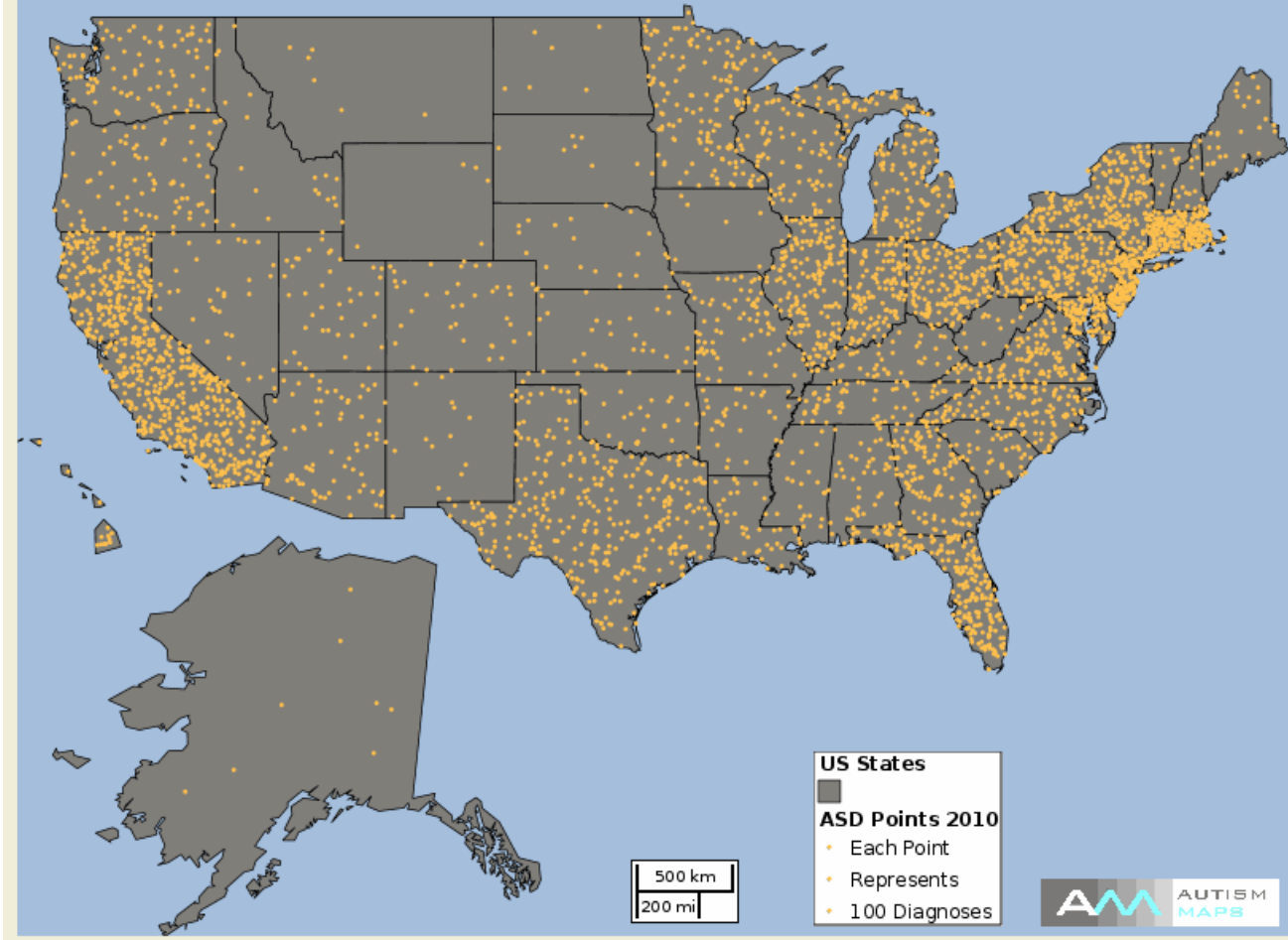


Acupuncture for Autism: A Promising Therapy

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Aug 18, 2013

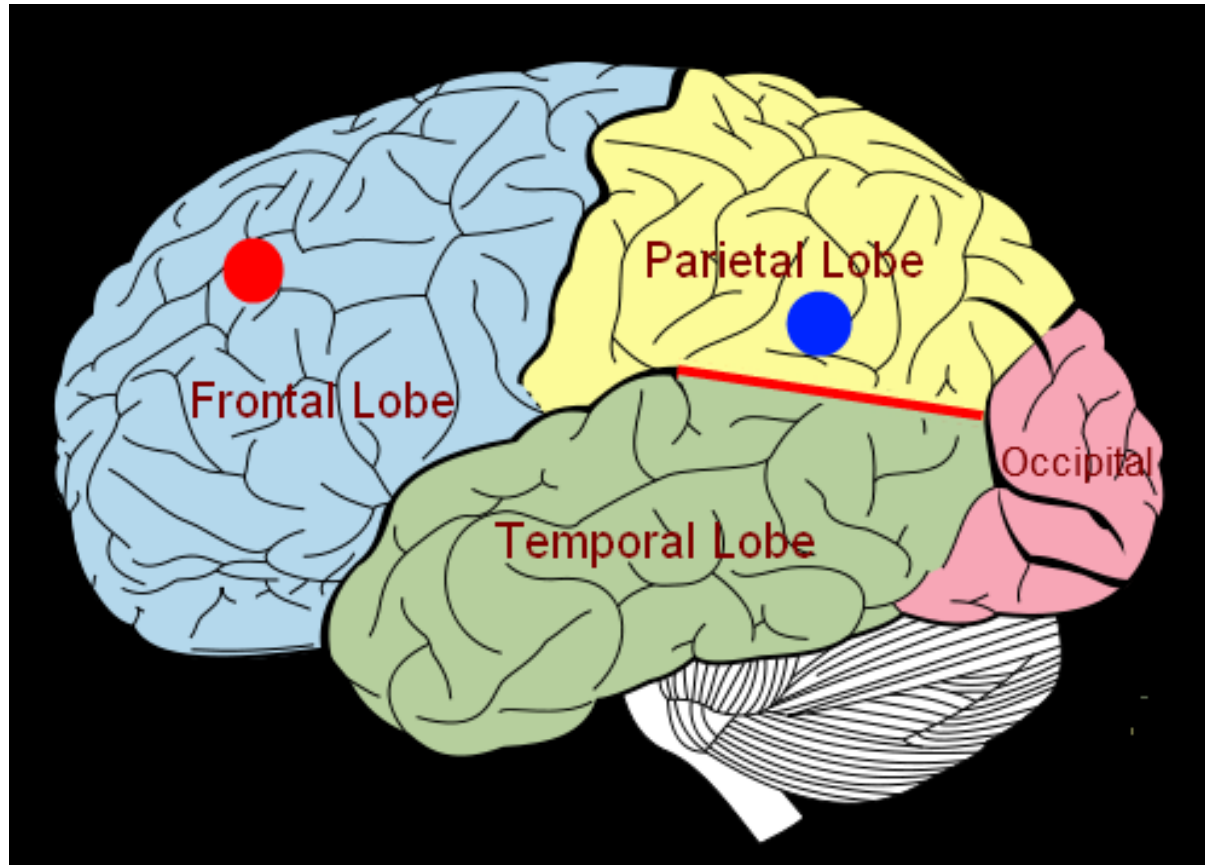
US, Autism Cases 2010 (each point represents 100)



Introduction

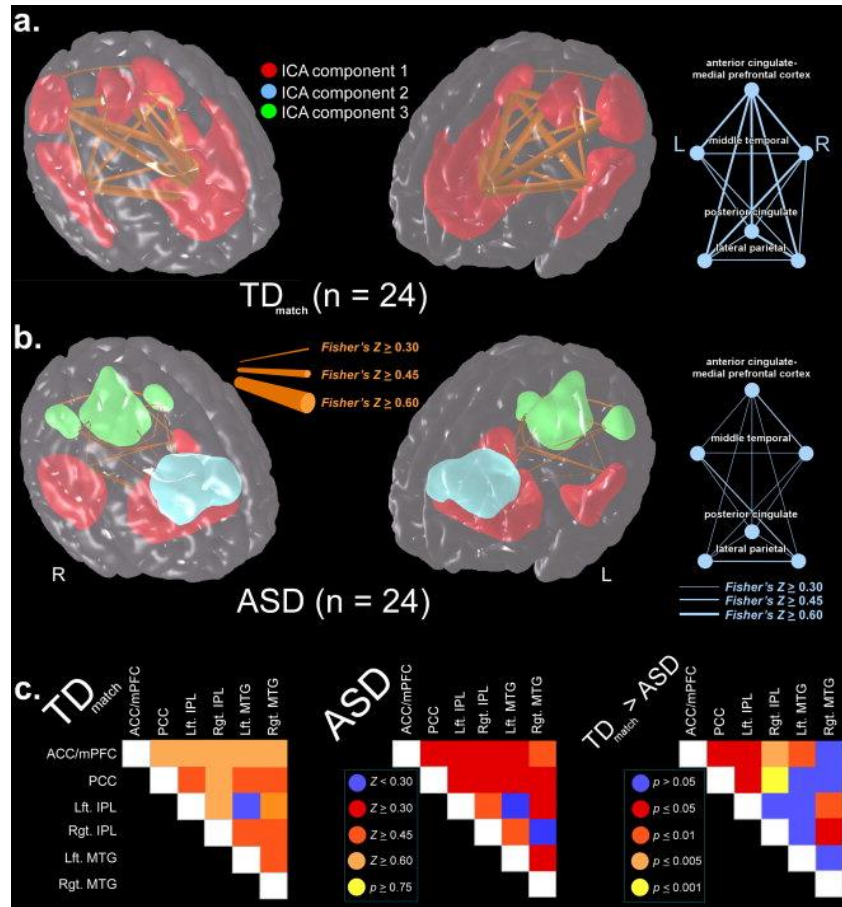
- Autism spectrum disorder (ASD) is disorders of brain development with difficulties in social interaction, verbal and nonverbal communication and repetitive behaviors.
- The default mode network (DMN) dysregulation has been found in ASD children.
- Acupuncture stimulation can alter DMN activations and deactivations.

Default Mode Network



<http://www.geon.us/Main/Brain.htm>

Dysmatururation of the default mode network in autism



Dysmatururation of the default mode network in autism

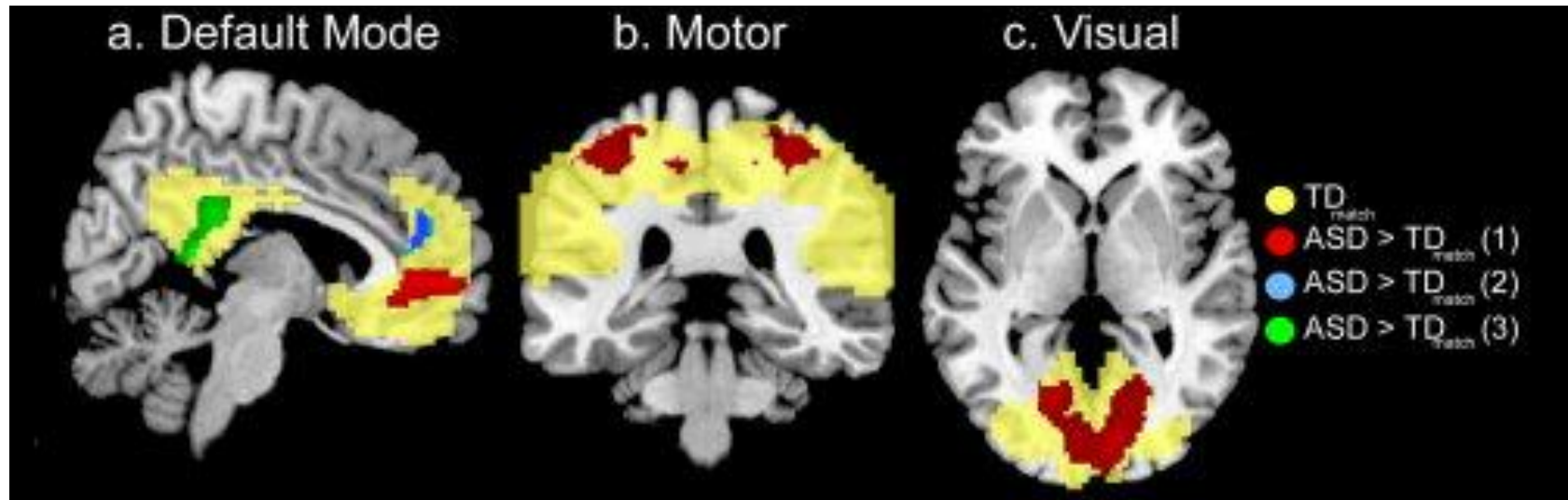
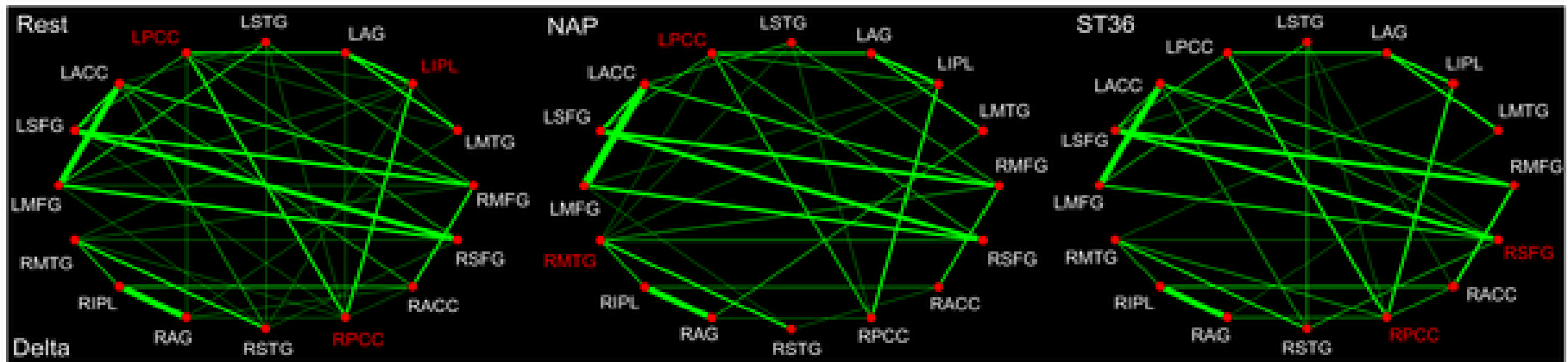


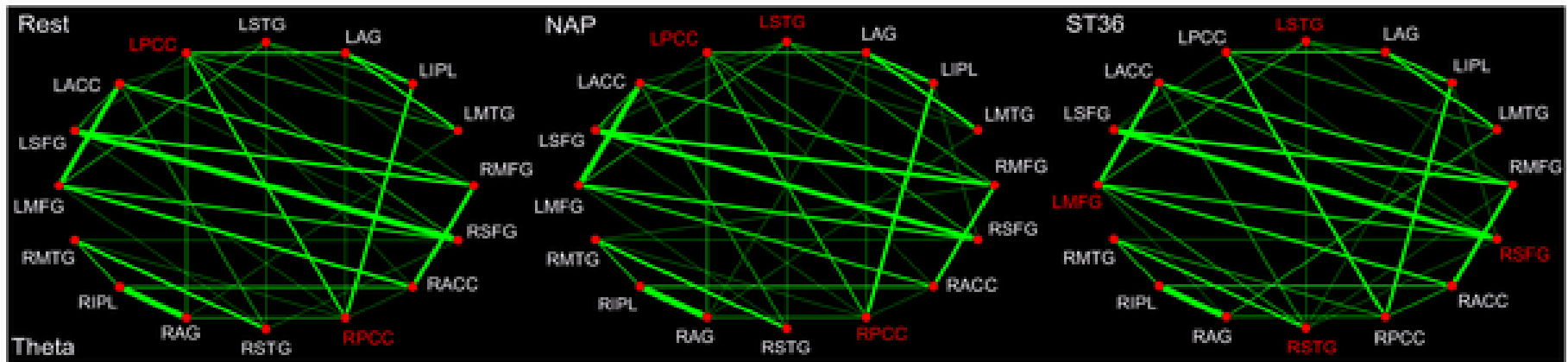
Figure 4. DMN hub configurations preceding acupuncture and following acupuncture at ST36 or NAP within the delta band



You Y, Bai L, Dai R, Cheng H, et al. (2013) Altered Hub Configurations within Default Mode Network following Acupuncture at ST36: A Multimodal Investigation Combining fMRI and MEG. PLoS ONE 8(5): e64509. doi:10.1371/journal.pone.0064509

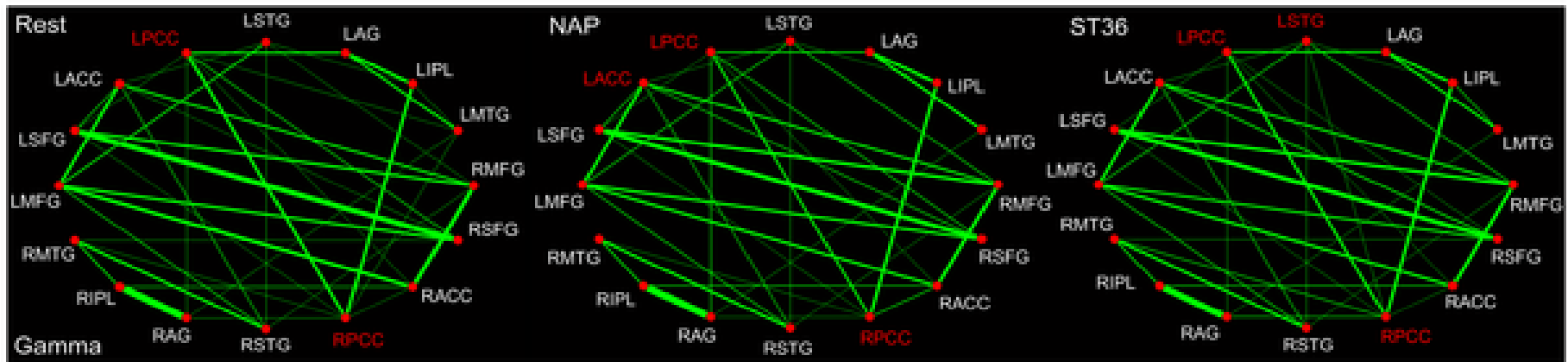
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0064509>

Figure 5. DMN hub configurations preceding acupuncture and following acupuncture at ST36 or NAP within the theta band



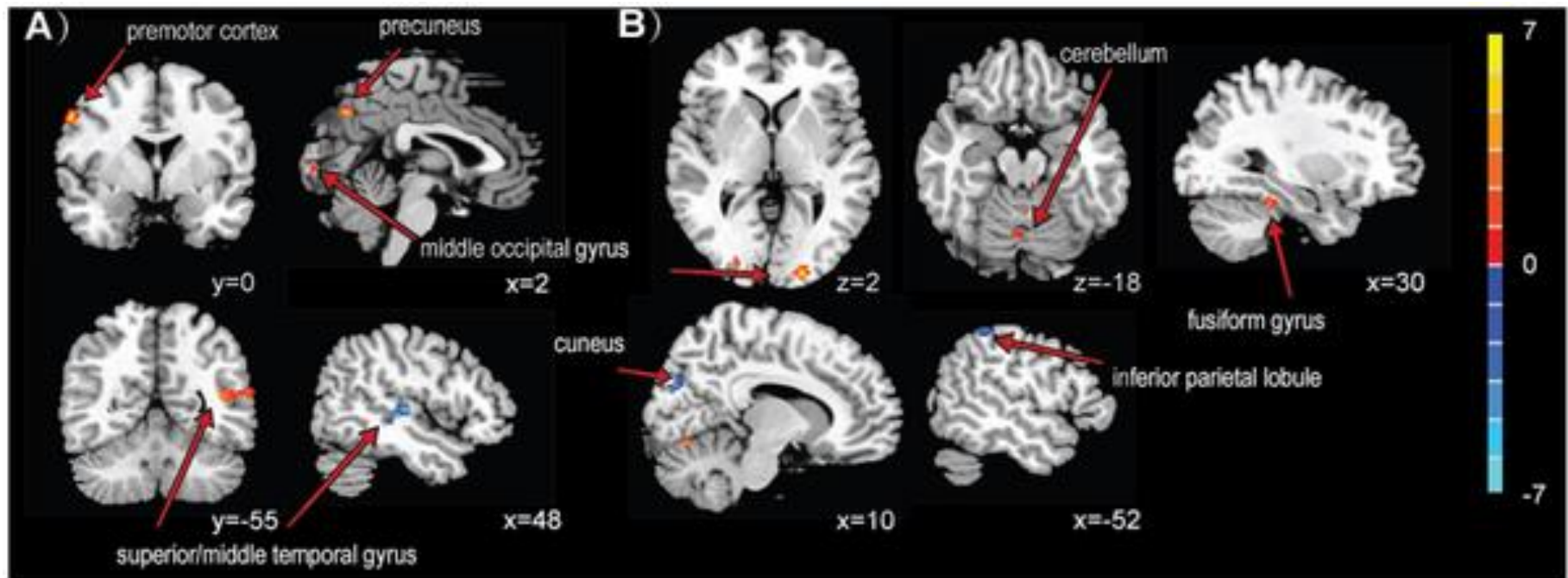
You Y, Bai L, Dai R, Cheng H, et al. (2013) Altered Hub Configurations within Default Mode Network following Acupuncture at ST36: A Multimodal Investigation Combining fMRI and MEG. PLoS ONE 8(5): e64509. doi:10.1371/journal.pone.0064509
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0064509>

Figure 8. DMN hub configurations preceding acupuncture and following acupuncture at ST36 or NAP within the gamma band



You Y, Bai L, Dai R, Cheng H, et al. (2013) Altered Hub Configurations within Default Mode Network following Acupuncture at ST36: A Multimodal Investigation Combining fMRI and MEG. PLoS ONE 8(5): e64509. doi:10.1371/journal.pone.0064509
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0064509>

Figure 3. Changes in functional connectivity of the DMN following MA (A) or EA (B).



Jiang Y, Wang H, Liu Z, Dong Y, et al. (2013) Manipulation of and Sustained Effects on the Human Brain Induced by Different Modalities of Acupuncture: An fMRI Study. PLoS ONE 8(6): e66815. doi:10.1371/journal.pone.0066815
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0066815>

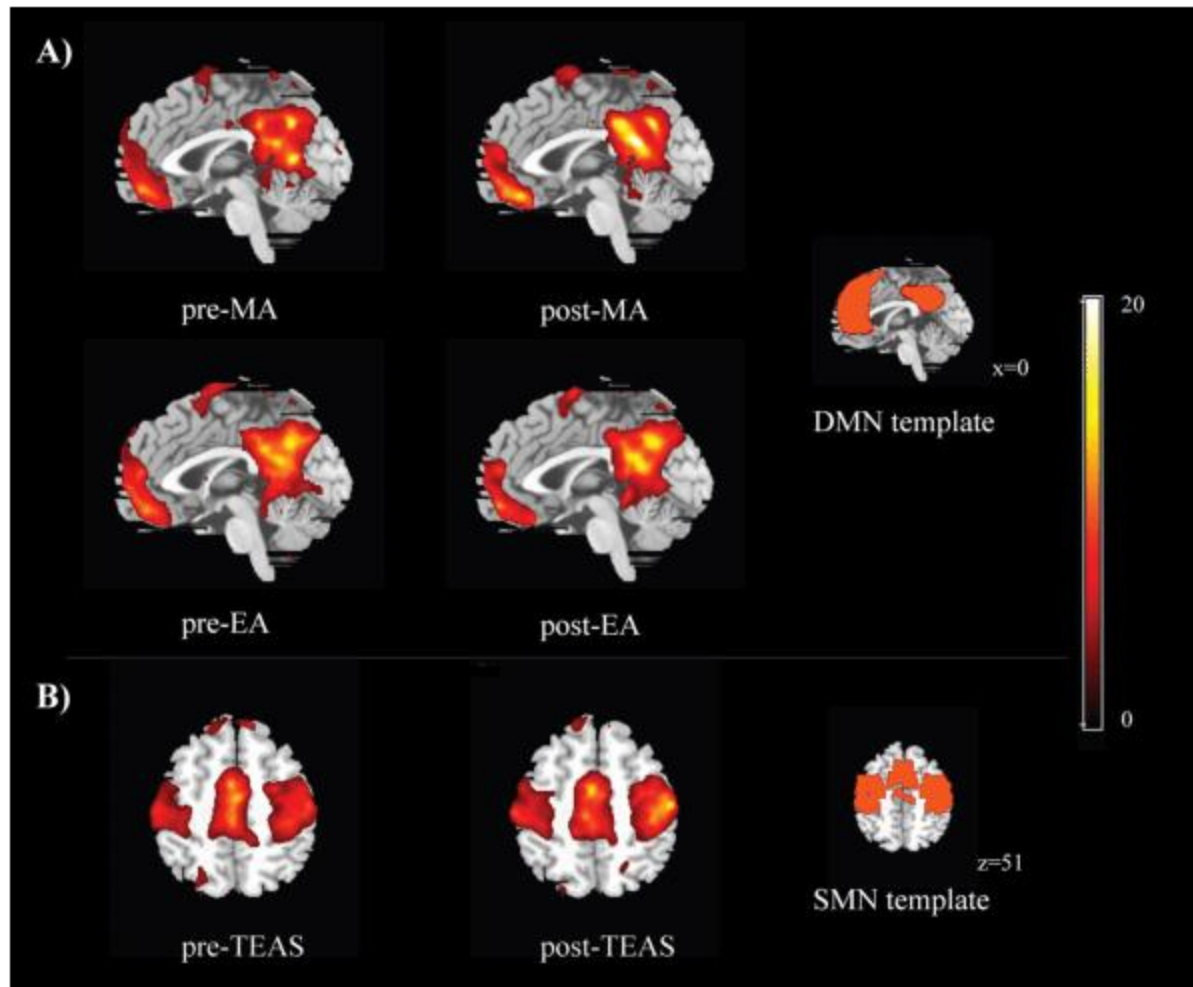


Fig.S1. Group maps for the DMN and the SMN, before and after acupuncture stimulation. The best-fit components were selected by using the templates of the DMN and SMN shown in the right line of the graph. The group results of (A) the DMN and (B) the SMN components decomposed by ICA included the pre-MA rest/post-MA rest, the pre-EA

- **Effect of Acupuncture in Mild Cognitive Impairment and Alzheimer Disease: A Functional MRI Study**

PLoS ONE 7(8): e42730.

Table 1. Characteristics of the AD, MCI patients and Normal controls.

Characteristics	AD	MCI	NOR	P value
N (M/F)	14(4/10)	8(3/5)	14(6/8)	-
Age, years	66.92±8.91	66.37±10.96	66.07±5.78	0.96*
Education, years	10.07±3.38	10.62±3.54	11.00±4.52	0.82*
MMSE	15.92±4.32	25.37±1.30	28.00±1.41	<0.01*
AVLT(immediate)	11.35±3.95	14.13±3.52	26.86±5.24	<0.01*
AVLT(delayed)	2.64±1.59	4.37±1.59	11.07±2.76	<0.01*
AVLT(recognition)	3.35±1.55	7.38±3.11	12.71±2.09	<0.01*
CDR	1–2	0.5	0	-

MMSE, Mini-Mental State Examination; Plus-minus values are means ± S.D. AVLT, Auditory verbal learning test; immediate, immediate recall of learning verbal; delayed; delayed recall of learning verbal; recognition, recognition of learning verbal; CDR, clinical dementia rate.

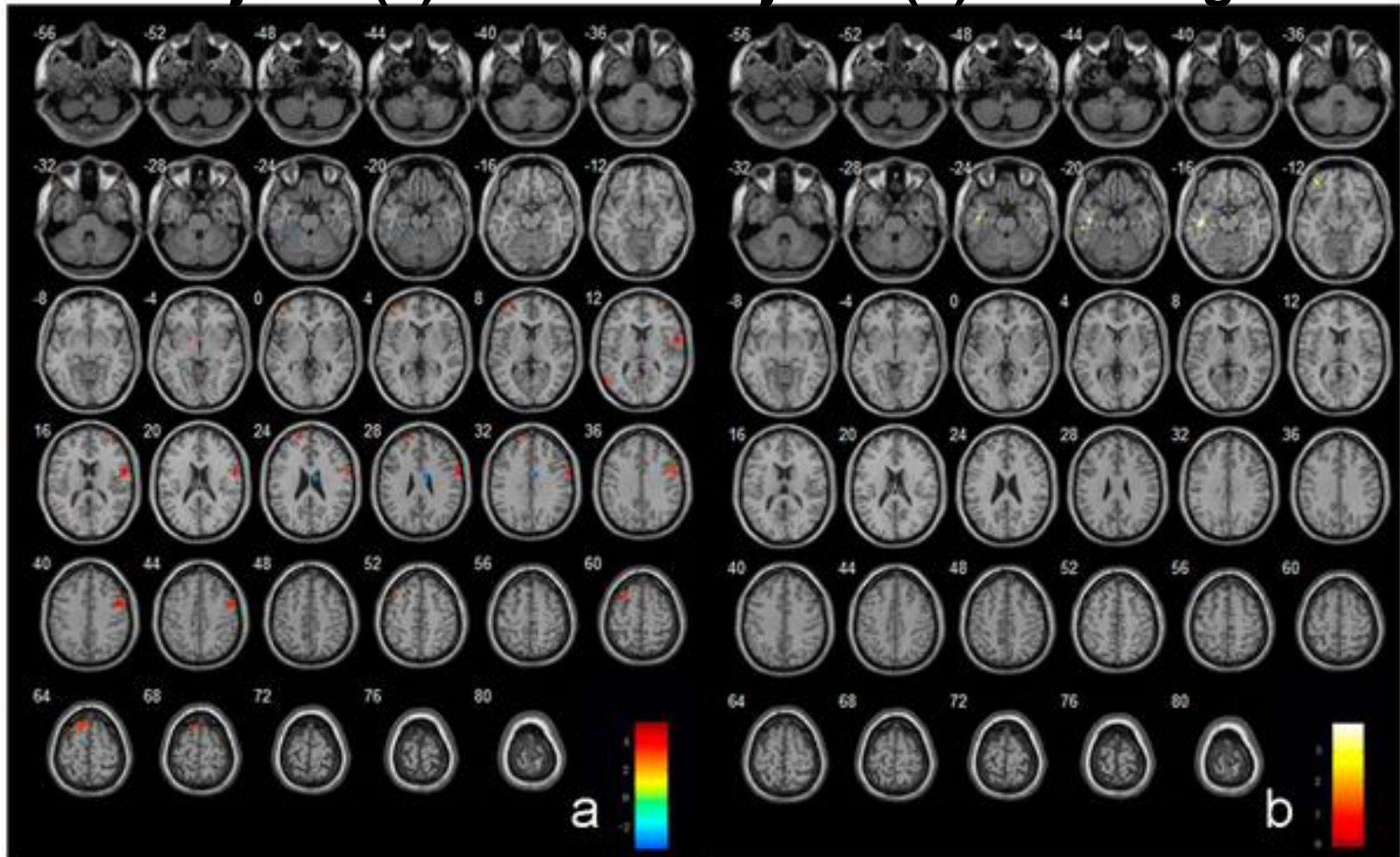
*The *P* values were obtained by one-way analysis of variance tests.

doi:10.1371/journal.pone.0042730.t001

Wang Z, Nie B, Li D, Zhao Z, et al. (2012) Effect of Acupuncture in Mild Cognitive Impairment and Alzheimer Disease: A Functional MRI Study. PLoS ONE 7(8): e42730. doi:10.1371/journal.pone.0042730

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0042730>

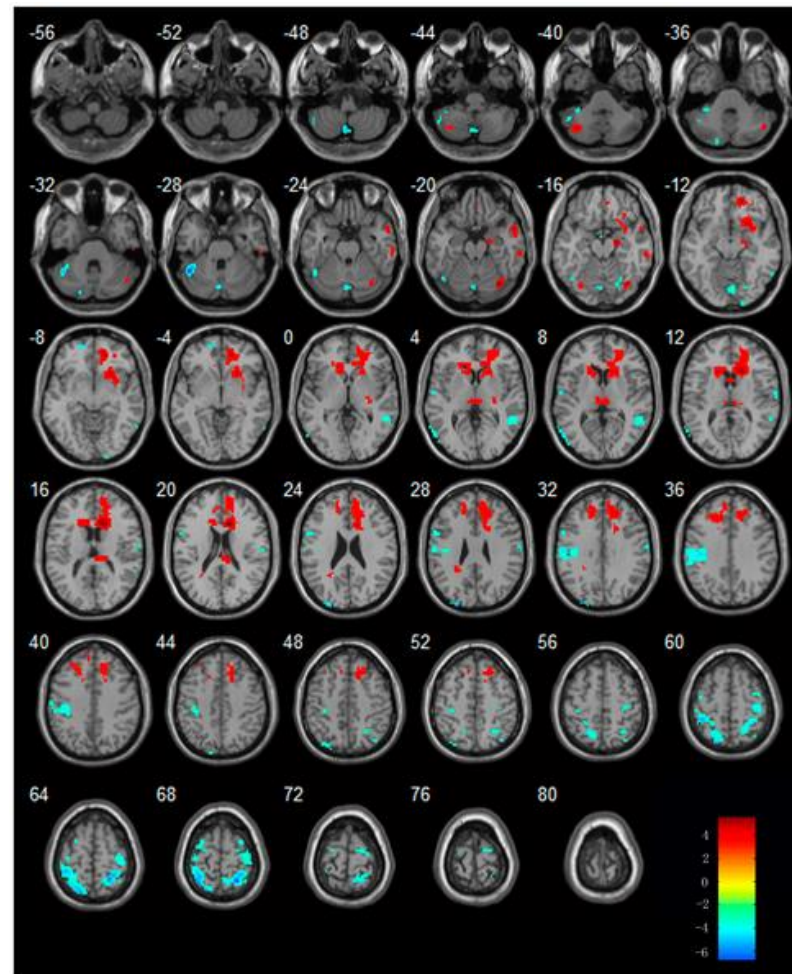
Figure 2. Regions showing abnormal activities in MCI subjects (a) and AD subjects (b) in resting state.



Wang Z, Nie B, Li D, Zhao Z, et al. (2012) Effect of Acupuncture in Mild Cognitive Impairment and Alzheimer Disease: A Functional MRI Study. PLoS ONE 7(8): e42730. doi:10.1371/journal.pone.0042730

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0042730>

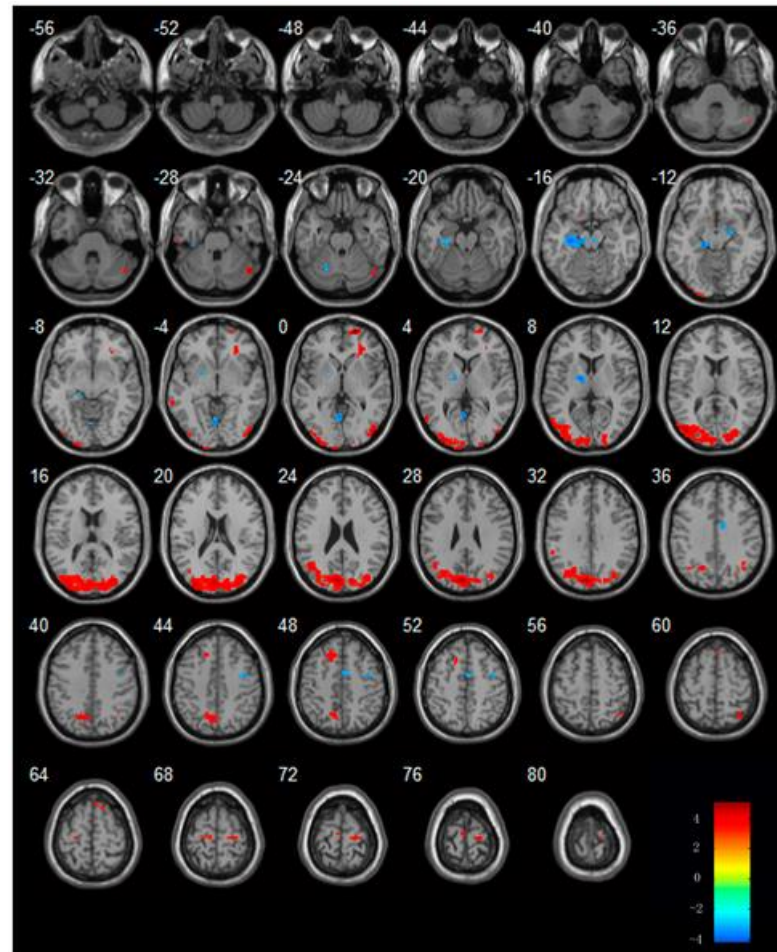
Figure 5. Regions showing increased or decreased activities in MCI subjects after acupuncture comparing to resting state.



Wang Z, Nie B, Li D, Zhao Z, et al. (2012) Effect of Acupuncture in Mild Cognitive Impairment and Alzheimer Disease: A Functional MRI Study. PLoS ONE 7(8): e42730. doi:10.1371/journal.pone.0042730

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0042730>

Figure 6. Regions showing increased or decreased activities in AD subjects after acupuncture comparing to resting state.



Wang Z, Nie B, Li D, Zhao Z, et al. (2012) Effect of Acupuncture in Mild Cognitive Impairment and Alzheimer Disease: A Functional MRI Study. PLoS ONE 7(8): e42730. doi:10.1371/journal.pone.0042730

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0042730>

Acupuncture in Mild Cognitive Impairment and Alzheimer Disease

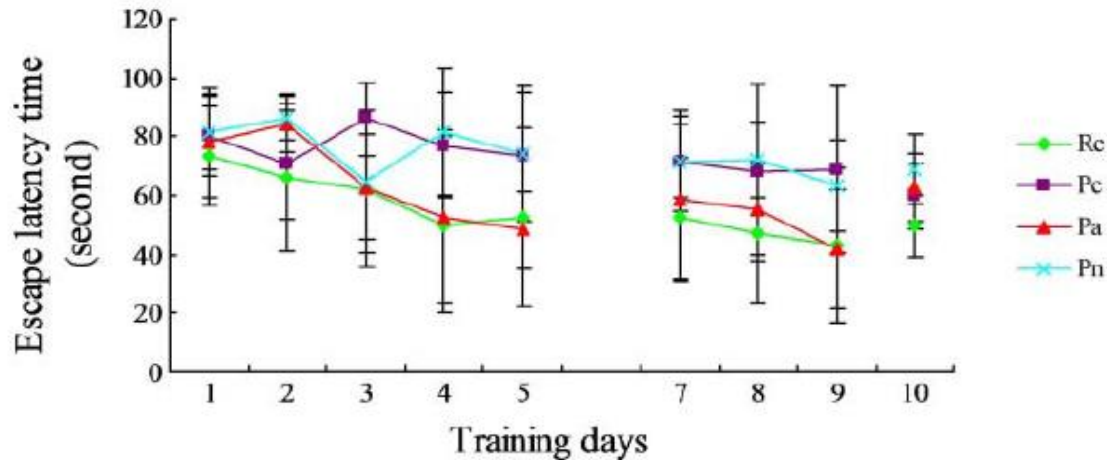
- Most of the regions were involved in the temporal lobe and the frontal lobe, which were closely related to the memory and cognition.
- The fMRI study confirmed that acupuncture at Tai chong (Liv3) and He gu (LI4) can activate certain cognitive-related regions in AD and MCI patients.

- Acupuncture improves cognitive deficits and increases neuron density of the hippocampus in middle-aged SAMP8 mice.

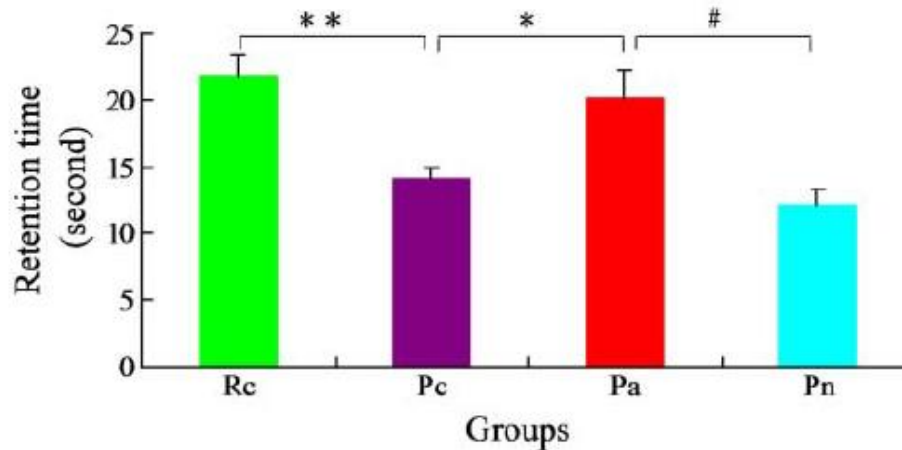
Acupuncture in Medicine, 2012 Dec; 30 (4): 339-45.

Acupuncture improves cognitive deficits

(A) Performance in Morris water maze test

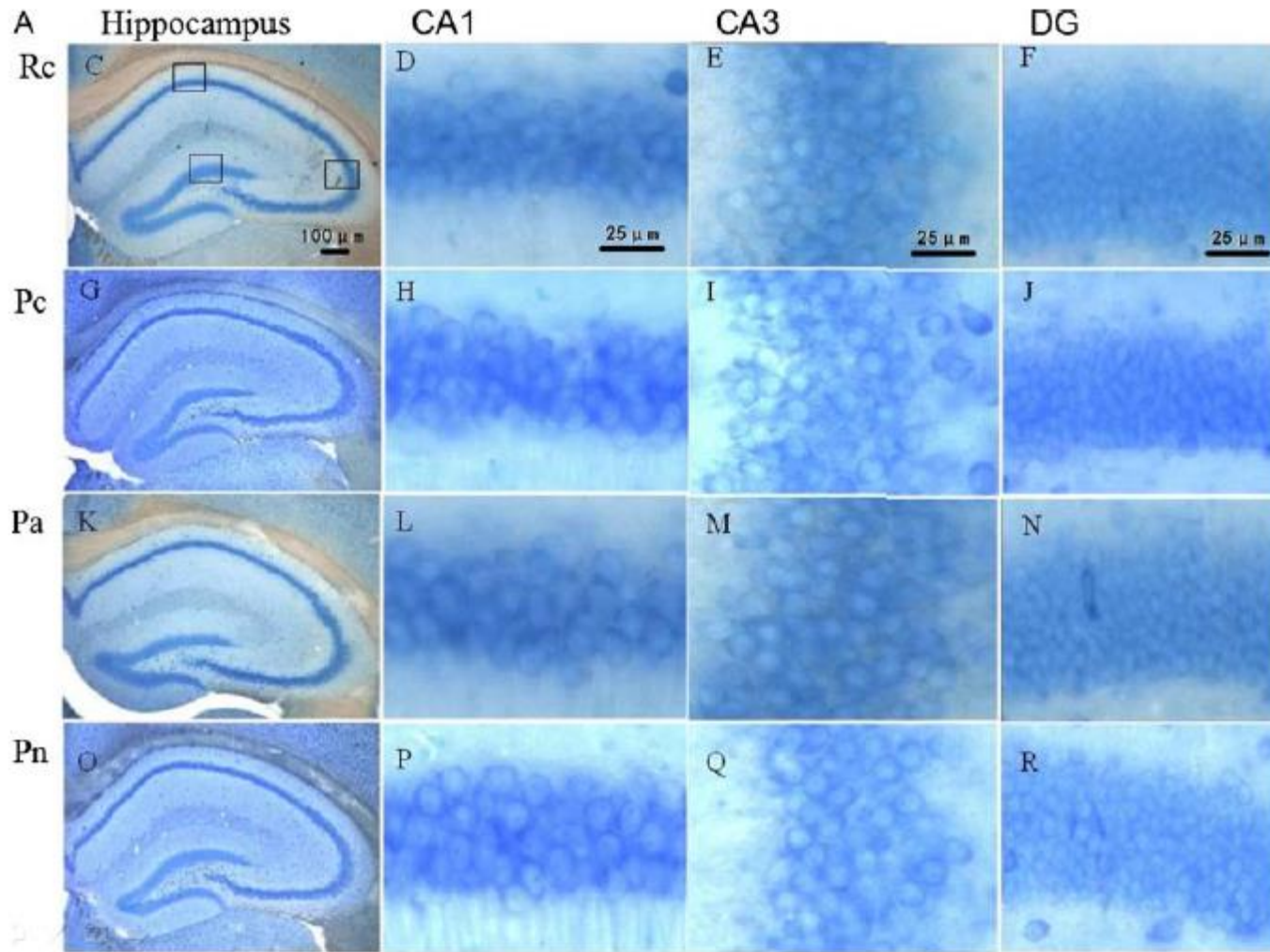


(B) Retention time in probe trial



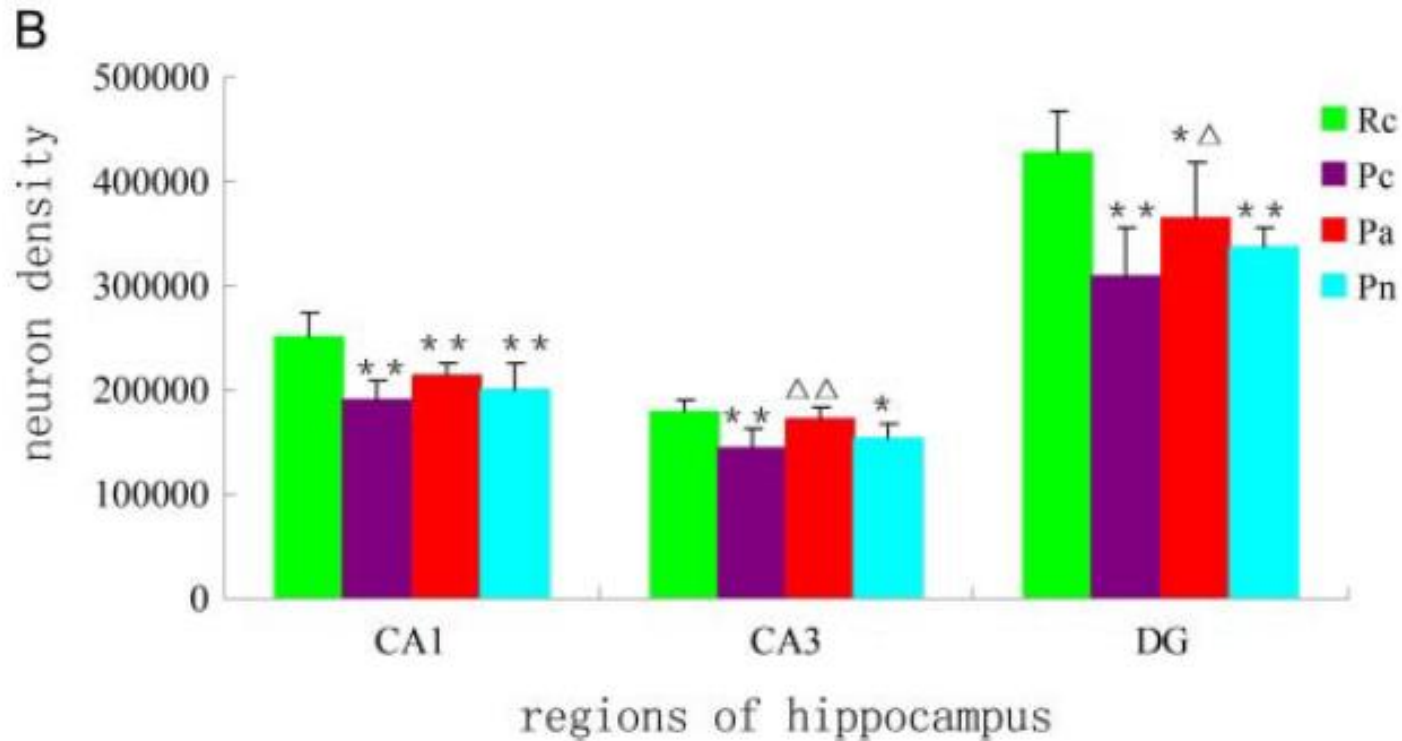
Acupuncture in Medicine,
2012 Dec; 30 (4): 339-45.

Acupuncture improves cognitive deficits



Acupuncture in Medicine,
2012 Dec; 30 (4): 339-45.

Acupuncture improves cognitive deficits



Acupuncture in Medicine,
2012 Dec; 30 (4): 339-45.

A Systematic Review

- **Acupuncture for Treatment of Autism Spectrum Disorders**

Ming, Evid Based Complement Alternat Med.
2012;2012:679845

Study by reference	Number of subjects	Controls	Randomization	Blinded*	Description of subject dropout	Jadad Scores
Wong et al. [43]	55	Yes	Yes	DB*	Yes	5
Zhang et al. [22]	30	Yes	Yes	No	Yes	3
Allam et al. [45]	20	Yes	Yes	SB*	No	3
Li et al. [41]	70	Yes	Yes	SB*	No	2
Wong and Sun [44]	50	Yes	Yes	SB*	No	2
Yan et al. [30]	40	Yes	Yes	No	No	2
Zhang et al. [25]	30	Yes	Yes	No	Yes	2
Ma et al. [21]	44	Yes	Yes	No	No	1
Yuan et al. [16, 19, 24], Wu et al. [23]	202	Yes	No	No	Yes	1
Liu and Yuan [32]	67	Yes	Yes	No	No	1
Wang et al. [31]	60	Yes	Yes	No	No	1
Zhou and Zhang [37]	30	Yes	Yes	No	No	1
Li et al. [39]	38	Yes	Yes	No	No	1
Xie [26]	182	Yes	No	No	No	0
Yuan et al. [17]	69	Yes	No	No	No	0
Yuan et al. [20]	49	Yes	No	No	No	0
Yuan et al. [18]	40	Yes	No	No	No	0
Liu et al. [28]	38	No	No	No	No	0
H. Wu and Z. Y. [7], Wu [36]	35	No	No	No	No	0
Luo et al. [27]	35	No	No	No	No	0
Jia et al. [34]	34	No	No	No	No	0
Xi et al. [29]	32	No	No	No	No	0
Zhao et al. [42]	24	No	No	No	No	0
Ju and Feng [33]	13	No	No	No	No	0
Zhang [38]	12	No	No	No	No	0
Jiang and Wang [35]	11	No	No	No	No	0
Wang [40]	11	No	No	No	No	0

Acupuncture for ASD, A Review

TABLE 2: Method of acupuncture used.

Acupoints	Angle of needling	Depth of puncture	Duration of needling (minutes)	Frequency (weekly)	Length of treatment
Jin's three needles acupoints, body, or tongue acupoints	0°, 45°, 90°, or towards a specific anatomic site	0.1–1 <i>cun</i>	0, 0.4, 10, 25, 30, 45, 60, up to 240	Ranges from once to six times weekly	Ranges from 4 weeks to 9 months

Ming, Evid Based Complement Alternat Med.
2012;2012:679845

Acupuncture for ASD, A Review

Table 3: Prospective controlled clinical trials of acupuncture in autistic children with 50 or more subjects or Jadad score ≥ 2 .

Study by reference ^a	Number of subjects	Age (yrs)	Length of study	Group design ^b	Jadad score	Outcome measures	Results
Wong et al. [43]	55	3-18	4 wks	EA versus SEA	5	WeeFIM, PEDI, Leiter-R, CGI-I, ABC, RFRLS, RDLS, parental report	Greater improvements of language, self-care and overall CGI-I scores, motor coordination, social skills, and attention span in EA group than these in SEA group (P<0.006, P<0.01)
Zhang et al. [22]	30	2-12	4 mos	ACP versus herbs	3	Chinese version of IQ, social, language tests	Greater improvement in all the measures after treatment in ACP group than that of herbs group (P<0.05, P<0.01)
Allam et al. [45]	20	4-7	9 mos	ACP + LT versus LT	3	Arabic language test	Both groups improved. Greater improvement in attention and receptive semantics in ACP + LT group (P=0.008, 0.034, resp.)

Ming, Evid Based Complement Alternat Med.
2012;2012:679845

Acupuncture for ASD, A Review

Li et al. [41]	70	2-10	3 mos	ACP + BT + MT versus BT + MT	2	CARS, Clancy autism behavior scale, ABC, Gesell development scale	Significant improvement in all the measures before and after treatment in ACP + BT + MT group (P<0.01). Better improvement in Gesell scale in ACP + BT + MT group (P<0.05)
Wong and Sun [44]	50	3-11	8 wks	TAC versus sham	2	Griffiths mental developmental scale, WeeFIM, RFRLS, RDLS, symbolic play test	Improvements were documented in both groups, with the greater improvement in TCA group in some of the functional independence measures (P<0.0005, P<0.006)
Zhang et al. [25]	30	? - 12	4 mos	ACP versus herbs	2	Event-evoked potential P3 latency and amplitude	Shortened latency and increased amplitude in ACP groups only after treatment (P<0.001, P<0.05). No change in herbs group
Yan et al. [30]	40	2.5-8	90 days	ACP + BT versus BT	2	C-PEP	Greater improvement in ACP + BT group than BT group (P<0.01)

Acupuncture for ASD, A Review

Liu and Yuan [32]	67	3-9	12 wks	ACP versus SIT	1	CARS and ABC	Greater improvement of both ABC and CARS in ACP group than that in SIT group (P<0.05)
Wang et al. [31]	60	3-9	4 mos	EA versus BT	1	PPVT overall score and subscores	Greater improvements of overall score, subscores of sensation, association, body and self-care factors in EA group (86%) than those in BT group (56%) (P<0.05)
Yuan et al. [16, 19, 24], Wu et al. [23]	202	1.5-8 yrs	4 mos	ACP versus BT	1	CARS (total and subscores)	88% of ACP group, 65% of BT group improved in CARS. ACP was effective across all age groups especially in more severe subjects, and in 3 of the 4 TCM syndromes. All CARS subscores except imitation and fine motor function were improved in both groups (P<0.05, P<0.01)
Xie [26]	182	<3 or >3	4 mos	ACP + TCM versus BT	0	Intelligence tests (DQ, WPPSI, WISC-R), clinical improvement scales (operationally defined)	Greater improvement of DQ, WPPSI, and clinical symptoms in ACP + TCM group; greater clinical improvement in <3 yrs old in both treatment groups compared with those of >3 yrs (P<0.05, P<0.01)

Acupuncture for ASD, A Review

- *Results.* “highly variable”. Behavioral and/or developmental improvements were reported in all acupuncture treatment studies. All studies reported general tolerability.
- *Conclusions.* Vigorously controlled double-blinded clinical trials are needed to evaluate the efficacy and safety of acupuncture in children with autism spectrum disorders.

Acupuncture for autism spectrum disorders (ASD)



Current evidence does not support the use of acupuncture for treatment of ASD. There is no conclusive evidence that acupuncture is effective for treatment of ASD in children and no RCTs have been carried out with adults. Further high quality trials of larger size and longer follow-up are needed.

Cheuk. Cochrane Database Syst Rev. 2011 Sep
7;(9):CD007849



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Contents lists available at SciVerse ScienceDirect

Research in Developmental Disabilities

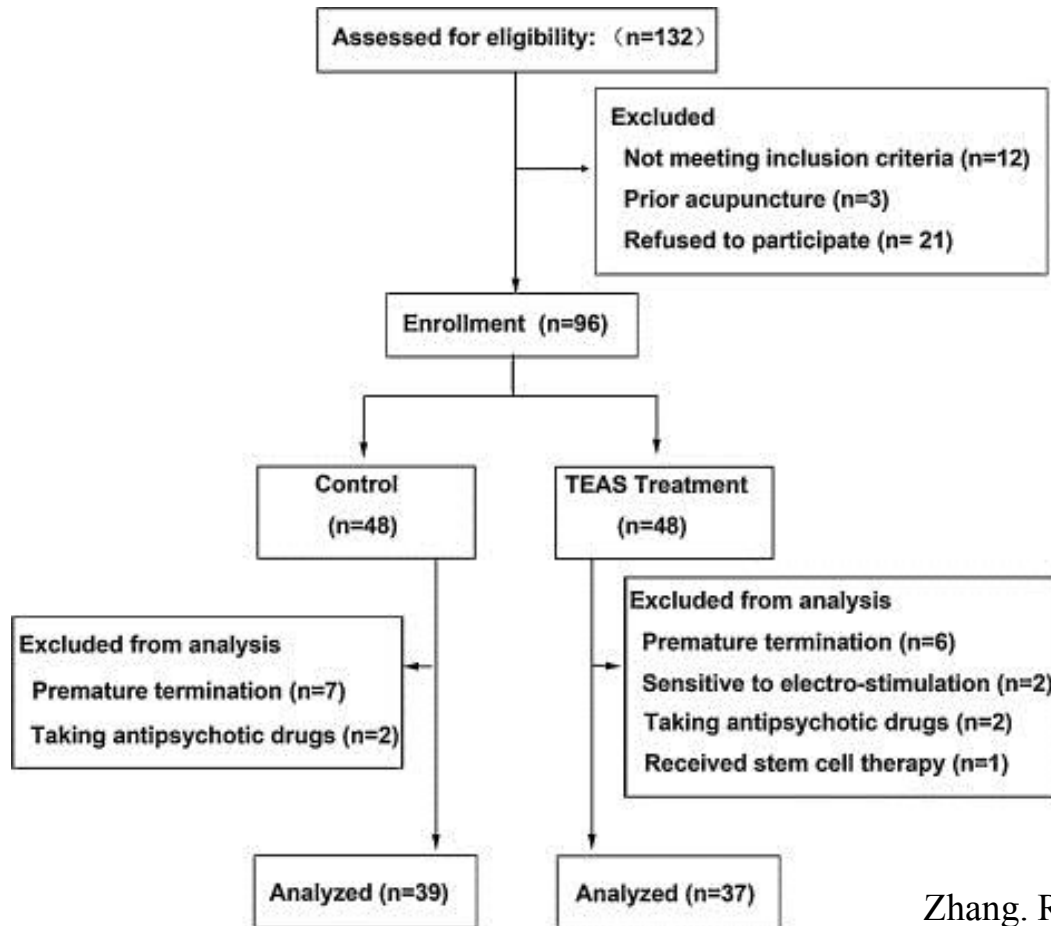


Transcutaneous electrical acupoint stimulation in children with autism and its impact on plasma levels of arginine-vasopressin and oxytocin: A prospective single-blinded controlled study[☆]

Rong Zhang^a, Mei-Xiang Jia^b, Ji-Sui Zhang^c, Xin-Jie Xu^d, Xiao-Jing Shou^d, Xiu-Ting Zhang^e, Li Li^f, Ning Li^f, Song-Ping Han^g, Ji-Sheng Han^{h,*}

Zhang. Research in Developmental Disabilities
33 2012 (4): 1136–1146

TEAS for autism, a controlled trial

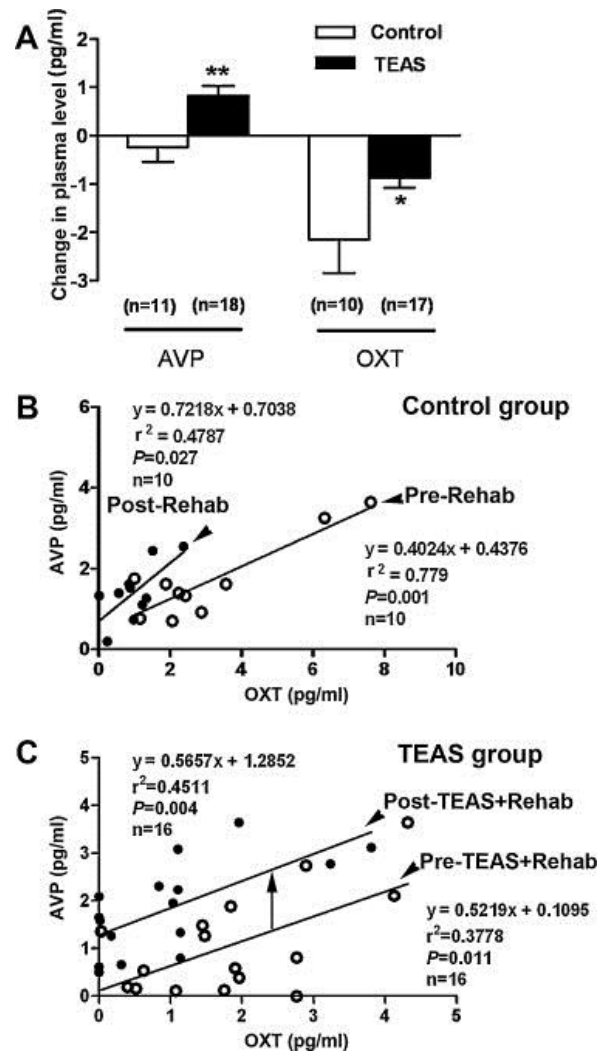


Zhang. Research in Developmental Disabilities
33 2012 (4): 1136–1146

TEAS for autism, a controlled trial

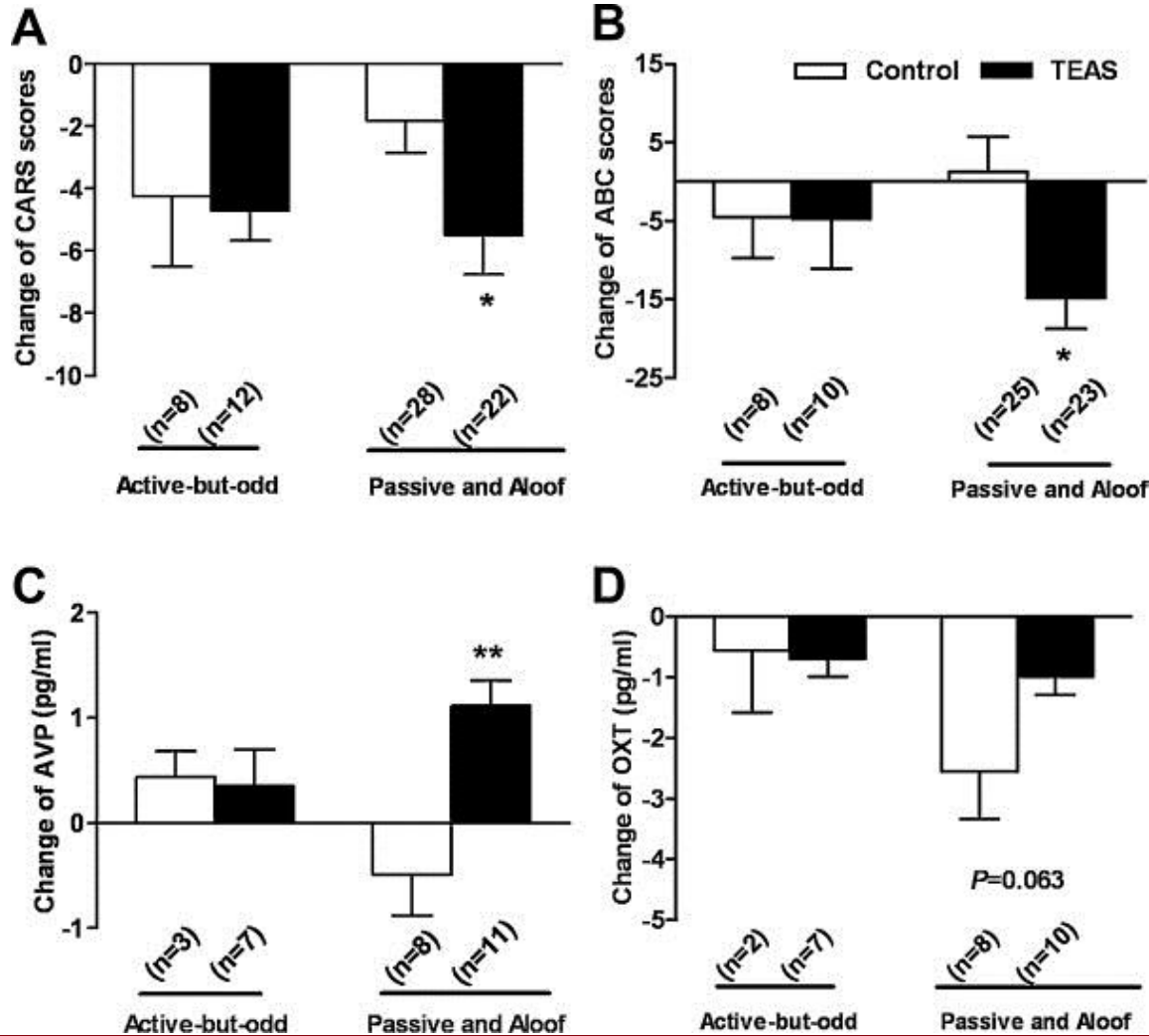
- 30 min per session, 5 days a week x 12 weeks.
- LI 4 (Hegu) and PC 6 (Neiguan) on one side ST 36 (Zusanli) and SP 6 (Sanyinjiao) on the other side.
- Frequency: alternating 2/15 Hz (2 Hz with a 0.6 ms pulse width; 15 Hz with a 0.3 ms pulse width, each lasting for 3 s).
- First week: 3 mA in the upper limb and 5 mA in the lower limb).
- Final intensity : 10 mA and 15 mA, respectively

TEAS for autism, a controlled trial



Zhang. Research in Developmental Disabilities
33 2012 (4): 1136–1146

TEAS for autism, a controlled trial



Zhang. Research in
Developmental
Disabilities
33 2012 (4): 1136–
1146

TEAS for autism, a controlled trial

- It is concluded that TEAS is effective for the treatment of autistic children with a passive and aloof social interaction style.
- Changes in plasma levels of AVP and possibly OXT may be involved in mediating the therapeutic effect of TEAS.

Zhang. Research in Developmental Disabilities
33 2012 (4): 1136–1146

Conclusions

- Default Mode Network dysregulations have been found in ASD Children.
- Acupuncture stimulation alters DMN activations and deactivations.
- Clinical trials suggest acupuncture is a promising therapy for ASD.
- More high quality clinical trials are needed.

Clinical Trials of Acupuncture for Autism

