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A Case Study of Melodic Intonation Therapy (MIT) in the Subacute Stage of Aphasia: Early Re-reactivation of Left Hemisphere Structures

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Background

Melodic Intonation Therapy (MIT) was designed to stimulate RH language processing in aphasic patients. However, whether its success can indeed be attributed to recruitment of RH areas is unclear. Some imaging studies report increased RH activation in successful MIT patients (Schlaug*et al.*, 2008); others suggest that MIT suppresses rather than stimulates RH activity (Belin*et al.*, 1996).

So far, MIT researchers have focused on patients with chronic aphasia, although early recovery is very important, both clinically and theoretically. Most patients start treatment in the subacute stage, and the early stages of recovery show a different reorganization pattern, with increased bilateral activation with peak activation of the right inferior frontal gyrus (IFG) in the subacute stage, followed by a re-shift to the left in the chronic phase (Saur *et al.*, 2006).

Purpose

To investigate early language reorganization in an aphasic patient receiving MIT-treatment.

Patient

Two weeks post-stroke, VD (female, 25 yrs, right-handed) had a severe Broca's aphasia and right-sided hemiplegia. MRI showed a large LH infarct zone, predominantly the parietotemporal region. From 2-8 wks VD received intensive MIT-training (5 hours p/w).

Method

Language tests (AAT; story retelling: CIUs/minute) and fMRI-scans were administered immediately before and after MIT.

VD was scanned at 3T using a T2*w GEEPI sparse sampling sequence (TR/TE 6000/30 ms, acquisition time 3000 ms). We used an event-related lexical decision task with auditorily presented spoken or melodically

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intonated words and non-words. Standard syllable strings (“nananana”) served as baseline (non-language) condition.

Statistical maps were calculated using the general linear model, and t-contrast maps were created for the contrasts spoken language > baseline pre- and post-therapy, as well as for the contrast of spoken language post-therapy > pre-therapy.

Results

VD responded positively to treatment. MIT facilitated language production; trained items improved more than untrained items.

Language production improved: AAT-spontaneous speech 1/5-->3/5; AAT-repetition T=39-->T=47; AAT-naming T=39-->T=46; CIUs/minute 22.5-->55.

Activation on pre-treatment scans($p<0.001$): the right superior and middle temporal gyrus, right caudate nucleus, and bilateral supplementary, cingulate and premotor areas.

Post-treatment activation ($p<0.001$): left more than right IFG ("Broca"), left superior and middle temporal gyrus and perilesional region in the angular/supramarginal gyrus ("Wernicke"), left caudate nucleus, bilateral supplementary, cingulate and premotor areas, left prefrontal cortex. There was no difference between spoken and melodic language.

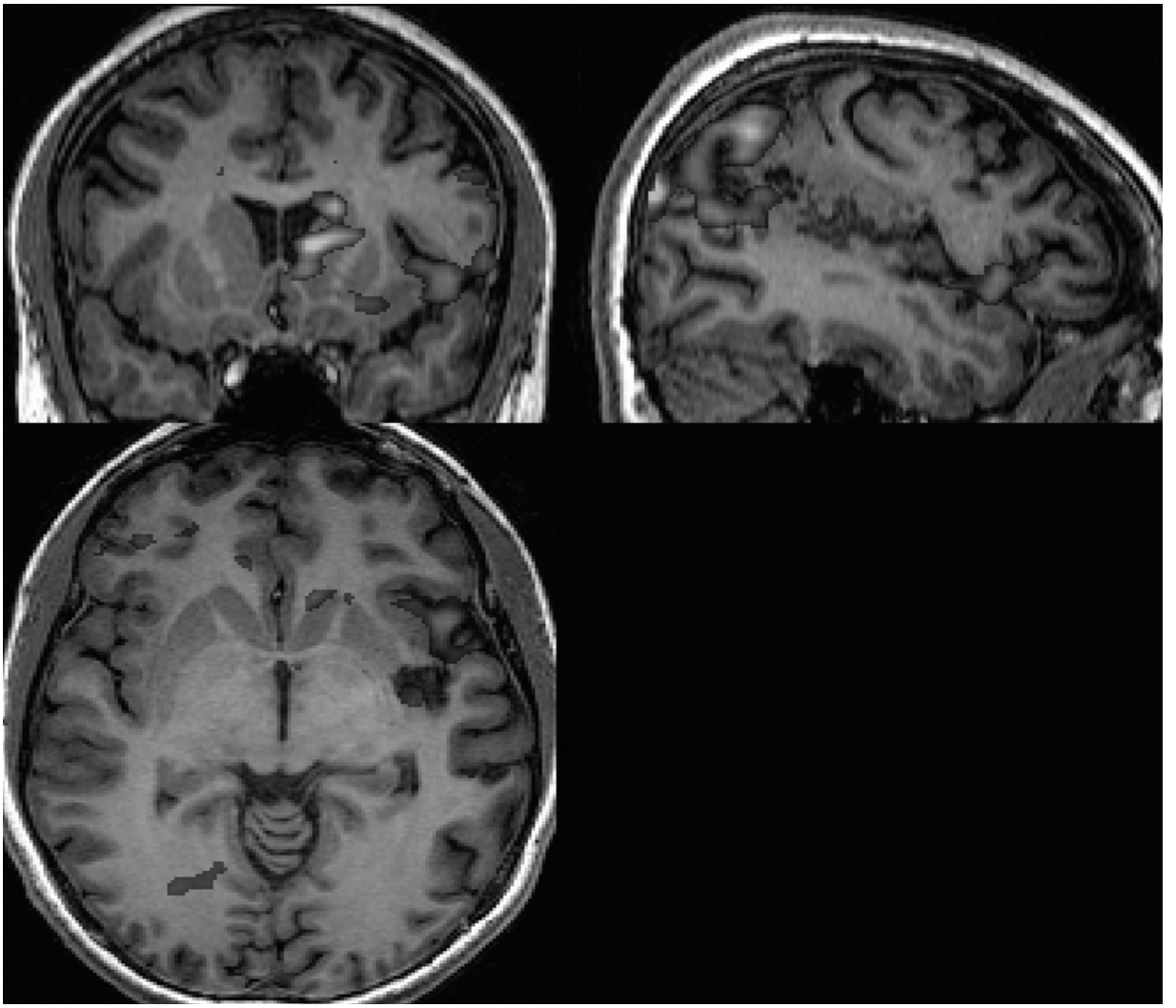

Figure 1. Post-MIT activation, as compared to pre-MIT activation, showing LH activation in Broca's area, perilesional activation in Wernicke's area, and caudate nucleus

Conclusion

The early re-shift to the LH does nut support the hypothesis that massed MIT practice will promote RH language processing. Assuming that MIT has positively influenced VD's recovery, this would implicate that MIT suppresses rather than stimulates RH activation during early recovery.

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