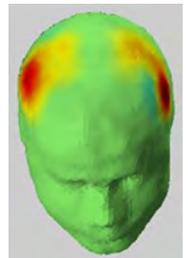
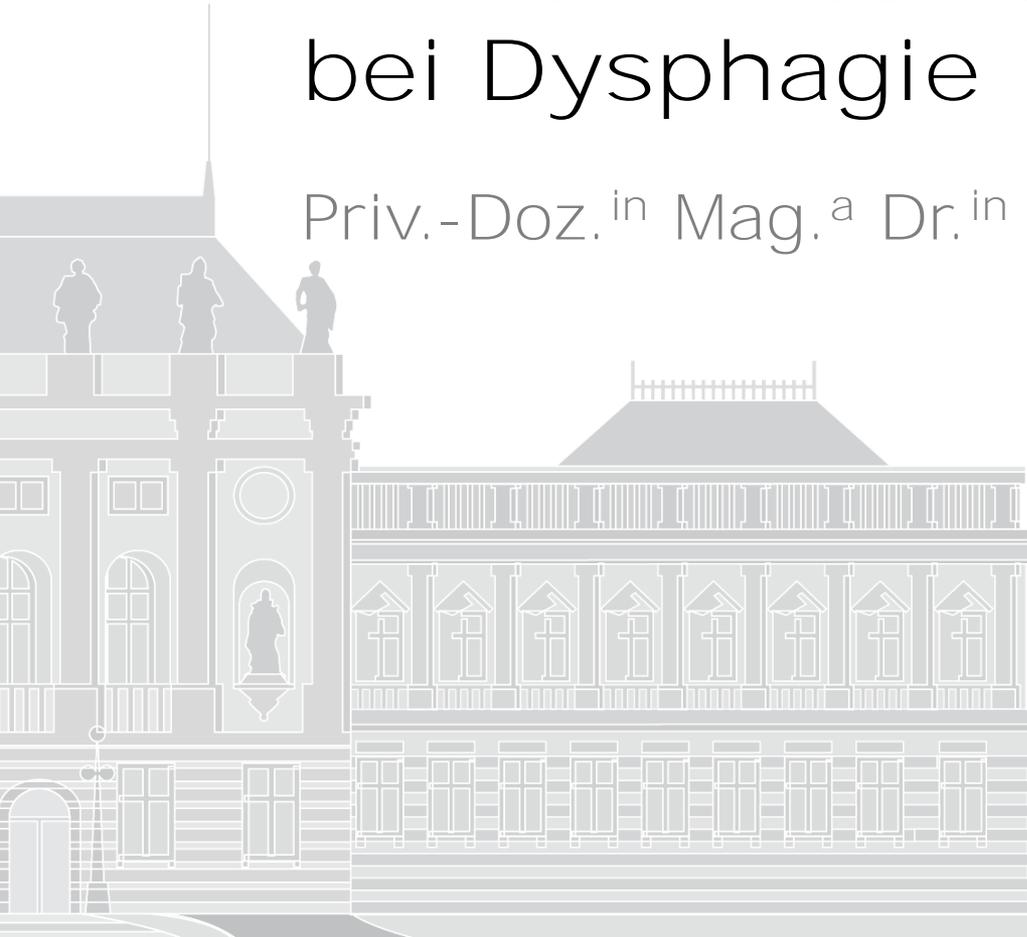


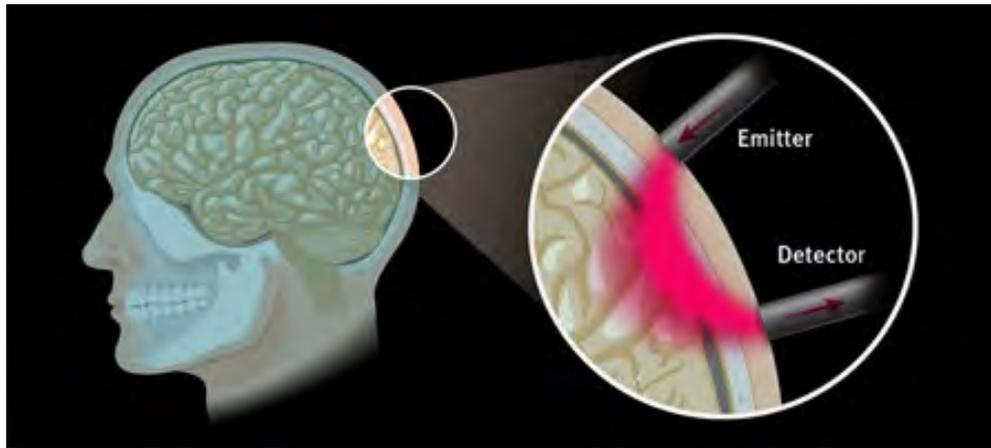
NIRS-basiertes Neurofeedbacktraining bei Dysphagie

Priv.-Doz.ⁱⁿ Mag.^a Dr.ⁱⁿ Silvia Erika Kober

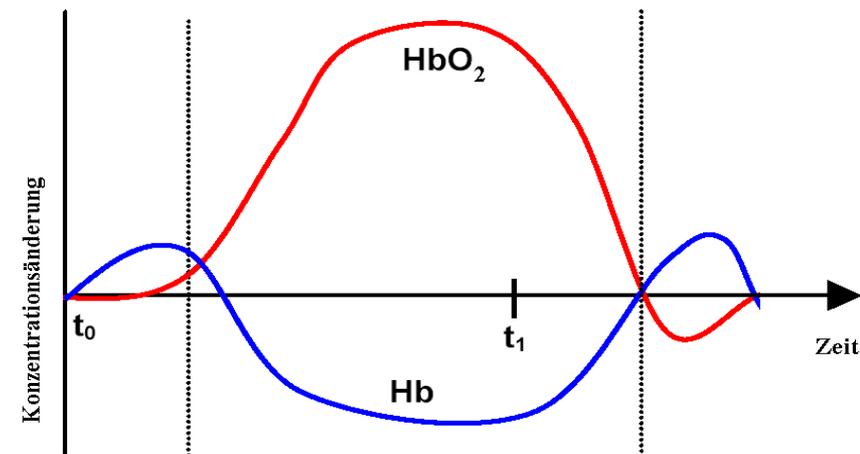


Nahinfrarot-Spektroskopie (NIRS)

- Ein nicht-invasives optisches Verfahren zur Messung des Hirnstoffwechsels (Änderungen der Hämoglobinkonzentration)
- Neurovaskuläre Kopplung: Neuronale Aktivierung führt zu Veränderungen der Hämoglobinkonzentration (Oxygeniertes-, Deoxygeniertes- und Gesamt-Hämoglobin)
- Beruht auf dem Prinzip der Absorption und Streuung von Photonen im Nahinfrarotbereich



mMol*mm



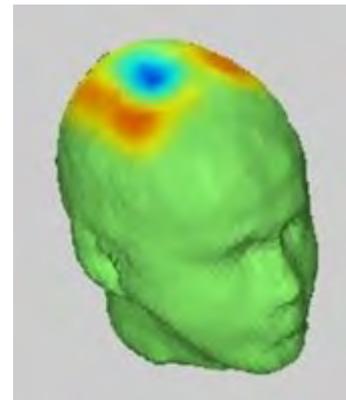
Portables NIRS System

< 1kg

8 Sensoren & 8 Detektoren

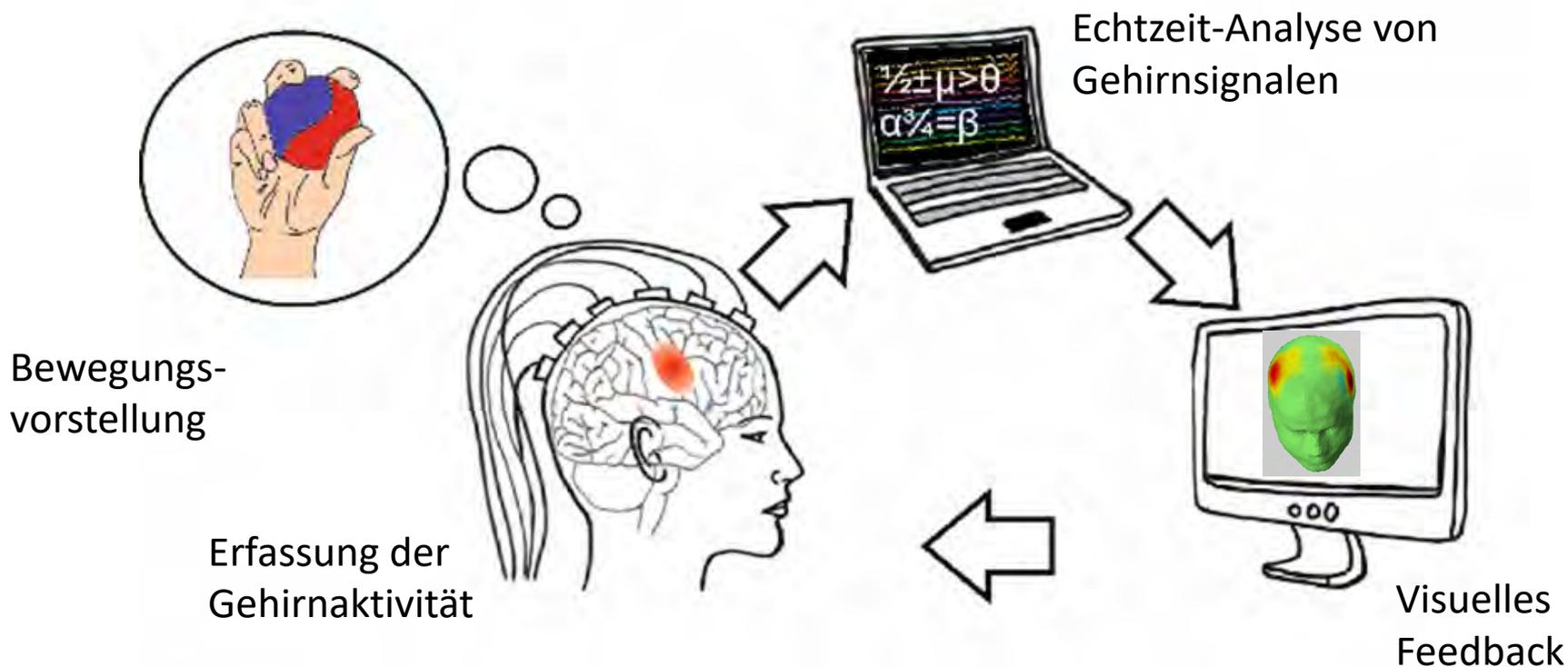


NIRSport, NIRx
<https://nirx.net/nirsport>



Neurofeedback

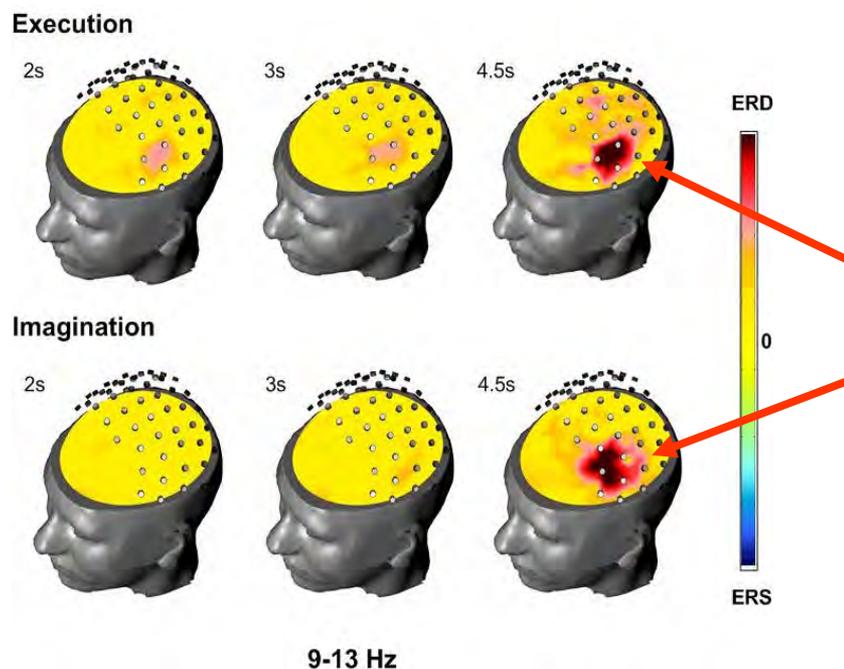
Ziel eines Neurofeedback-Trainings: Gehirn zu trainieren und so seine Funktion zu verbessern bzw. wiederherzustellen



Bewegungsvorstellung

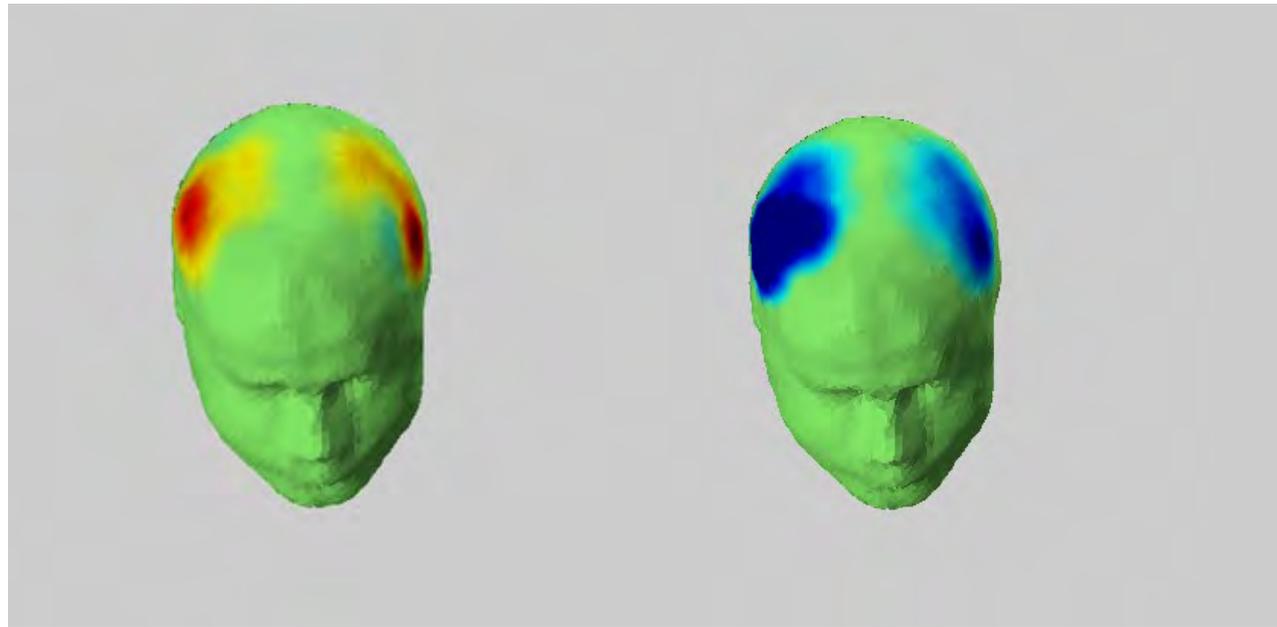
Bewegungsausführung und -vorstellung führen zu vergleichbaren Gehirnaktivierungsmustern

→ Wiederherstellung der Aktivität im Motorkortex durch Bewegungsvorstellung



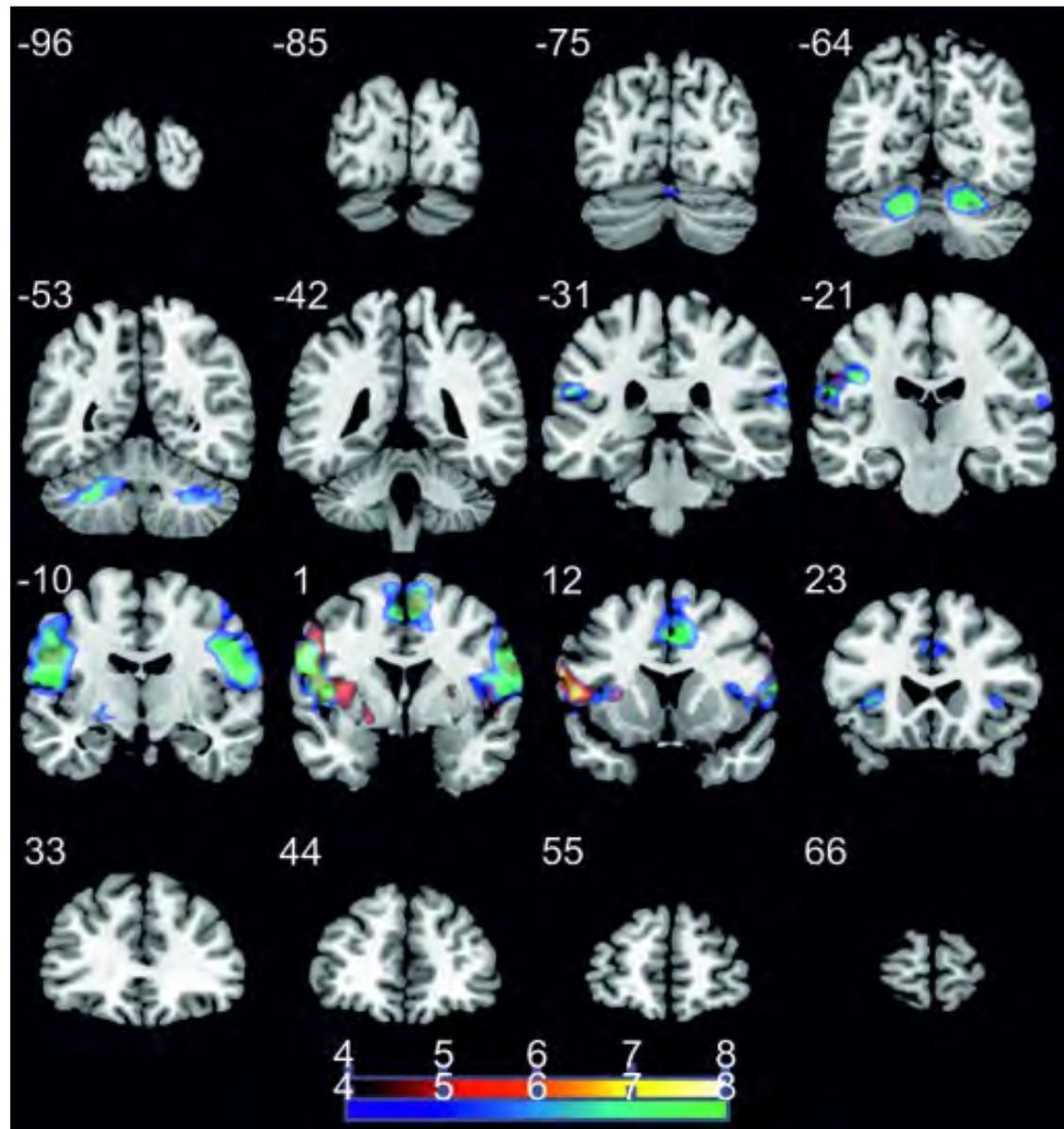
Desynchronisation in Handareal Mu/Beta Rhythmus

Und was ist mit der Vorstellung von Schluckbewegungen?



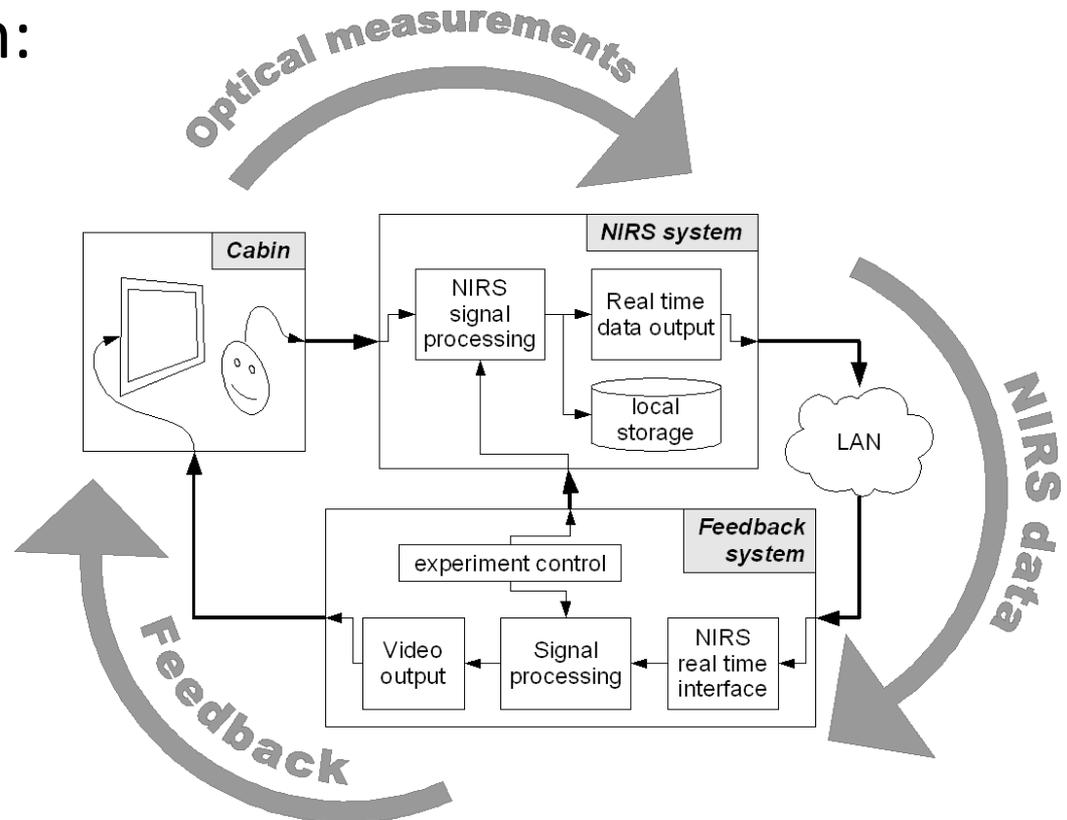
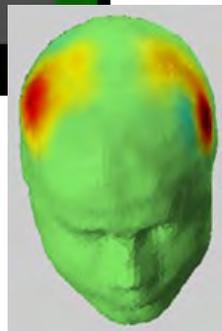
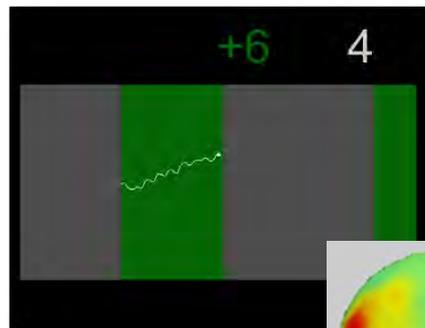
Vorstellung und Ausführung von Schluckbewegungen führen zu ähnlichen Gehirnaktivierungsmustern (NIRS und fMRI Studien)

fMRI Studie (Kober et al., 2019)



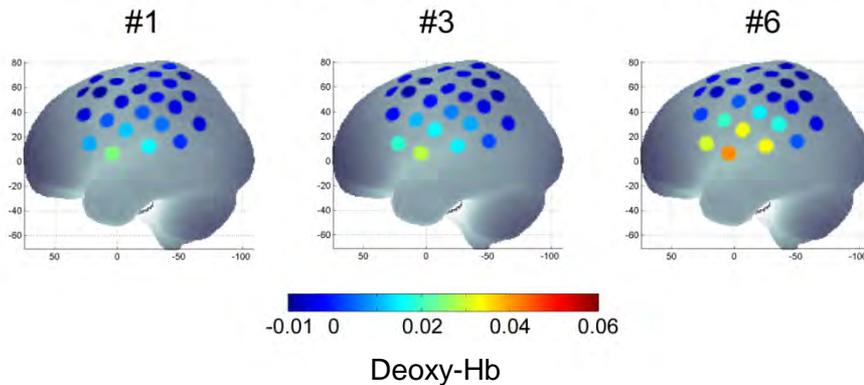
Kann man Aktivität in schluckrelevanten Gehirnarealen mittels NF modulieren?

NF System:

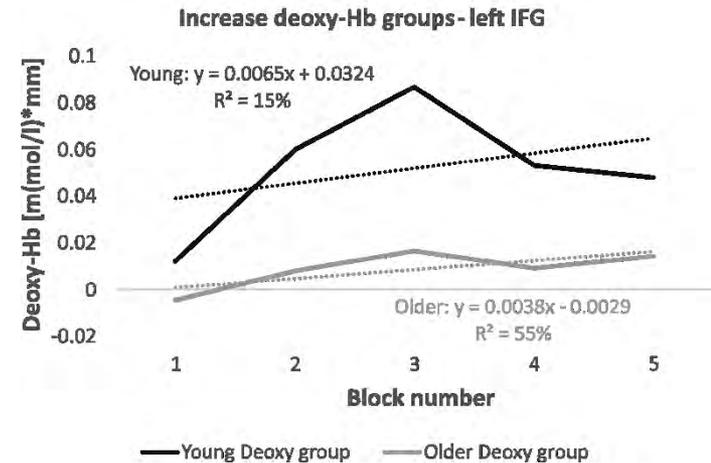
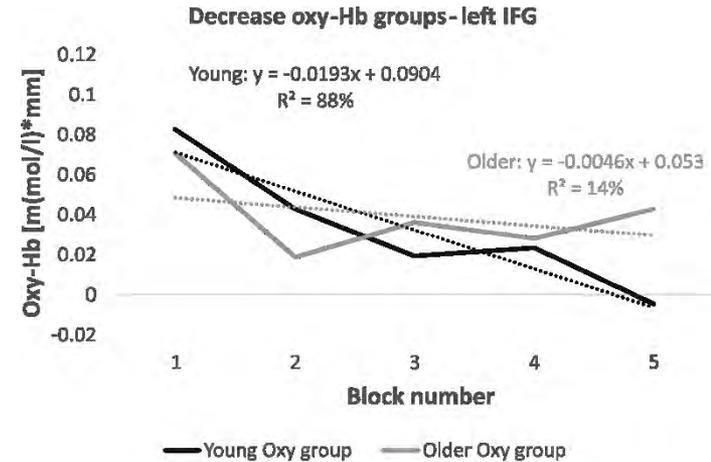


Gesunde junge und ältere Personen sind in der Lage Aktivität in schluckrelevanten Gehirnareal zu modulieren

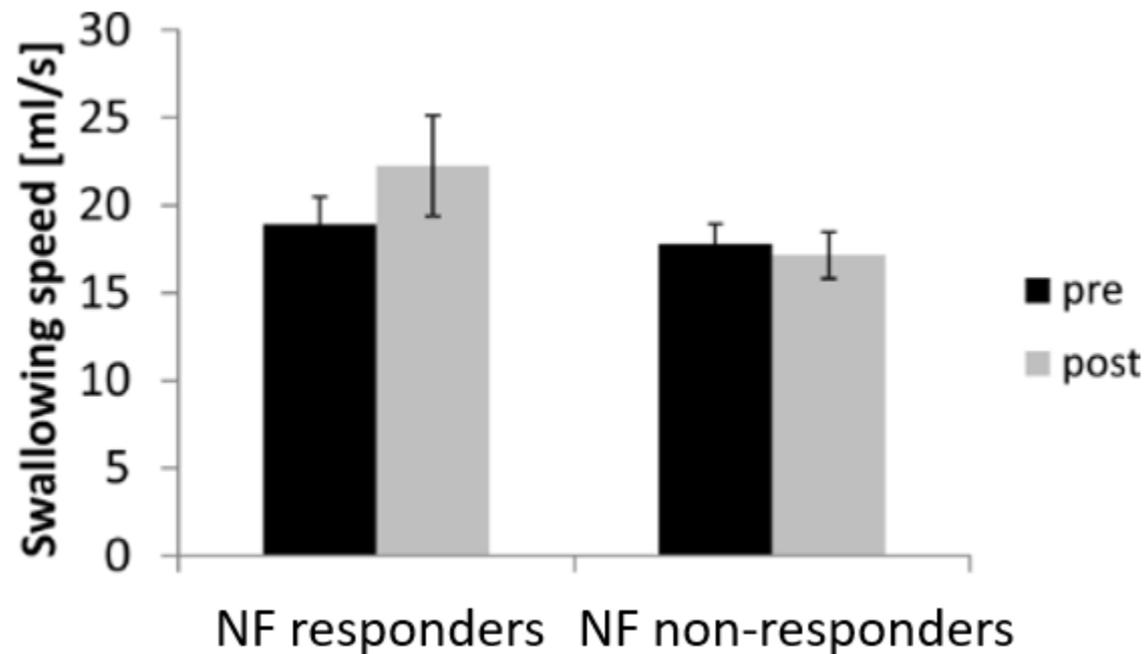
NIRS based NF training - Session number



(Kober et al., 2015; Kober et al., 2018; Kober et al., 2019)

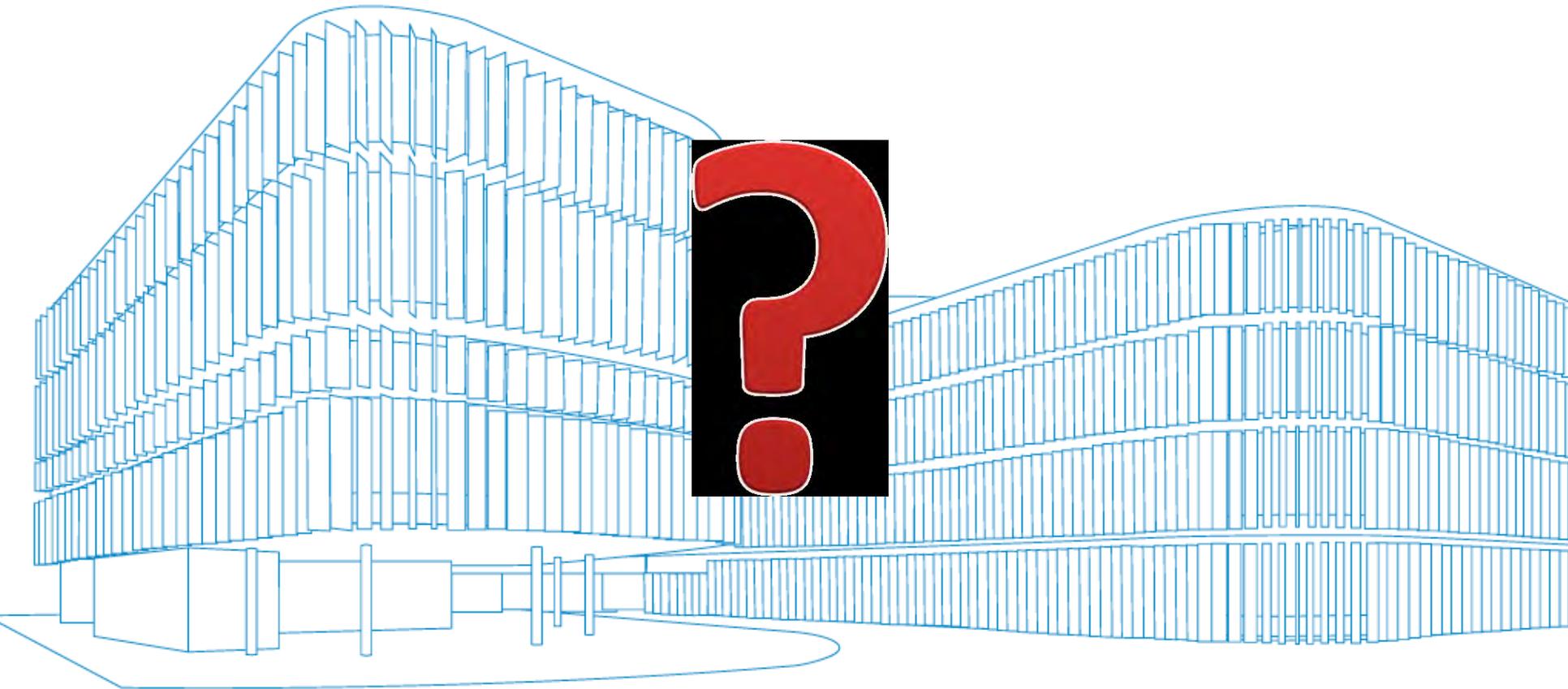


Veränderungen in Schluckfunktion bei gesunden jungen ProbandInnen nach NF Training

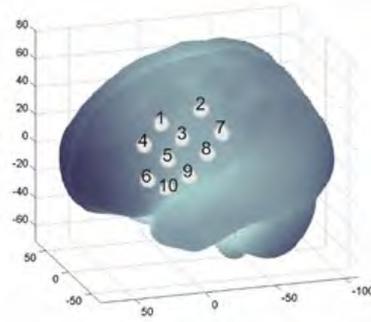


(Kober et al., 2015)

Was ist mit Dysphagie- PatientInnen?



Prozedere



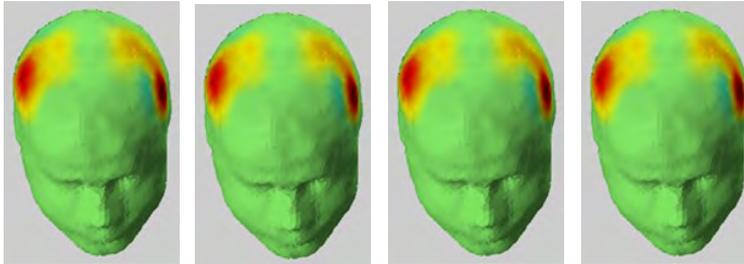
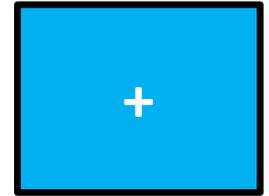
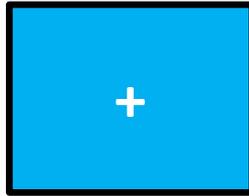
NIRSport, NIRx
<https://nirx.net/nirsport>



Schluckdiagnostik



Schluckdiagnostik



NIRS-basiertes NF Training
(5 Sitzungen)

Prä-Test

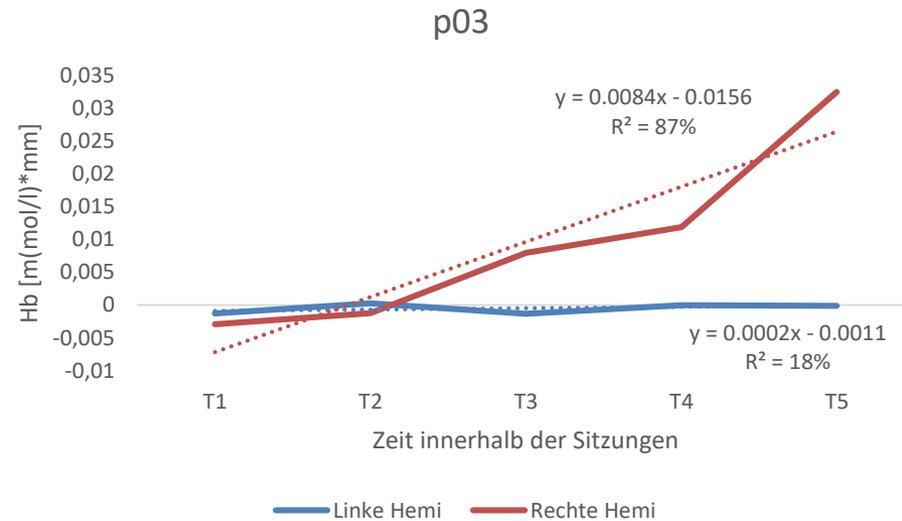
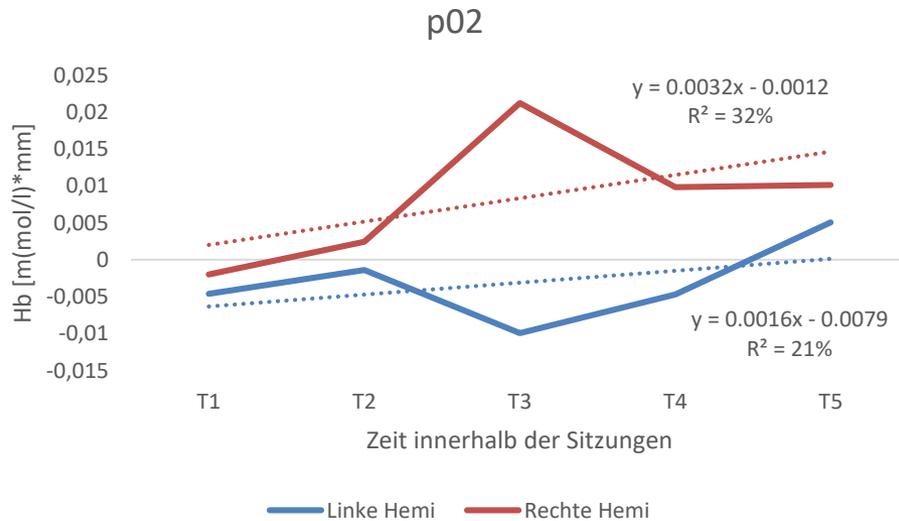
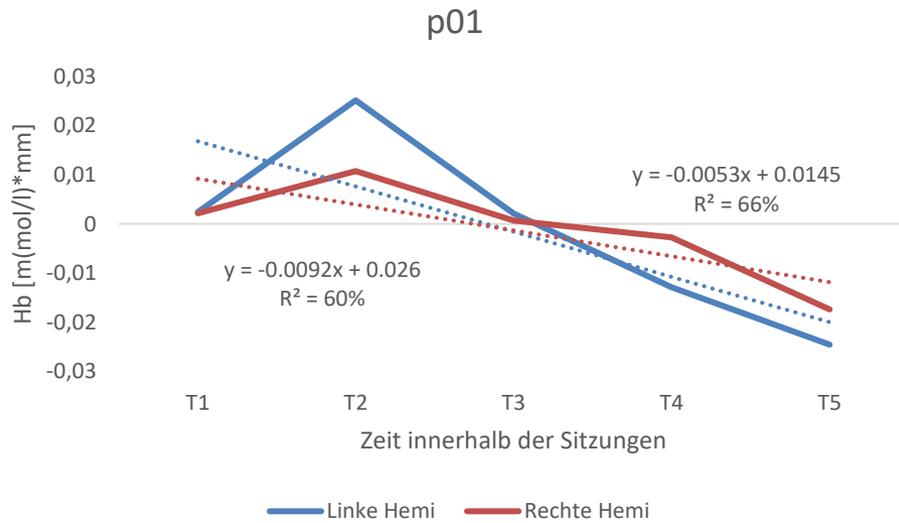
Post-Test

Erste Einzelfall- Ergebnisse



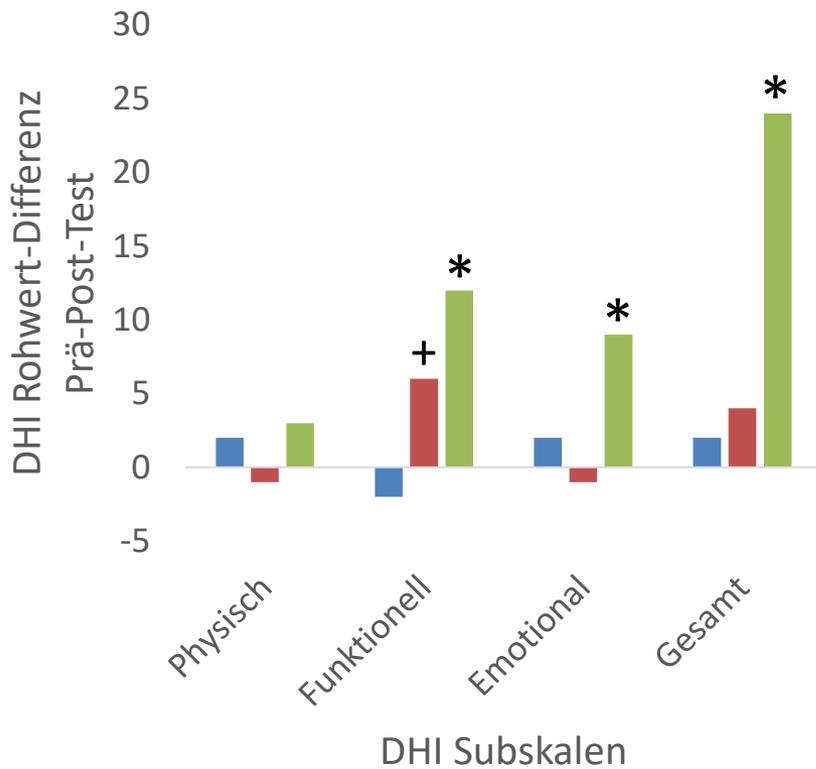
Code	Alter	Geschlecht	Dysphagie GUSS	Neurolog. Erkrankung	MMSE
p01	78	M	17/20	Parkinson	27/29
p02	67	M	18/20	Schlaganfall	26/30
p03	60	W	16/20	Schlaganfall	27/29

NF Ergebnisse



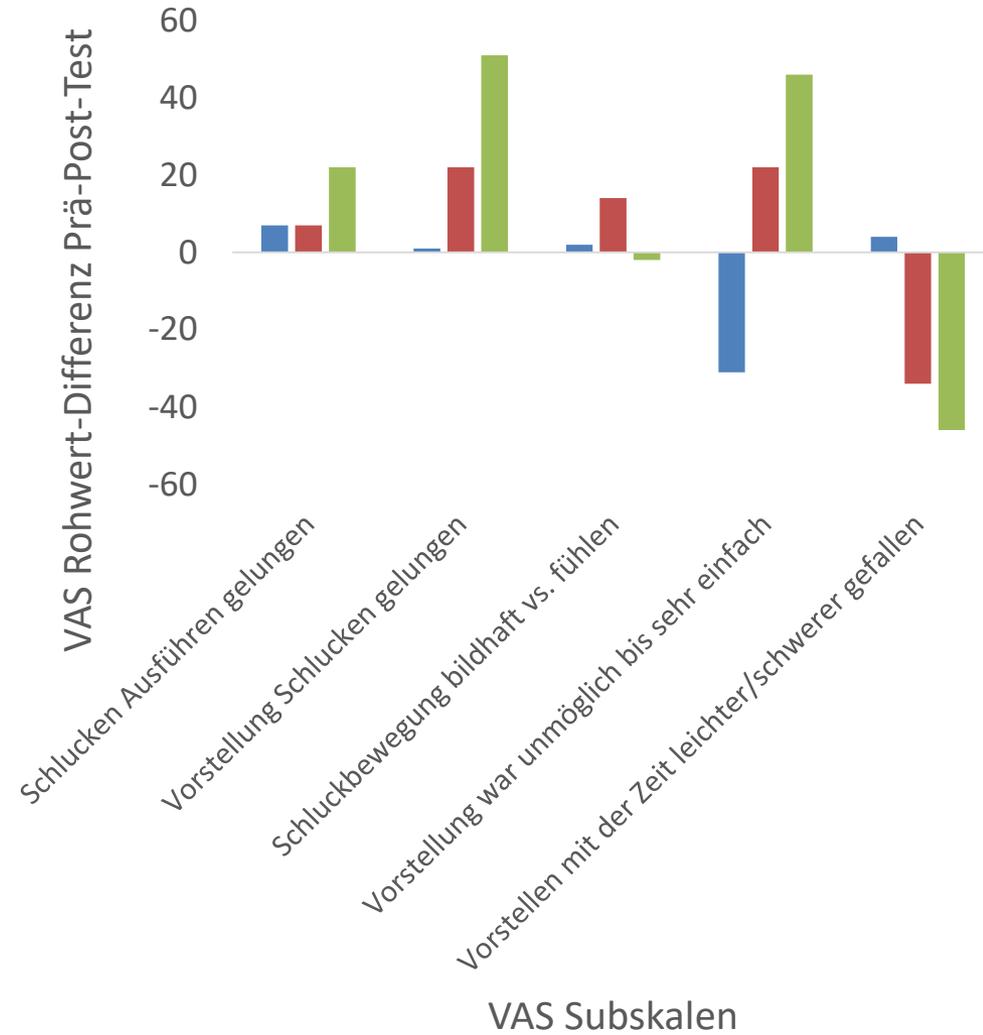
Subjektive Selbsteinschätzung

Deglutition Handicap Index



■ p01 ■ p02 ■ p03

Visuelle Analogskala

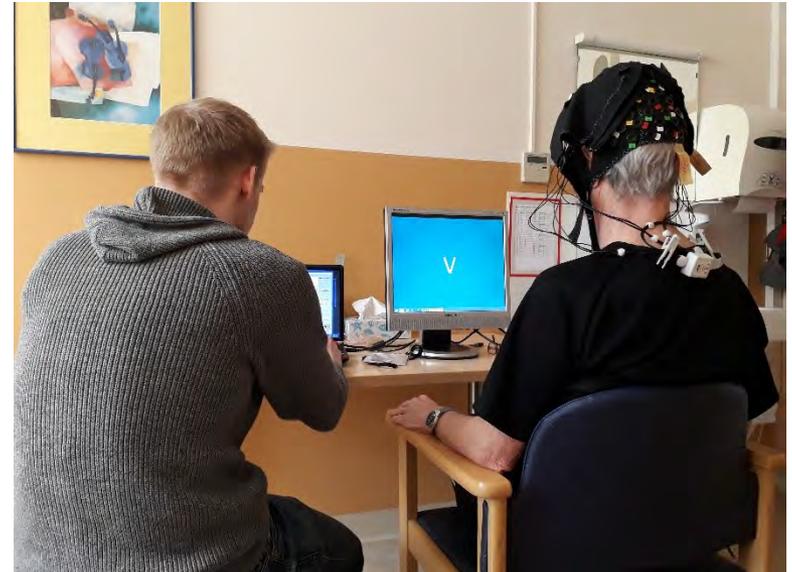


■ p01 ■ p02 ■ p03

Einzelfall

Dysphagie-Patient:

70-jähriger, männlicher
Schlaganfallpatient, multiple
Gehirnläsionen (z.B.
Gehirnstamm), 4 Monate nach
Schlaganfall, keine kogn.
Defizite, moderate Dysphagie

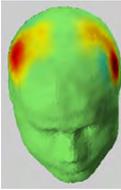


Gesunde Kontrollperson:

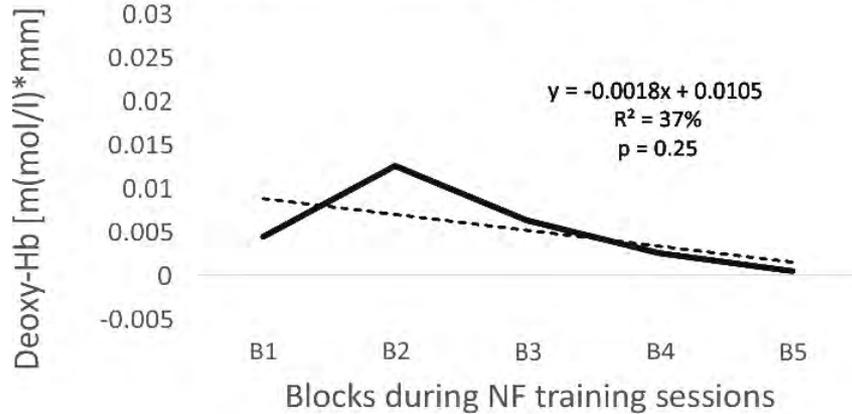
78 Jahre, männlich, keine neurologischen Vorerkrankungen,
keine Dysphagie

(Kober et al., 2019)

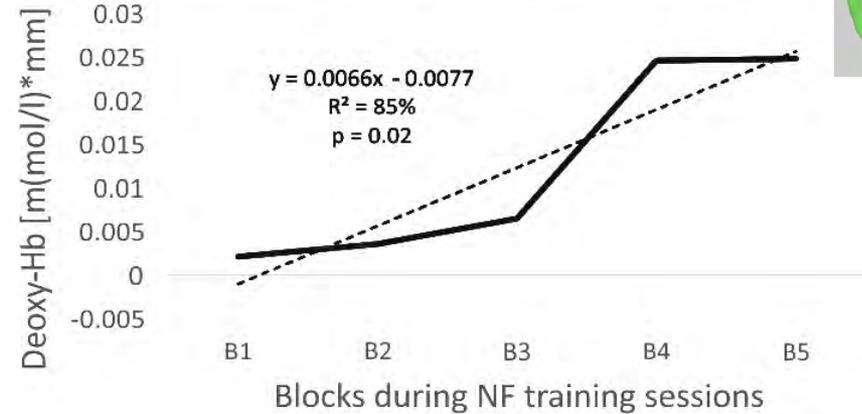
NF Ergebnisse



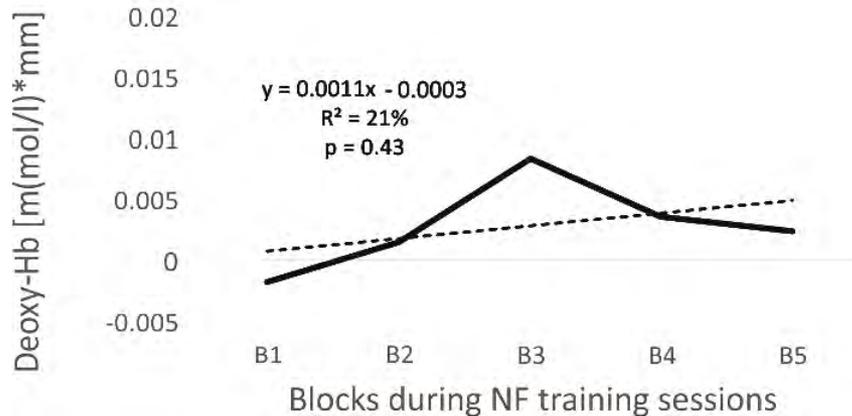
NF Performance Stroke Patient- Left IFG



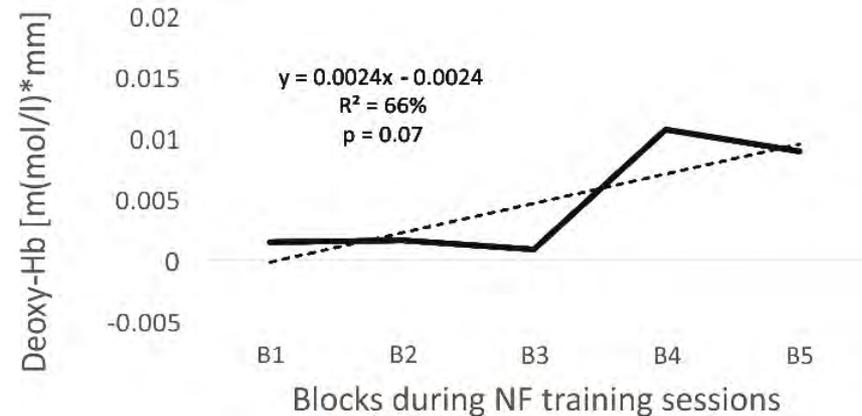
NF Performance Stroke Patient- Righth IFG



NF Performance Healthy Subject- Left IFG



NF Performance Healthy Subject- Righth IFG

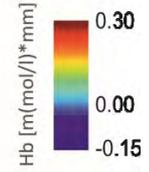
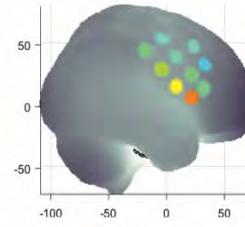
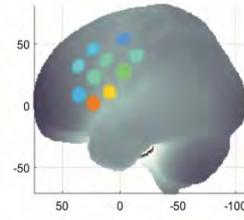
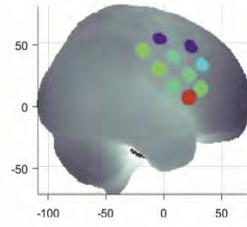
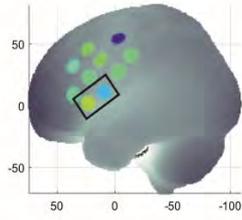


Pre-assessment

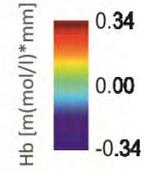
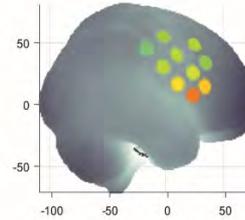
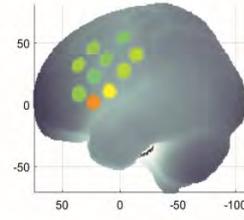
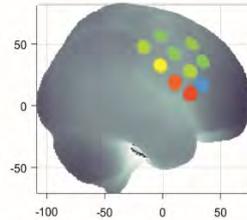
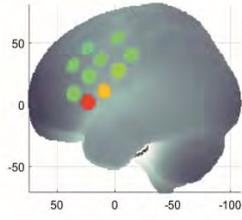
Post-assessment



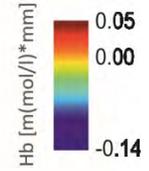
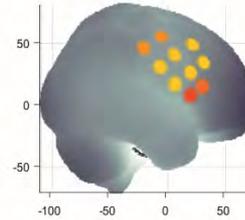
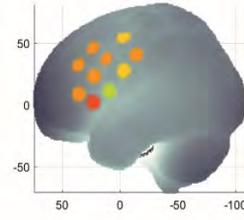
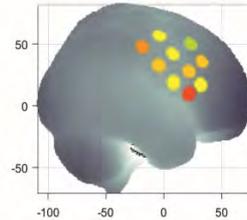
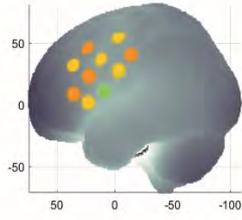
Stroke Patient
Oxy-Hb



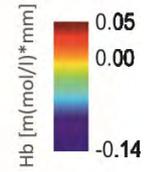
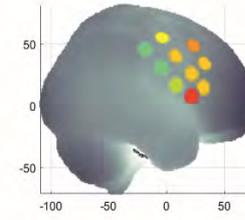
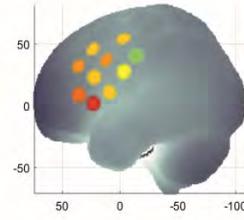
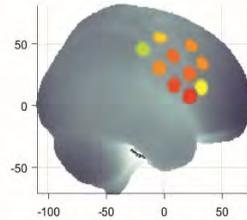
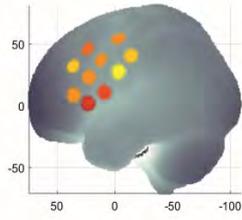
Healthy Subject
Oxy-Hb



Stroke Patient
Deoxy-Hb



Healthy Subject
Deoxy-Hb



Zusammenfassung

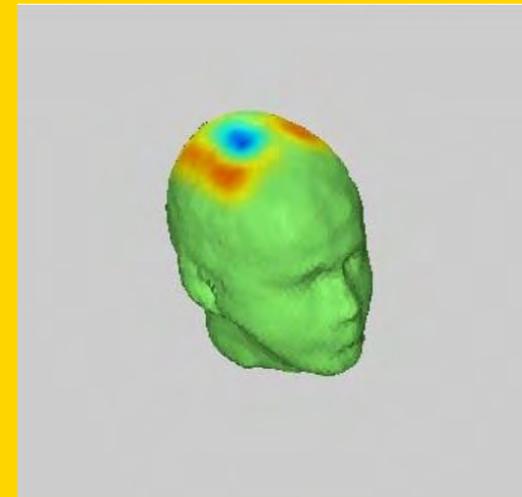
Dysphagie-PatientInnen sind in der Lage Aktivität in schluckrelevanten Gehirnarealen zu modulieren

Erfolgreiches NF Training assoziiert mit Verbesserungen in Schluckfunktion und Veränderung in Gehirnaktivierung beim Schlucken

NIRS-basiertes NF Training potentiell zukünftiges Werkzeug zur Behandlung von Schluckstörungen

Demo: NIRS-basiertes NF Training

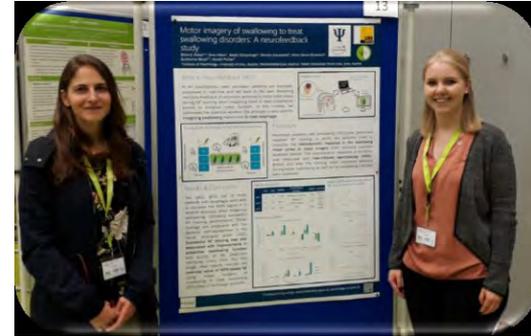
- NIRSport - Kleines portables NIRS System (<1kg)
- 8 Sensoren & 8 Detektoren





Univ.-Prof. Dr.
Guilherme Wood

KARL-FRANZENS-UNIVERSITÄT GRAZ
UNIVERSITY OF GRAZ



Sina Völker, Bsc.



Prim. Prof. Priv.-Doz. Dr., MBA
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Gerald Pichler

Danke!

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