of AD neurodegeneration and found decrease in the number of insulin receptors in 80% of AD patients compared to normal subjects. In addition, the ability of insulin to bind to the receptors was compromised. (3)



- Most studies showed that memory and especially story recall was improved after IN insulin administration. Sometimes the effect was restricted for apoe4 (-) patients.
- Data suggested that different insulin types and doses may have different effects on different apoe4 groups. In addition, the effects of treatment on Aβ levels differed from study to study. Finally, IN insulin resulted in minor adverse effects. (4)



- A study utilizing intracerebroventricular insulin showed that its administration enhanced memory formation in rodents.
- These studies suggest that insulin may have a role in enhancement of cognition and memory. (5)



### Conclusion

- Insulin functions by controlling neurotransmitter release processes at the synapses and activating signaling pathways associated with learning and memory.
- Novel research demonstrates that impaired insulin signaling may be implicated in AD.
- Thus, restoring insulin levels and/or its receptor-mediated signaling cascades (without affecting blood glucose levels) constitute a potentially interesting therapeutic strategy against AD, due to the inhibition of Aβ production (and its increased clearance) and tau protein hyperphosphorylation, two well-known hallmark of the pathology.
- Understanding the mechanism of action of this neuroendocrine disorder, termed type 3 diabetes, may shed light on new tools for diagnosing and treating AD and it may lead to improve therapeutic methods.



### References

- Kandimalla R, Thirumala V, Reddy P. Is Alzheimer's disease a Type 3 Diabetes? A critical appraisal. 2017. <https://www.sciencedirect.com/science/article/abs/pii/S0925443916302150>.
- Duarte A, Moreira P, Oliveira C. Insulin in Central Nervous System: More than Just a Peripheral Hormone. 2018. <https://www.hindawi.com/journals/jar/2012/384017/>.
- Type 3 Diabetes Mellitus: A Novel Implication of Alzheimers Disea...: Ingenta Connect. Ingentaconnectcom. 2018. <http://www.ingentaconnect.com/contentone/ben/ctmc/2017/0000017/00002/art00004>.
- Avgerinos KI e. Intranasal insulin in Alzheimer's dementia or mild cognitive mpairment: systematic review. - PubMed - NCBI. Ncbinlmnihgov. 2018. <https://www.ncbi.nlm.nih.gov/pubmed/29392460>.
- American College for Advancement in Medicine (ACAM). Acamorg. 2018 <http://www.acam.org/blogpost/1092863/185761/The-Relationship-Between-Alzheimer-s-disease-and-Diabetes-Type-3-Diabetes>.