



# ***Hypothesis of Neural Information Flow about Acupuncture***

—the new methods of meridian research

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# Background

- *Acupuncture, originated in China more than 3000 years ago, is an important component of Traditional Chinese Medicine and possesses a long-standing history of development.*
- *At the present time, Acupuncture therapeutics are used widely as treatment modalities for various clinical disorders.*

# Background

- *However, the therapeutic mechanism still remains unclear, leading to its limited use in some western countries.*
- *A great deal of ancient literature showed that the **Meridian Doctrine**, known as the **theoretical core** of Acupuncture Science, laid the theoretical foundation of Acupuncture development.*

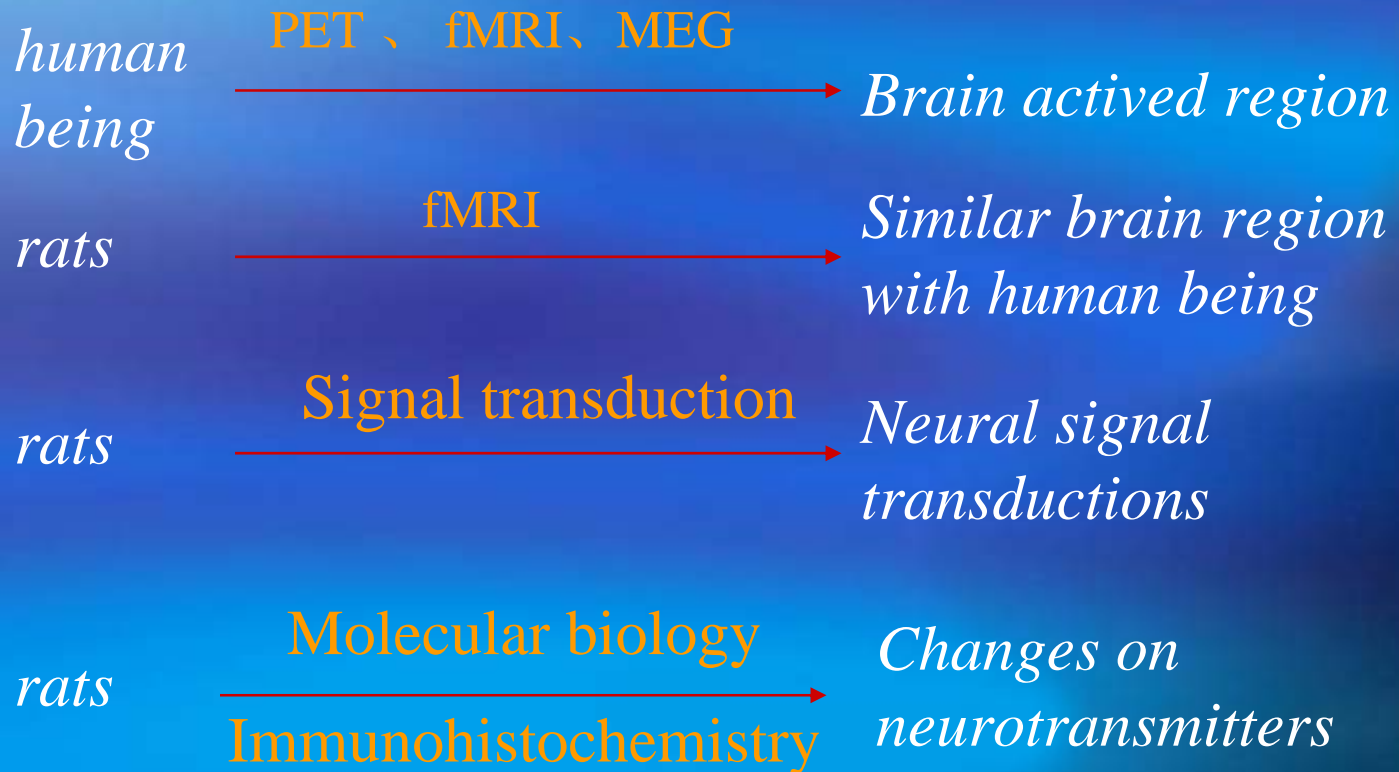
# Ancient Stomach Meridian



# Background

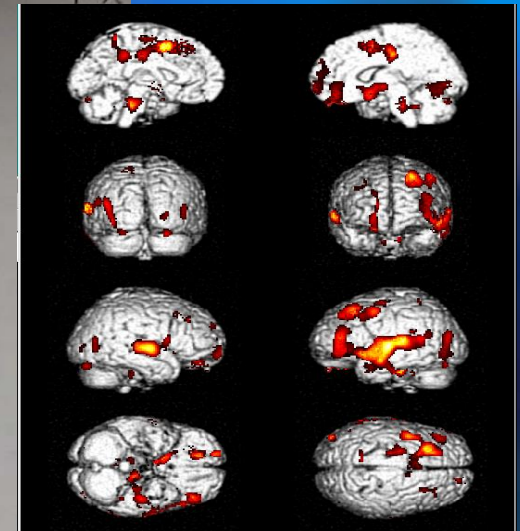
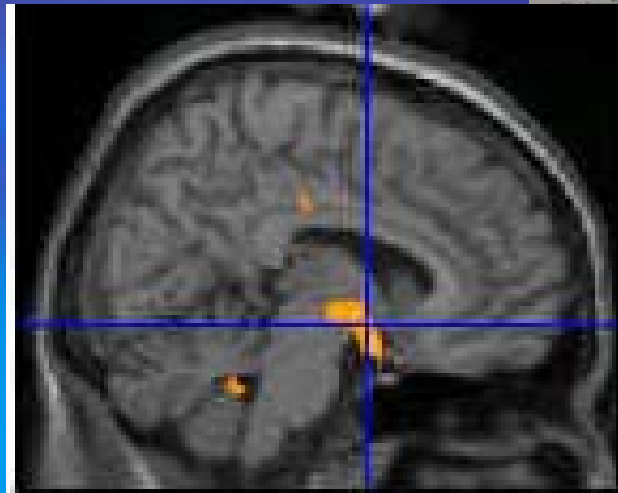
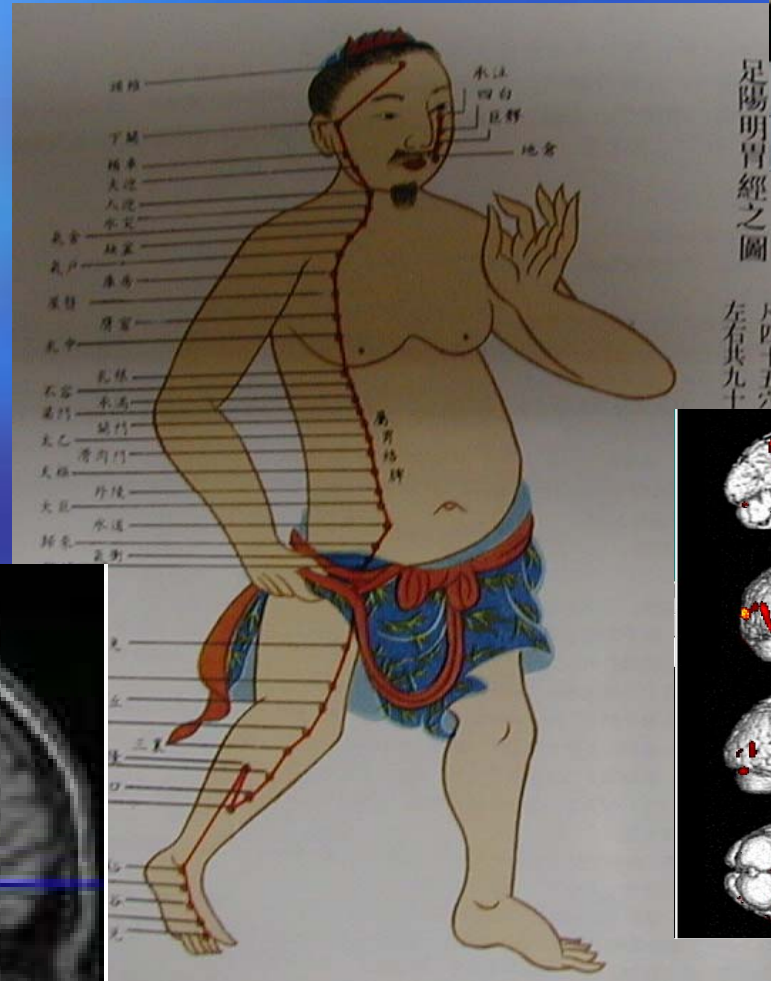
- *This yielded lots of experimental evidence on Acupuncture and Meridian. Most researchers presumed the afference and efference of Acupuncture information are related to the Meridian system, but there was still no satisfactory answer for its essence.*
- *It is thus clear that the afference of Acupuncture information - at least parts of it - depends on the peripheral nerve.*

# *Research content*



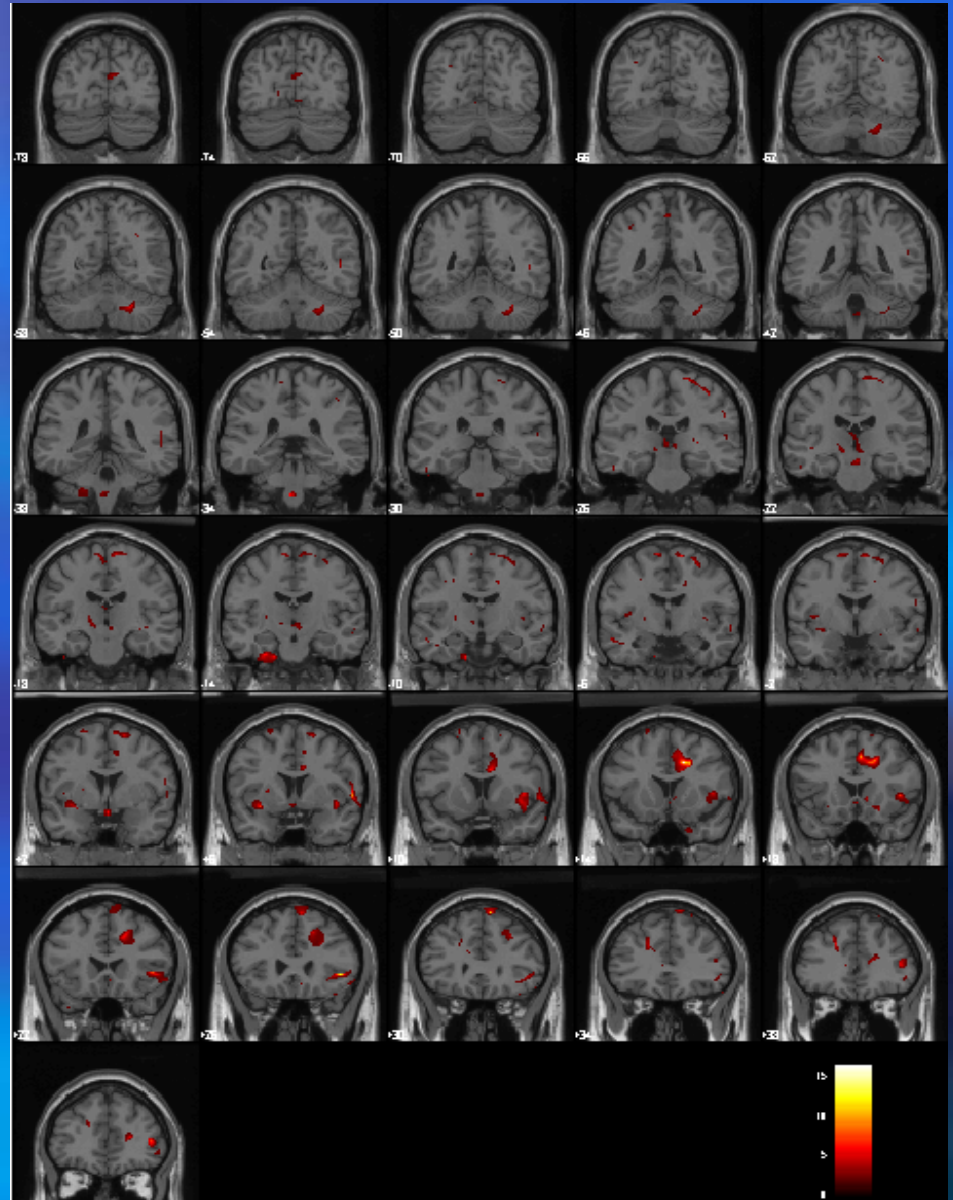
# Part one of Research

## PET imaging(ST36)



## *PET -ST36*

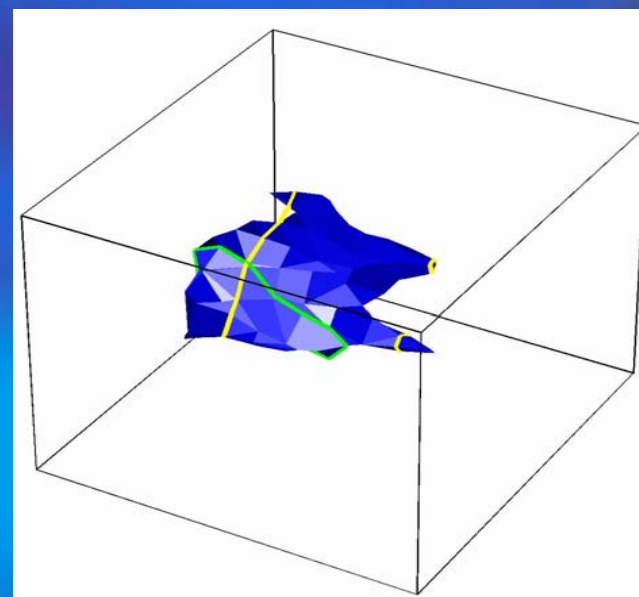
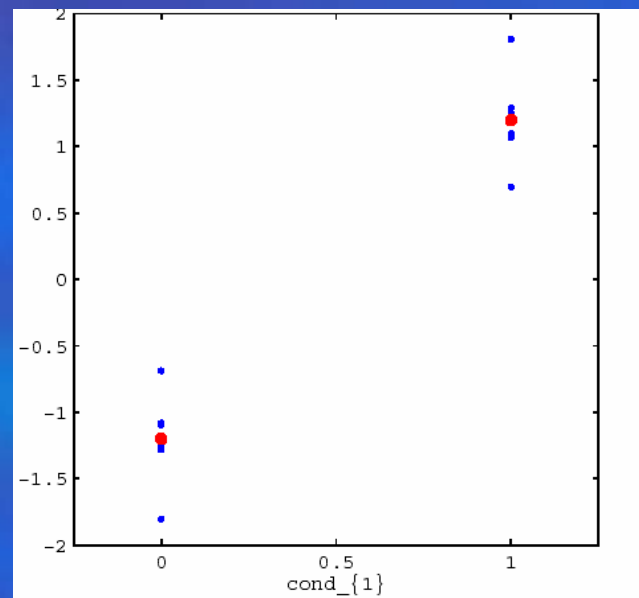
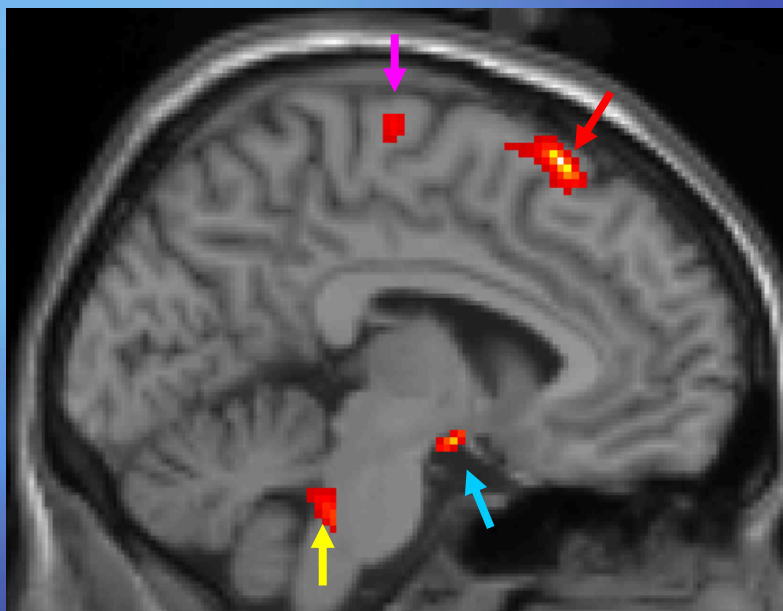
- Yin Ling, Jin Xianglan, Qiao Weian et al.
- PET imaging on brain function while puncturing the acupoint ST36.



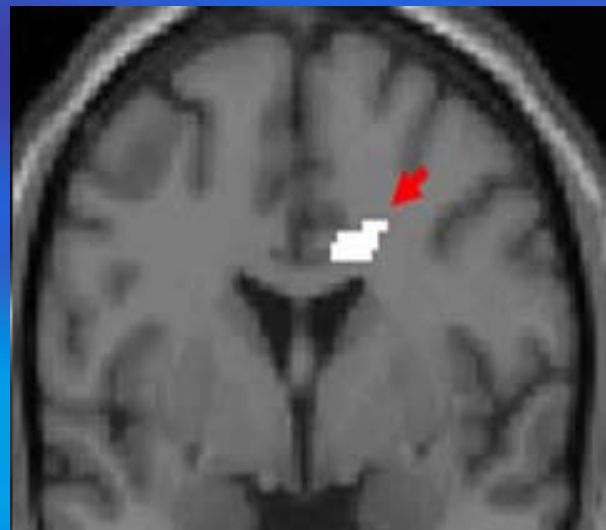
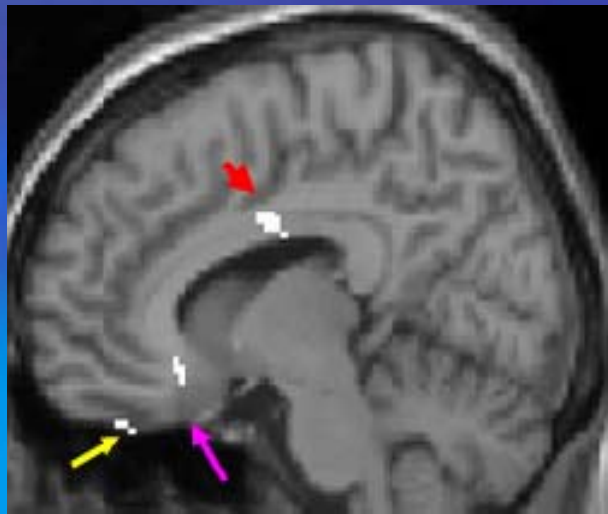
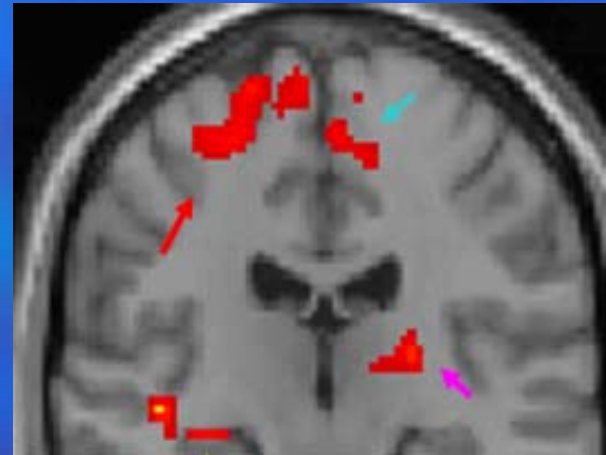
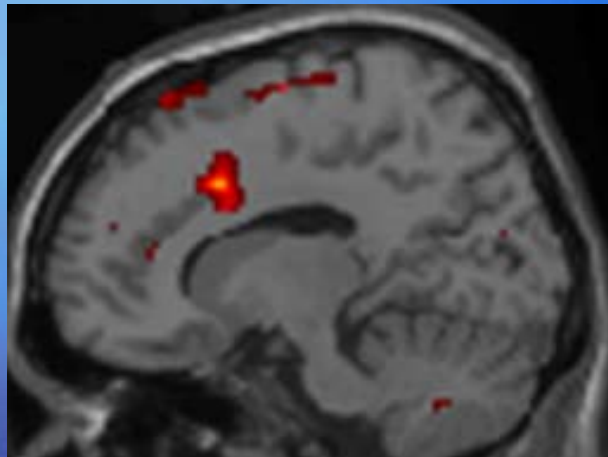
- Chinese Medical Journal, 2003, 116 (12): 1836-1839



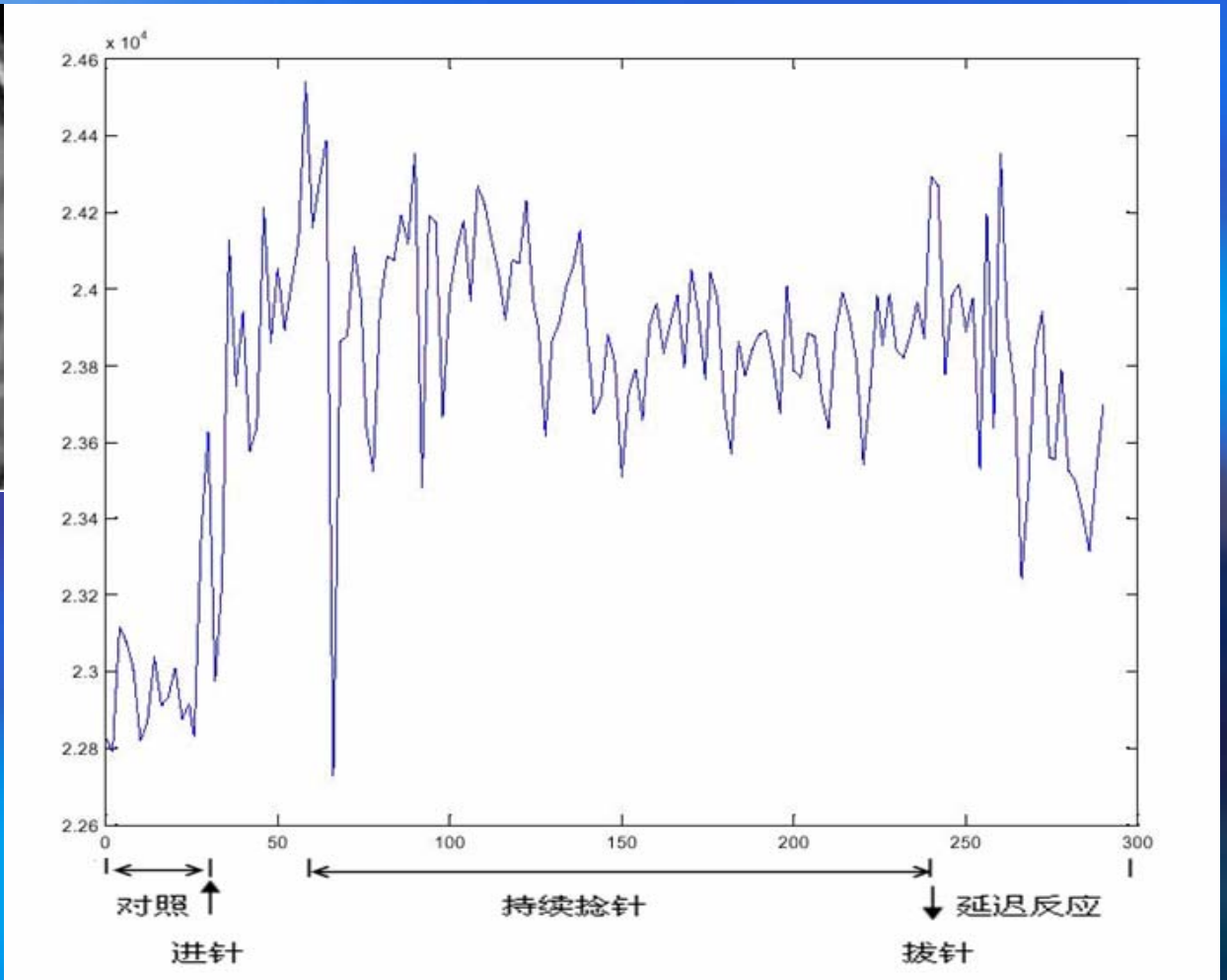
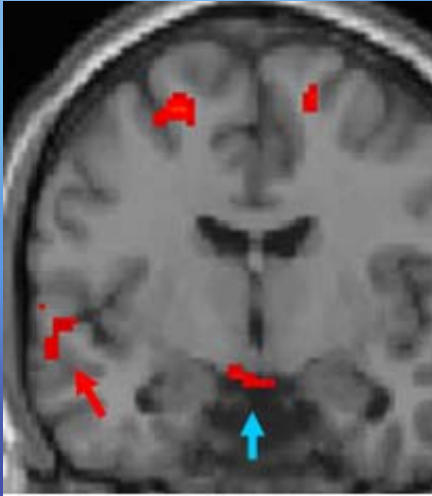
# PET-ST36



# *PET-ST36*



# fMRI-ST36



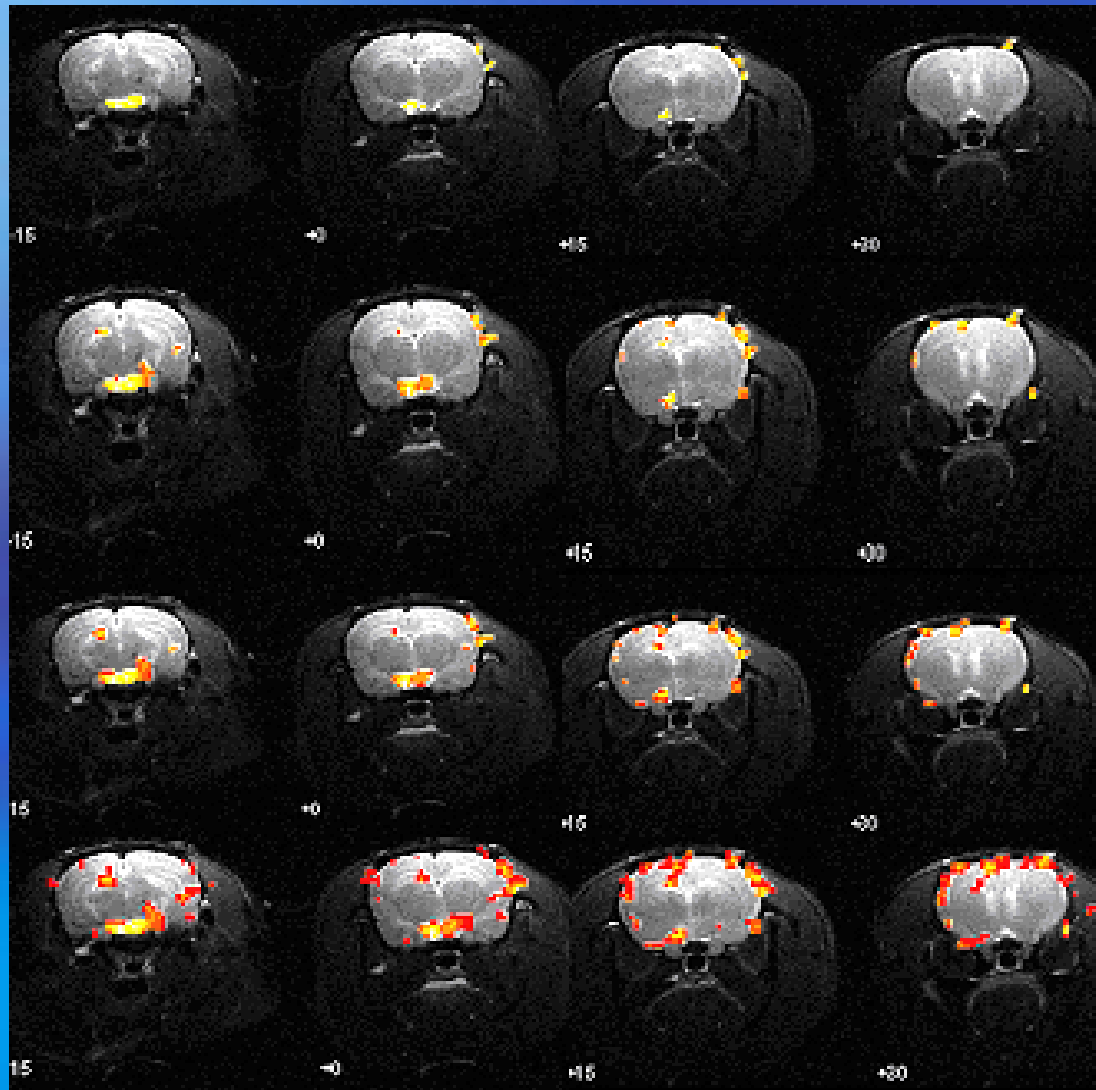
# Results

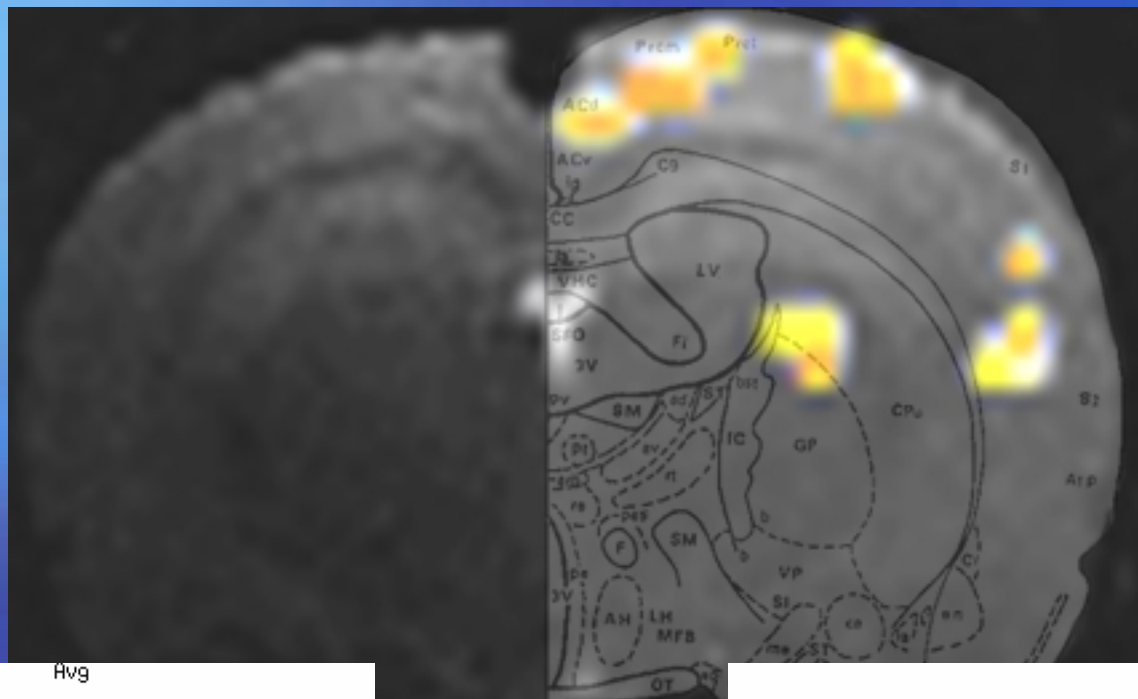
- *Our fMRI and PET studies showed that Stimulation of acupoint ST36 resulted in:*
  - *significantly increased glucose metabolism in the left precentral gyrus and postcentral gyrus, etc ;*
  - *such stimulation resulted in decreased glucose metabolism in the right inferior frontal, middle occipital and temporal gyrus , etc .*
- *This set of areas was mostly in good agreement with early observations made by fMRI and PET experiments.*

## Conclusion

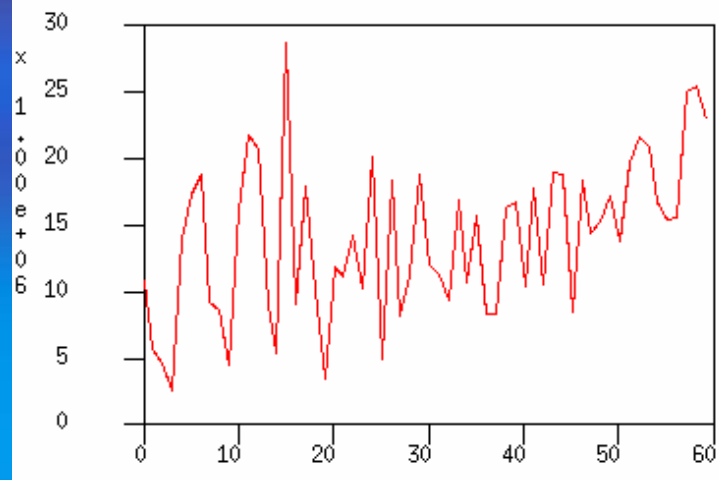
- *This study shows the evidence of brain metabolic modulation by Acupuncture in Human subjects. Acupuncturing ST36 seems to increase glucose metabolism in pain related Brain regions. Metabolic changes are also seen in different parts of the Autonomic Nervous System, which is correlated to gastric function. This method may provide more **direct insights** into the therapeutic mechanism of Acupuncture in Traditional Chinese Medicine (TCM).*

# *Part two of Research*

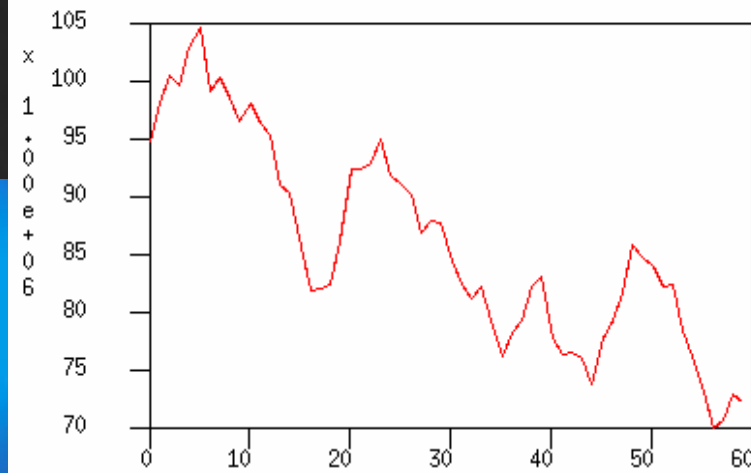




Hvg



Avg



## Conclusion

- *The acupuncture ST36 may activate the normal person and the rats' under cerebral ganglion and the feeling movement cerebral cortex, the rats' brain and the normal human brain have certain **similarity** to the acupuncture signal reply.*



# Part three of Research

## Animal Experiment Method

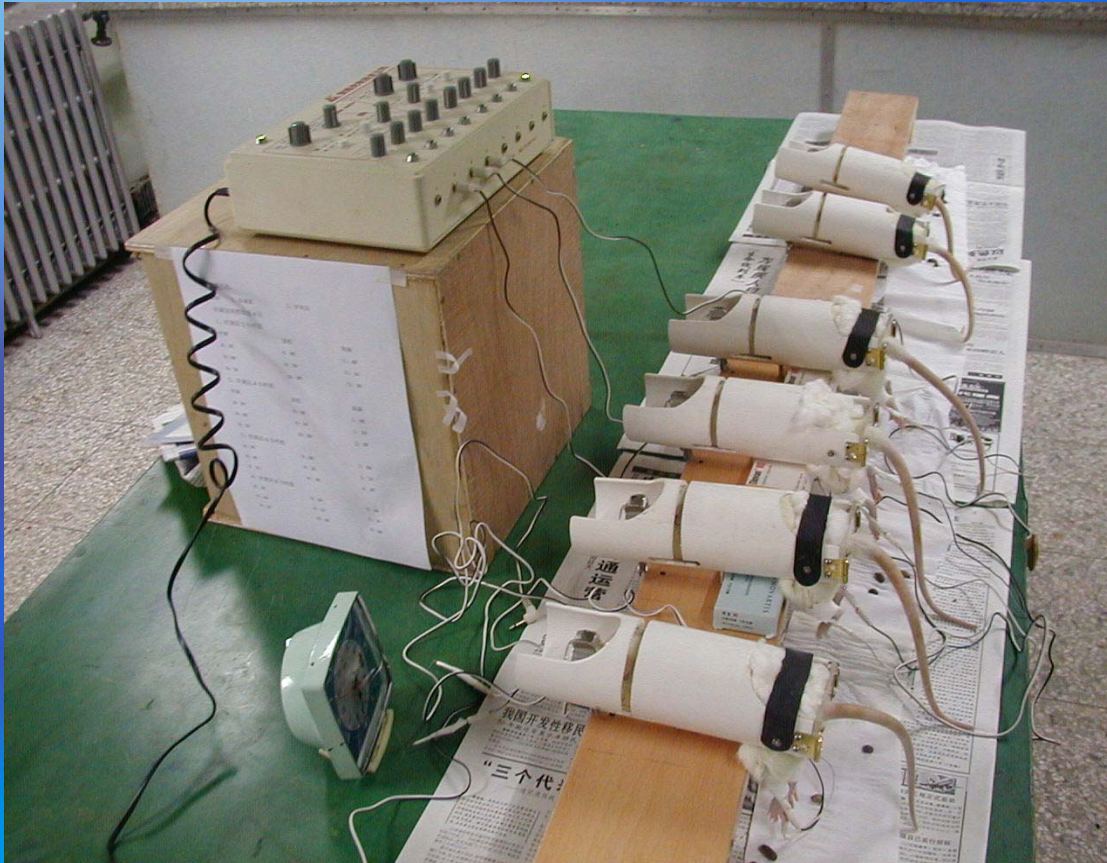
Control

Bandaged { 2h  
4h  
6h  
8h

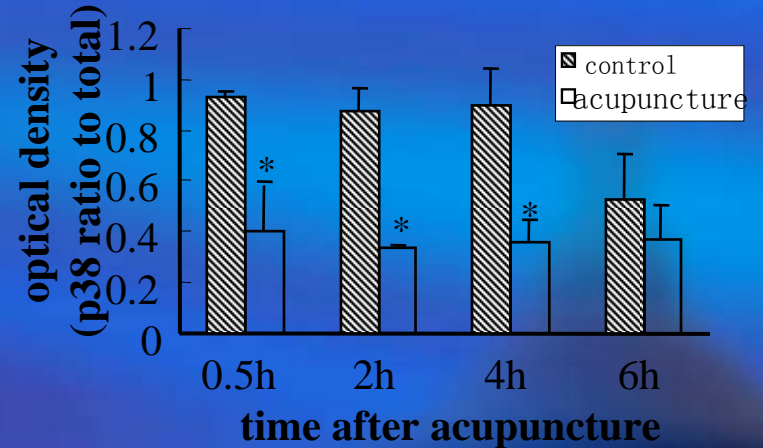
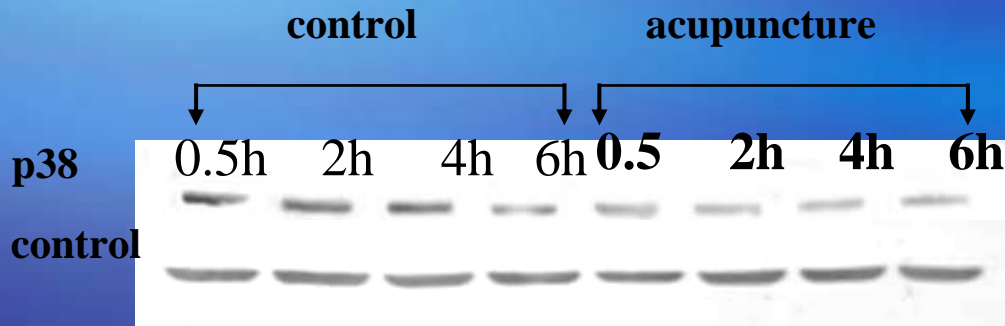
Puncturing ST36 { 2h  
4h  
6h  
8h

Puncturing side point { 2h  
4h  
6h  
8h

Totally 13 groups  
6 rats for each group

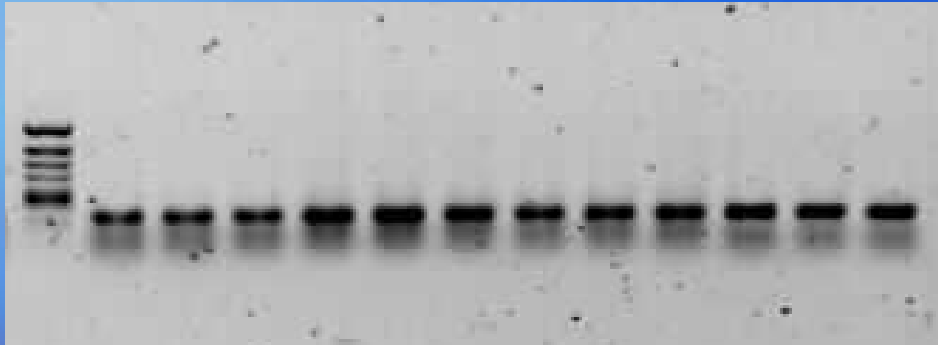


# P38



*Influence to expression of P38 in hypothalamus of normal rat by puncturing ST36*

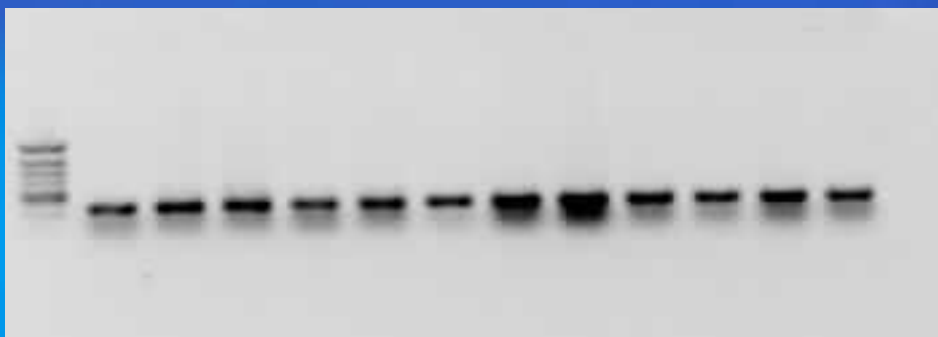
# POMC



2h decreased



4h 6h increased



8h came back

# *Puncturing ST36*

	2h	4h	6h	8h
GnRH	↓	↑	↑	↑
SP	—	—	↑	↑
Vasopressin	↓	↓	↓	↓
POMC	↓	↑	↑	recovered
IL-1 $\beta$	↑	↑	recovered	recovered
ER $\alpha$	↑	↑	recovered	recovered

# *Calculation method of ulcer index*

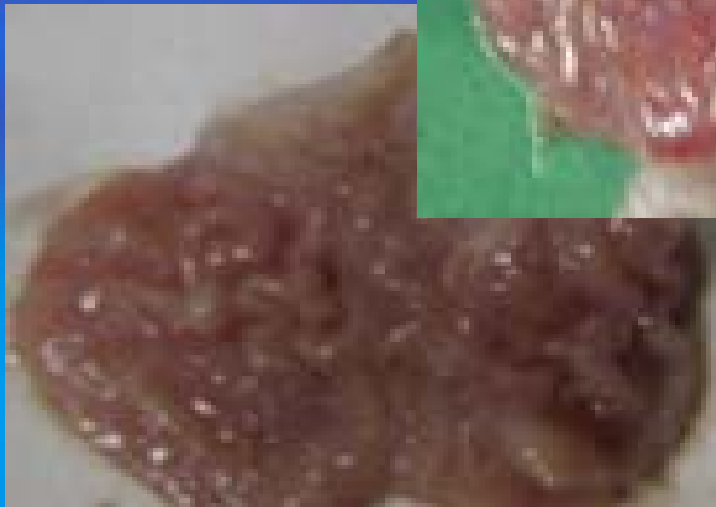
Normal rats 0 score



Stress rats 190 score



Punctured rats



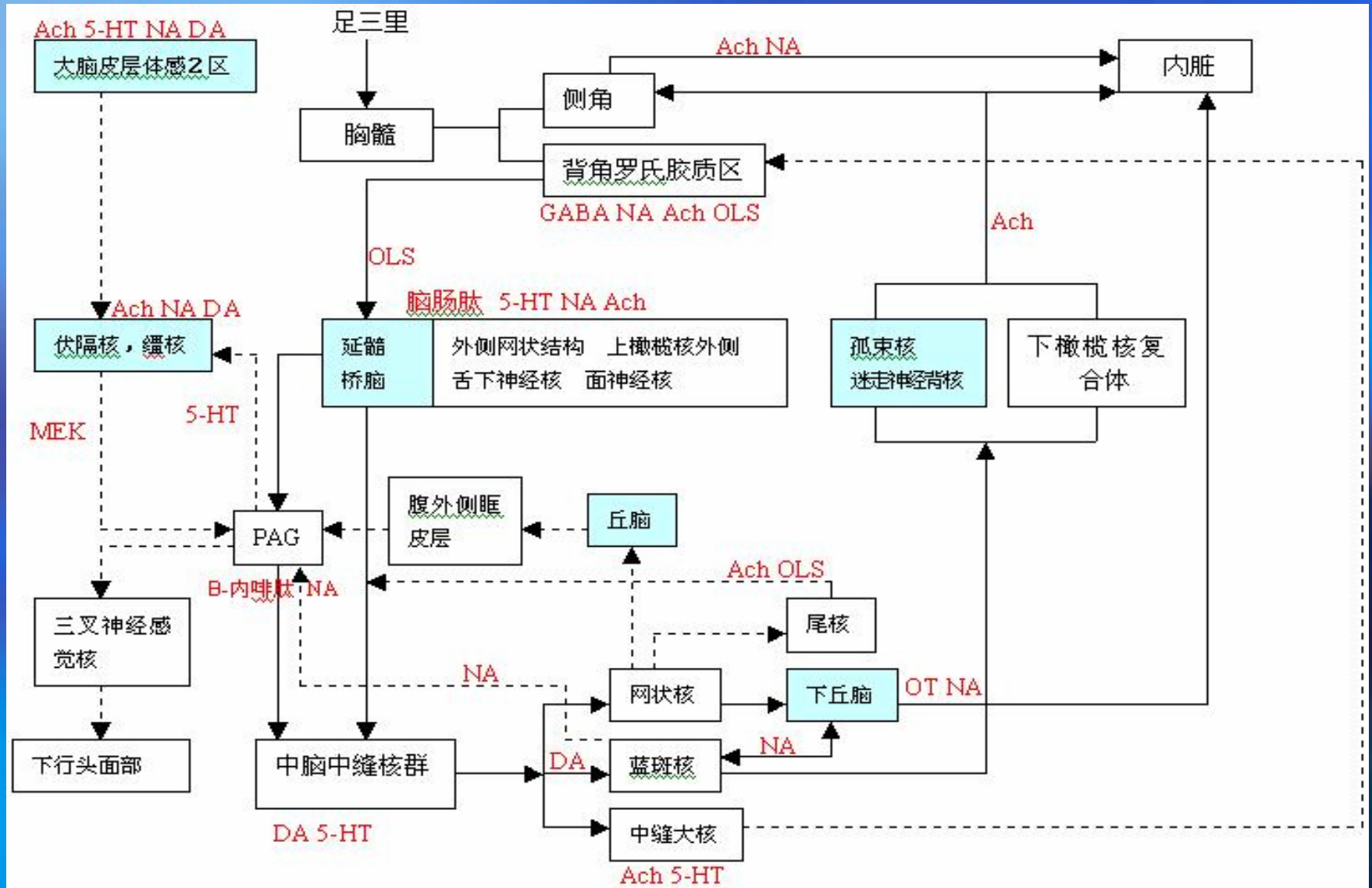
# *Results*

- *This study shows that acupuncture stimulation could lead to:*
  - *changed levels of some neurotransmitters or modulators and their receptors in the brain;*
  - *changed levels of various enzyme proteins in intracellular signaling pathways;*
  - *the changed gene expressions of enkephalin or endorphin, etc.*

# Conclusion

- *The different neurotransmitters or modulators had different biological activities and regulatory action on the related neurons, indicating that the **Central Nervous System** (primarily, **Brain**) plays an important role in the **Acupuncture action mechanism**.*

# Acupuncture ST36 brains neural network stimulation chart





## *Hypothesis of Neural Information Flow*

*Acupuncture signal transmits via the neural afferent pathway, and its sensing, analyzing, processing and integrating are localized at the related neurons of the Central Nervous System (Brain and Spinal Cord). Finally, the integrated signals were sent out to act on the target organs through the efferent nerve and neural-endocrine mechanism to deliver regulatory and therapeutic effects.*

*Thank you!*