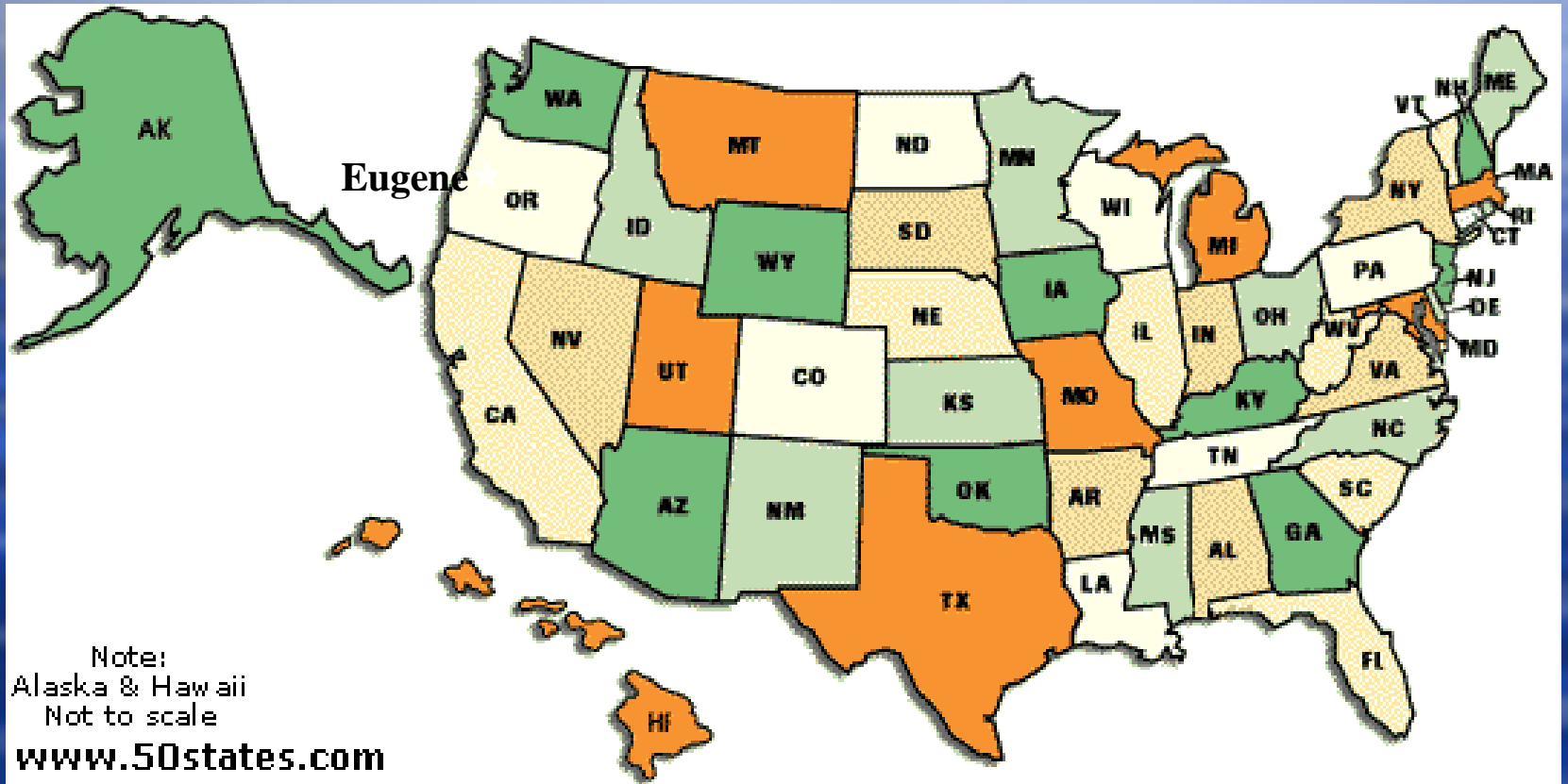


**Association of Pacific Rim Universities  
13<sup>th</sup> Annual Presidents Meeting  
June 28-30, 2009  
California Institute of Technology**

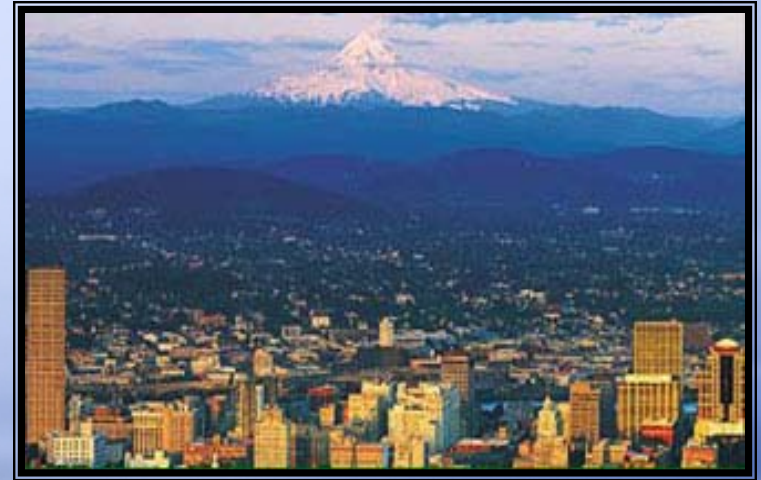
**APRU Presidents Open Forum**

**“Integrative Body Mind Training (IBMT):  
Similarity and difference between Chinese and American”**

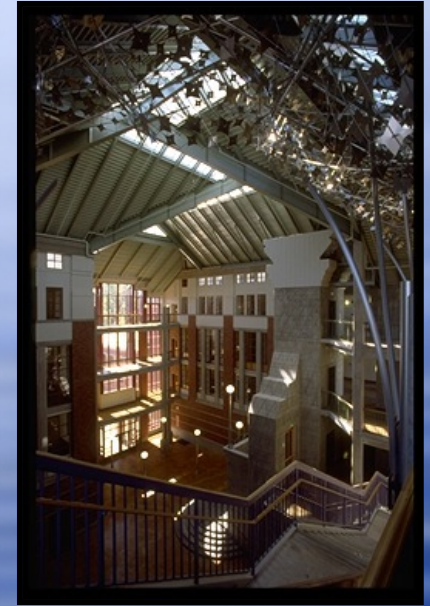
**Dave Frohnmayer, JD  
President  
University of Oregon  
Eugene, Oregon**



# *Oregon*



# University of Oregon Eugene



**Integrative Body Mind Training (IBMT):  
similarity and difference between Chinese  
and American**

# Similarities

Short-term IBMT improves attention and self-regulation in Chinese and American

# PNAS Report

## Short-term meditation training improves attention and self-regulation

Yi-Yuan Tang<sup>\*†‡§¶</sup>, Yinghua Ma<sup>\*</sup>, Junhong Wang<sup>\*</sup>, Yaxin Fan<sup>\*</sup>, Shigang Feng<sup>\*</sup>, Qilin Lu<sup>\*</sup>, Qingbao Yu<sup>\*</sup>, Danni Sui<sup>\*</sup>, Mary K. Rothbart<sup>†</sup>, Ming Fan<sup>¶</sup>, and Michael I. Posner<sup>†¶</sup>

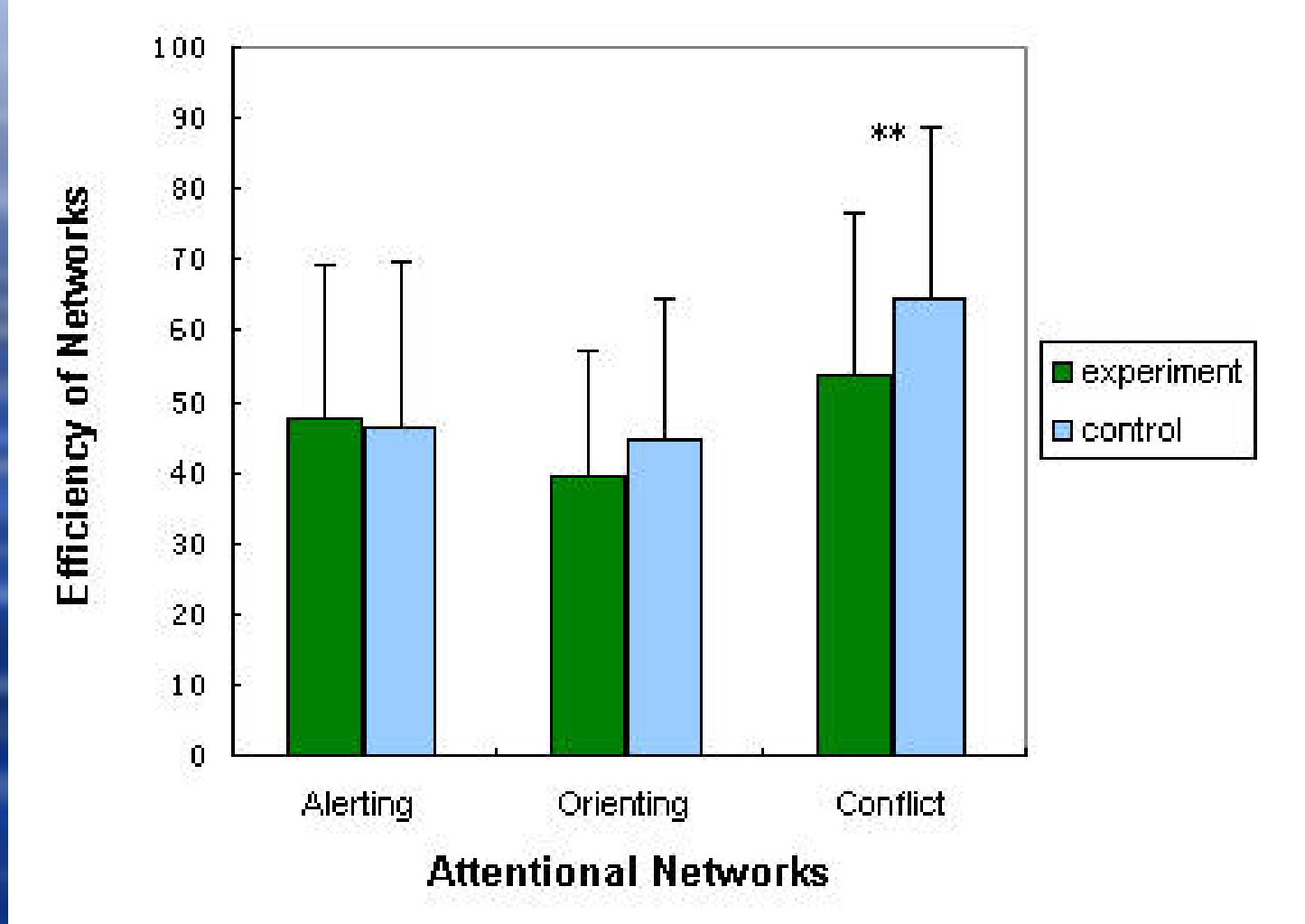
<sup>\*</sup>Institute of Neuroinformatics and Laboratory for Body and Mind, Dalian University of Technology, Dalian 116023, China; <sup>†</sup>Department of Psychology, University of Oregon, Eugene, OR 97403; <sup>‡</sup>Key Laboratory for Mental Health, Chinese Academy of Sciences, Beijing 100101, China; <sup>§</sup>Center for Social and Organizational Behavior, Graduate University of Chinese Academy of Sciences, Beijing 100080, China; and <sup>¶</sup>Institute of Basic Medical Sciences, Beijing 100850, China

Contributed by Michael I. Posner, August 16, 2007 (sent for review July 26, 2007)

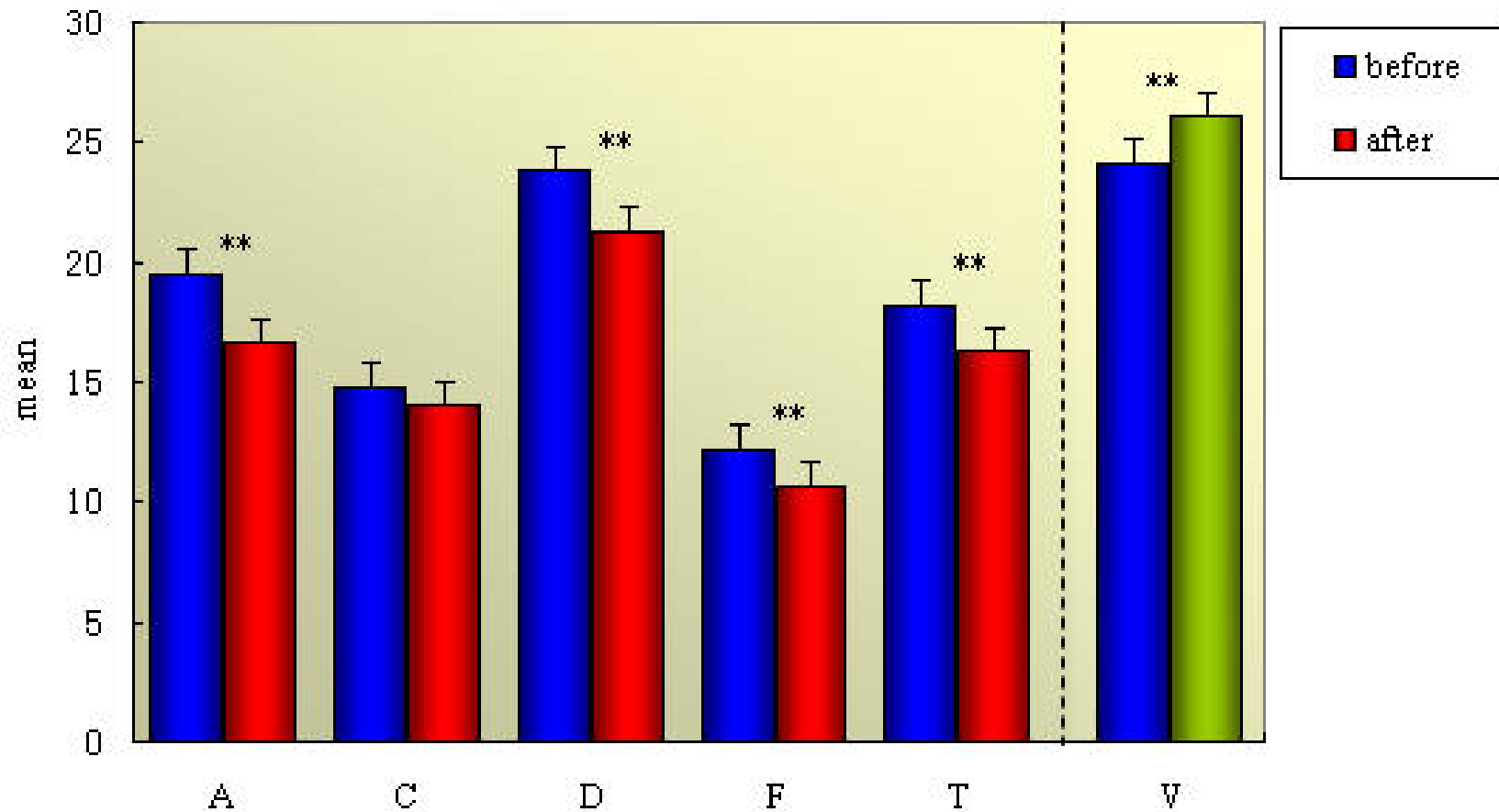
Recent studies suggest that months to years of intensive and systematic meditation training can improve attention. However, the lengthy training required has made it difficult to use random assignment of participants to conditions to confirm these findings. This article shows that a group randomly assigned to 5 days of meditation practice with the integrative body–mind training method shows significantly better attention and control of stress than a similarly chosen control group given relaxation training. The training method comes from traditional Chinese medicine and incorporates aspects of other meditation and mindfulness training. Compared with the control group, the experimental group of 40 undergraduate Chinese students given 5 days of 20-min integrative training showed greater improvement in conflict scores on the Attention Network Test, lower anxiety, depression, anger, and

attention to the present moment, etc. (2, 12–15). Mental training methods also share several key components, such as body relaxation, breathing practice, mental imagery, and mindfulness, etc., which can help and accelerate practitioner access to meditative states (3, 8, 16–19). This background raises the possibility that combining several key components of body and mind techniques with features of meditation and mindfulness traditions, while reducing reliance on control of thoughts, may be easier to teach to novices because they would not have to struggle so hard to control their thoughts. Therefore, integrative body–mind training (IBMT; or simply integrative meditation) was developed in the 1990s, and its effects have been studied in China since 1995. Based on the results from hundreds of adults and children ranging from 4 to 90 years old in China, IBMT practice improves emotional and cogni-

# Effect of five days of training on ANT performance to measure the conflict resolution ability

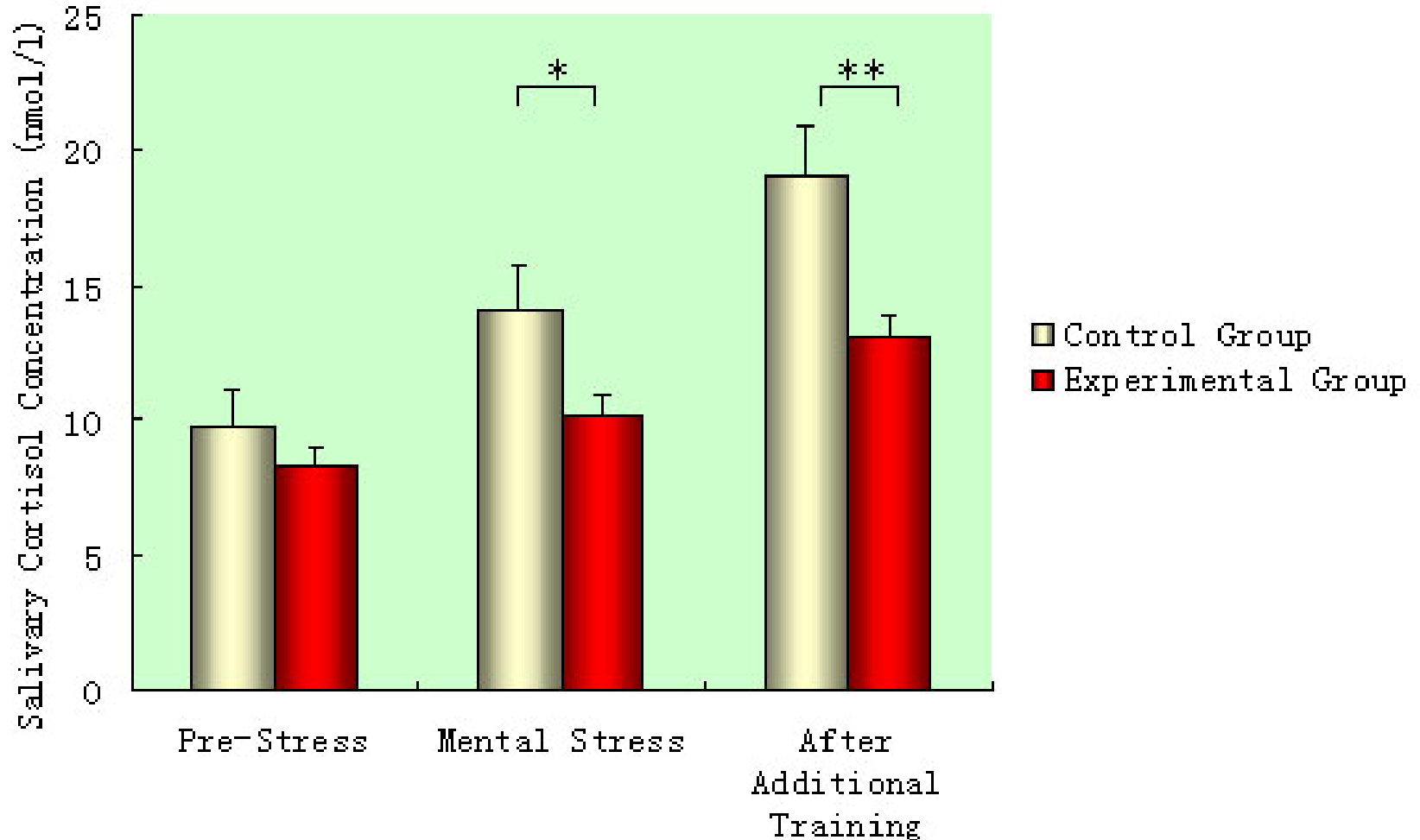


# Comparison of Scales of POMS pre- and post-training

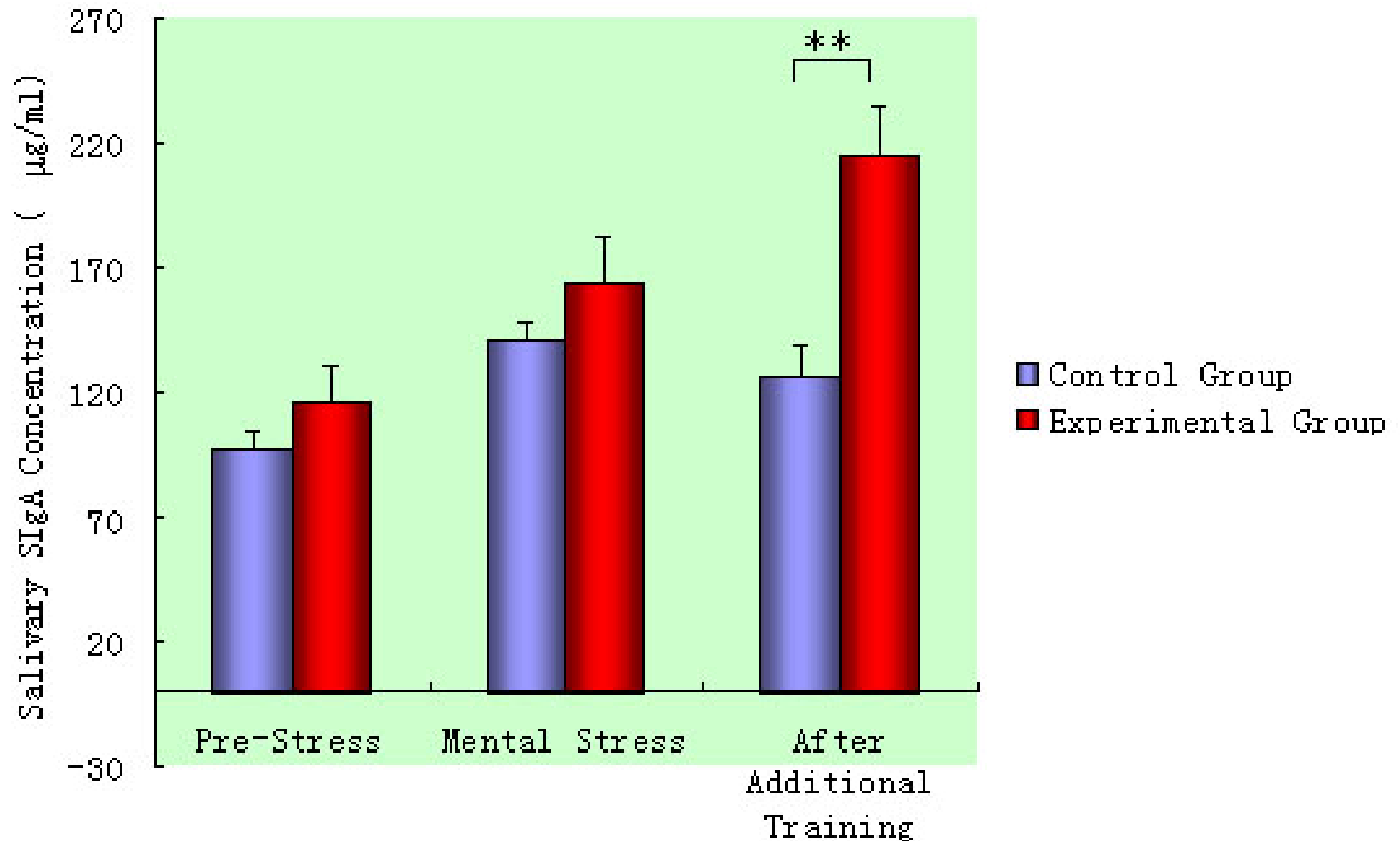


A (anger—hostility); C (confusion—bewilderment); D (depression—dejection); F (fatigue—inertia); T (tension—anxiety); V (Vigor-Activity).

# Comparison of Cortisol concentration in three different stages (stress management)



# Comparison of sIgA concentration in three different stages (immunoactivity)



# Differences

- ◆ American uses more language strategy to enter the meditation state compared to Chinese
- ◆ Chinese uses more inner experiences to enter the state
- ◆ More conscious control and effort associated to dorsal ACC activity in American
- ◆ Less control and effort associated to ventral ACC activity in Chinese
- ◆ Better compliance in Chinese compared to American
- ◆ Others

## Central and autonomic nervous system interaction is altered by short-term meditation

Yi-Yuan Tang<sup>a,b,1</sup>, Yinghua Ma<sup>a</sup>, Yaxin Fan<sup>a</sup>, Hongbo Feng<sup>a</sup>, Junhong Wang<sup>a</sup>, Shigang Feng<sup>a</sup>, Qilin Lu<sup>a</sup>, Bing Hu<sup>a</sup>, Yao Lin<sup>a</sup>, Jian Li<sup>a</sup>, Ye Zhang<sup>a</sup>, Yan Wang<sup>a</sup>, Li Zhou<sup>a</sup>, and Ming Fan<sup>c</sup>

<sup>a</sup>Institute of Neuroinformatics and Laboratory for Body and Mind, Dalian University of Technology, Dalian 116024, China; <sup>b</sup>Department of Psychology, University of Oregon, Eugene, OR 97403; and <sup>c</sup>Institute of Basic Medical Sciences, Beijing 100850, China

Communicated by Michael I. Posner, University of Oregon, Eugene, OR, April 12, 2009 (received for review February 18, 2009)

Five days of integrative body–mind training (IBMT) improves attention and self-regulation in comparison with the same amount of relaxation training. This paper explores the underlying mechanisms of this finding. We measured the physiological and brain changes at rest before, during, and after 5 days of IBMT and relaxation training. During and after training, the IBMT group showed significantly better physiological reactions in heart rate, respiratory amplitude and rate, and skin conductance response (SCR) than the relaxation control. Differences in heart rate variability (HRV) and EEG power suggested greater involvement of the autonomic nervous system (ANS) in the IBMT group during and after training. Imaging data demonstrated stronger subgenual and adjacent ventral anterior cingulate cortex (ACC) activity in the IBMT group. Frontal midline ACC theta was correlated with high-frequency HRV, suggesting control by the ACC over parasympathetic activity. These results indicate that after 5 days of training, the IBMT group shows better regulation of the ANS by a ventral midfrontal brain system than does the relaxation group. This changed state probably reflects training in the coordination of body and mind given in the IBMT but not in the control group. These results could be useful in the design of further specific interventions.

anterior cingulate cortex | body–mind interaction | IBMT

In a previous study (1, 2), 80 Chinese undergraduates were randomly assigned to an experimental group (integrative body–mind training, IBMT) or to a control group (relaxation training) for 5 days of short-term training (20 min per day). Before training, no differences were found for behavioral, endocrine, and immune measures between the 2 groups. After 5 days of training, the IBMT group showed significantly greater

ical measures included heart rate, skin conductance response (SCR), and respiratory amplitude and rate, to monitor autonomic nervous system activity. These measures allowed evaluation of the training stages in the 2 parallel experiments to make sure all subjects attained similar meditative or relaxation states during and after training.

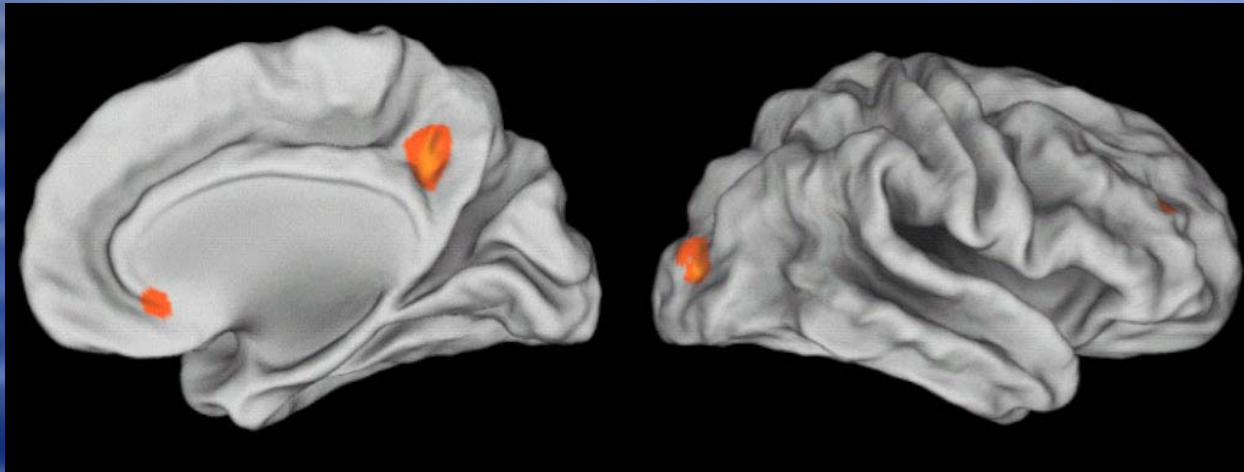
This design allowed us to apply random assignment using participants without any previous meditation or relaxation experience, given the same amount of training to detect the relationship between the brain networks and the autonomic nervous system (ANS) during training (*see Materials and Methods*).

A brain network including anterior cingulate cortex (ACC) and prefrontal cortex (PFC) has been shown to be an important mechanism for self-regulation of cognition and emotion (10–13). The sensitivity of the ACC to both reward and pain (14, 15) and evidence for ACC coupling to cognitive and emotional areas during task performance (16, 17) support the idea that the role of this brain region is to regulate the processing of information from other networks. The ACC thus serves as part of an executive attention network involved in the control of both cognition and emotion (18). Because the IBMT group showed higher levels of self-regulation than the relaxation group following training (1, 2), we hypothesized that activity in the ACC will be increased more by IBMT than by relaxation training.

Meditation is accompanied by physiological changes. Wallace (19) first reported that transcendental meditation induced physiological changes in oxygen consumption, heart rate, skin resistance, and certain EEG frequencies. Indexes of ANS function including heart rate/heart rate variability (HRV), skin conductance/resistance response, respiratory amplitude/rate, and EEG frequencies have become biomarkers for monitoring

# Brain imaging

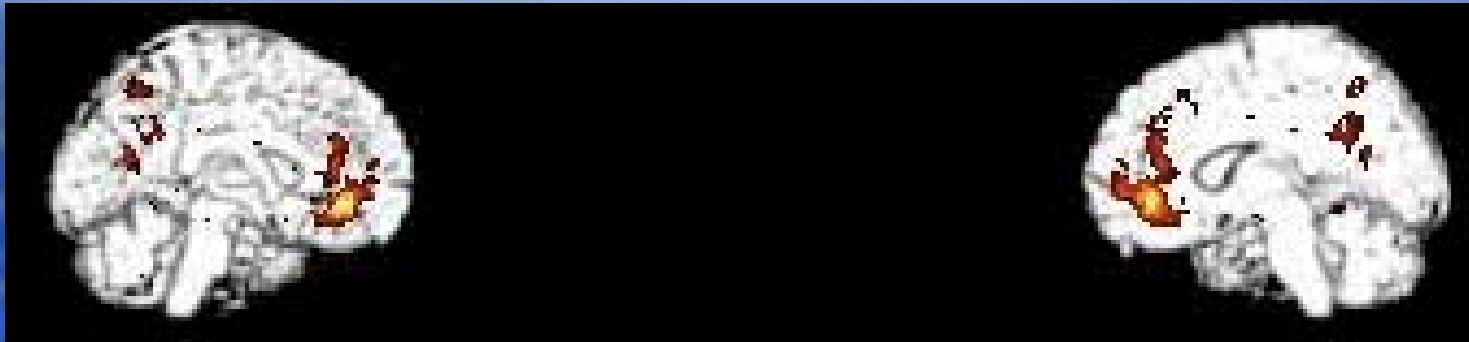
- ◆ vACC plays an important role after 5 days of IBMT than relaxation in Chinese



N=10, P<0.05

# Brain imaging

- ◆ vACC and dACC play an important role after 5 days of IBMT than relaxation in American



N=10, P<0.05

## Attention training and attention state training

Yi-Yuan Tang<sup>1,2</sup> and Michael I. Posner<sup>2</sup>

<sup>1</sup> Institute of Neuroinformatics, Dalian University of Technology, Dalian 116024, China

<sup>2</sup> Department of Psychology, University of Oregon, Eugene, OR 97403, USA

**The ability to attend and to exercise cognitive control are vital aspects of human adaptability. Several studies indicate that attention training using computer based exercises can lead to improved attention in children and adults. Randomized control studies of exposure to nature, mindfulness and integrative body-mind training (IBMT) yield improved attention and self-regulation. Here, we ask how attention training and attention state training might be similar and different in their training methods, neural mechanisms and behavioral outcomes. Together these various methods lead to practical ways of improving attention and self-regulation.**

### Improving attention

A very diverse set of training methods have been shown to improve attention and self-regulation. These methods are

closely related to the training and to more general cognitive abilities [1–4]. All of these methods involve practice in some cognitive skill by repetitive trials on tasks similar to those used in schools or cognitive psychology laboratories. All of these studies aim for long term improvement in attention, but in most cases only short term improvements close to the training have been well studied.

On the surface, these AT methods differ considerably from mindfulness training, exposure to nature settings or IBMT, which we group as AST. Recently, both IBMT (emphasizing body-mind balance) and nature exposure (using attention restoration theory) have used randomized designs with attention measures similar to those used with AT and have also shown significantly greater improvements in attention following training than those from

# Conclusions

1. Neuroscience crosses the boundaries of traditional disciplines to provide new insights into:

- psychology
- brain anatomy
- language acquisition
- mathematical skills
- learning theory

## Conclusions – continued

2. There are important and interesting cross-cultural differences in scientific findings.
3. This research suggests the continuing importance of the APRU collaboration in brain research.

## Conclusions – continued

### 4. The findings suggest new ideas:

- A possible way to deal with addictions (such as tobacco) by enhancing the self-regulatory network.
- Changing the brain “state” in children is possibly useful for improving “attention” in early learning.

**Thank you for your attention**

For more information

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