

# Neurophysiology of sham acupuncture

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# "Gold standard" to find clinical evidence

## Expected outcome

Sham treatment = inert, without curative anticipation, non-specific physiological + emotional changes

(non-specific effects)

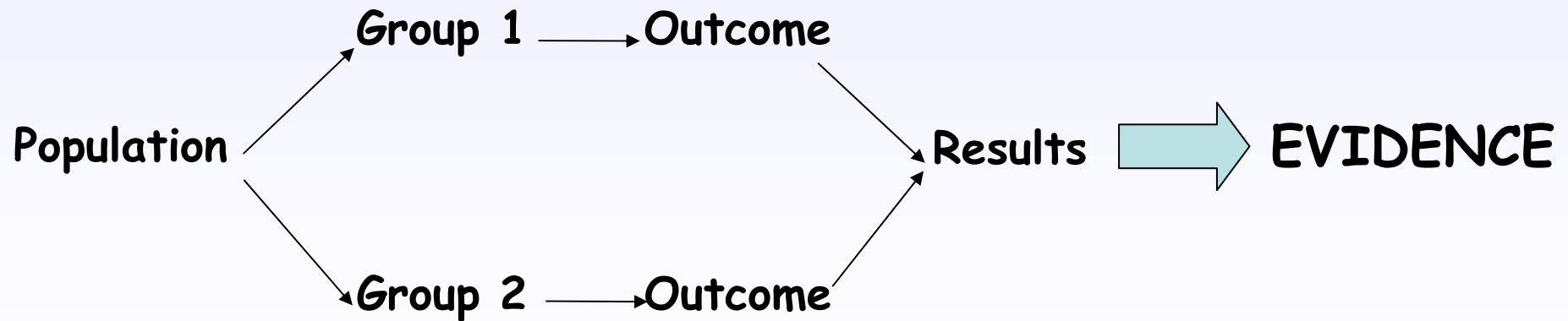
Active treatment = stronger response than sham

(non-specific + specific effects)

# "Gold standard" to find clinical evidence

Double blind randomized placebo controlled studies  
with two or more arms

**Intervention**



**Sham (placebo control)**

# Acupuncture

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graph TD; A[Acupuncture] --> B[TCM]; A --> C[Western];
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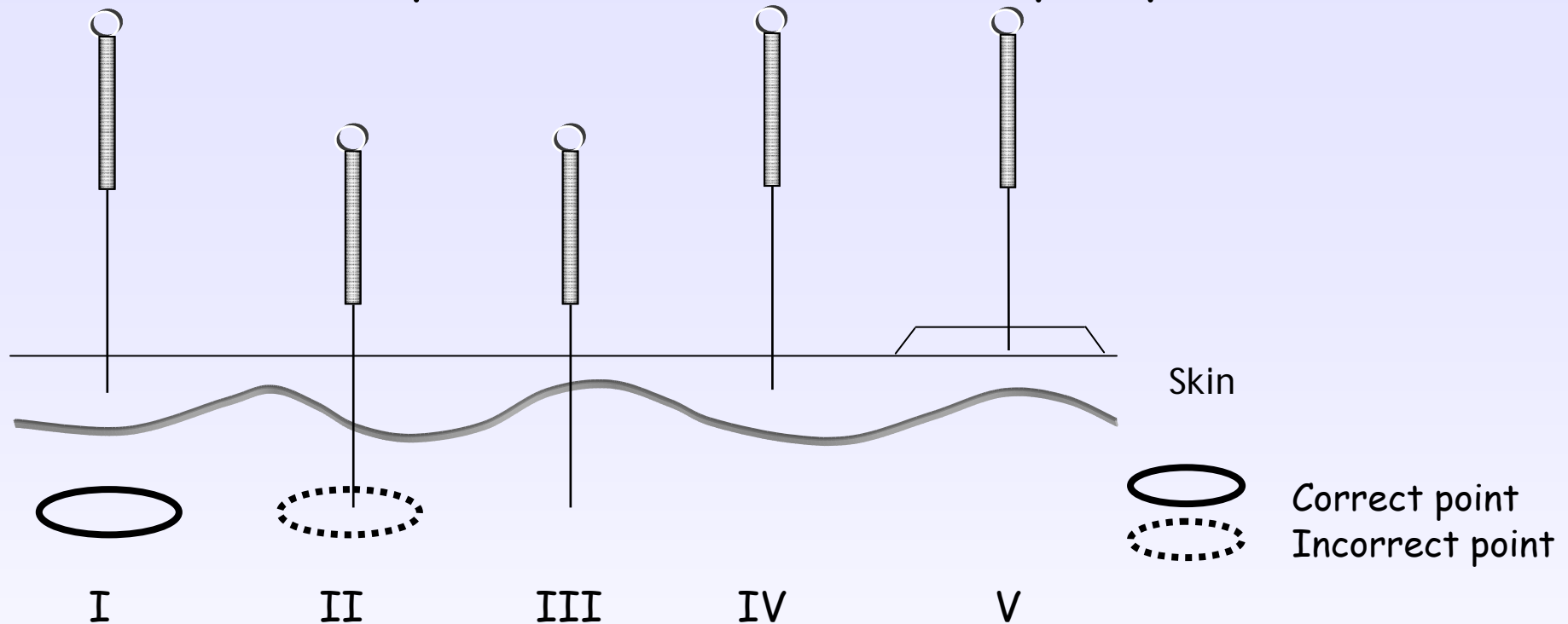
TCM

Specific clinical  
effects of each point

Western

Physiological effects  
of needle stimulation

# Control procedures from a TCM perspective



- I Superficial needling of correct point for the condition
- II Needling of incorrect point for the condition
- III Needling of non-acupuncture point
- IV Minimal acupuncture (superficial needling of points away from correct point)
- V Sham, placebo needles
- VI Pseudo-interventions

Lund I, Lundeberg T. Are minimal, superficial or sham acupuncture procedures acceptable as inert placebo controls?

Acupunct Med 2006;24(1):13-5.

Lund I, Nässtrand J, Lundeberg T. Minimal acupuncture is not a valid placebo control in randomised controlled trials of acupuncture: a physiologist's perspective. Chinese Medicine 2009, 4:1

# Western acupuncture

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graph TD; A[Western acupuncture] --> B[Control?]; A --> C[Treatment]; B --> D[Identical physiological responses]; C --> D;
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Control?

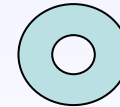
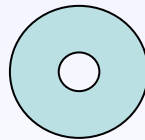
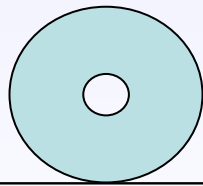
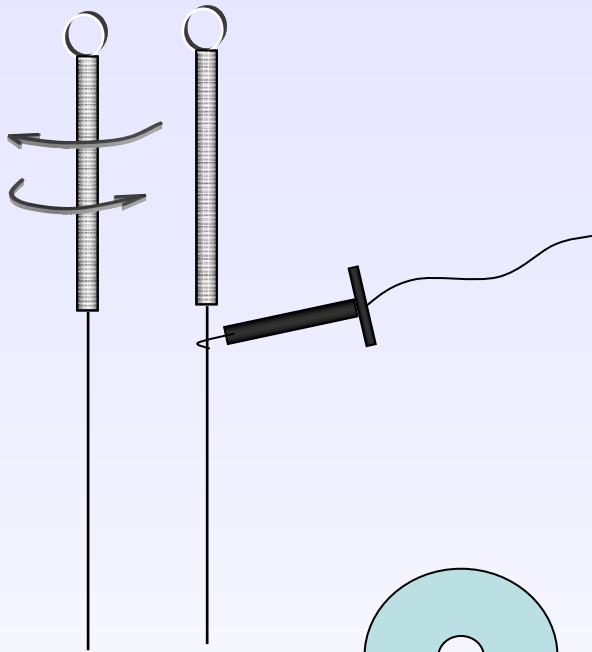
Needling "incorrect"  
point may affect  
same receptive field

Treatment

Needling acupuncture  
point in relation to  
innervation

Identical physiological responses

# Stimulation of afferent nerve fibres



Sensory organs coupled to afferent nerve fibres and sensations transmitted in different afferent nerve fibres

A $\alpha$ , I  
Motorneuron  
Musclespindle  
Golgie tendon  
organ

A $\beta$ , II  
Touch  
Pressure  
Vibration

A $\delta$ , III  
Hard pressure  
Cold  
Pain

C, IV  
Warmth  
Pain  
Touch

# Activated afferent nerve fibres depending of mode of acupuncture

Mode of acupuncture	Activated afferent nerve fibres
Manual acupuncture - deQi	A $\delta$ , C
Minimal acupuncture	2 types of C fibres
Electro acupuncture	A $\beta$ -A $\delta$

# Chronic pain

Plastic CNS changes  $\Rightarrow$  sensitization  $\Rightarrow$  **augmented** acupuncture responses

A) Light stimulation of skin, minimal acupuncture  
as strong effect as "real" acupuncture in various physiological responses

B) Stimulation away from defined acupuncture point  
response due to increased receptive fields

C) Repeated deQi

activation of descending pain inhibitory control outside stimulated myotome due to expanded receptive fields

# Intention of minimal acupuncture

Minimizing physiological effects # Physiological effects

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Light stimulation do produce physiological effects,  
i.e. not inert but may induce biased results



**Minimal acupuncture may introduce bias against  
the treatment being tested**

# Specific effects of acupuncture

Activation of descending pain inhibitory tracts and DNIC



Needle depth and site **unnecessary** for eliciting effects

**Deactivation of limbic activity**



Restore functional connectivity making the patient recipient to his/her expectancy to the treatment effect (*specific*)

*and*

to the patient therapist interaction (*non-specific*)



**Specific acupuncture effects conditions its non-specific effects**

# CONCLUSION

Different aspects of pain and acupuncture must be considered for optimal outcome and appropriate clinical advices.

Consequences and risks of faith in sham (placebo controlled) trials

- \*False negative results

- \*Reviews and meta analysis may conclude no effects