# Bruger vi den evidens der foreligger?

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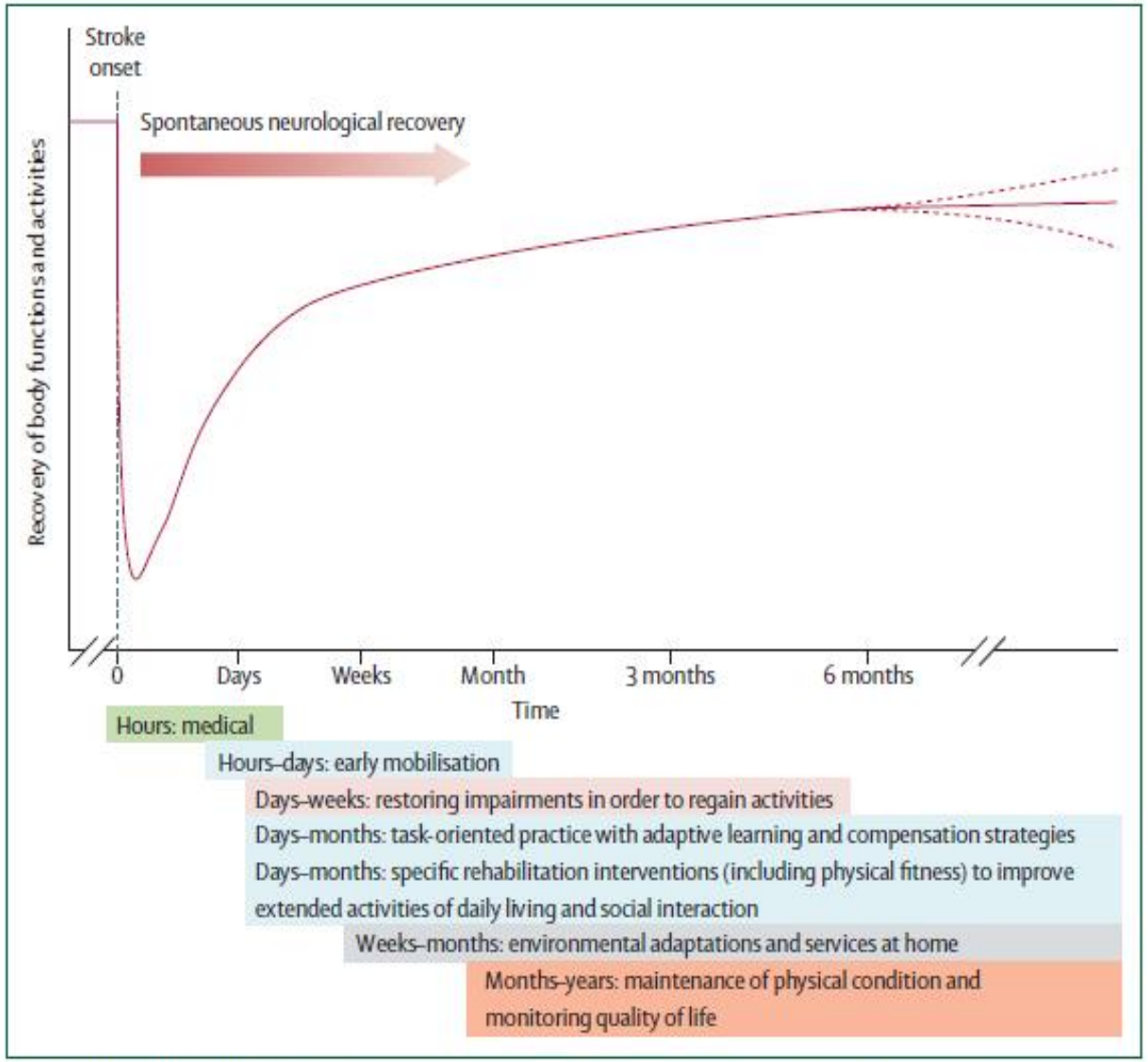
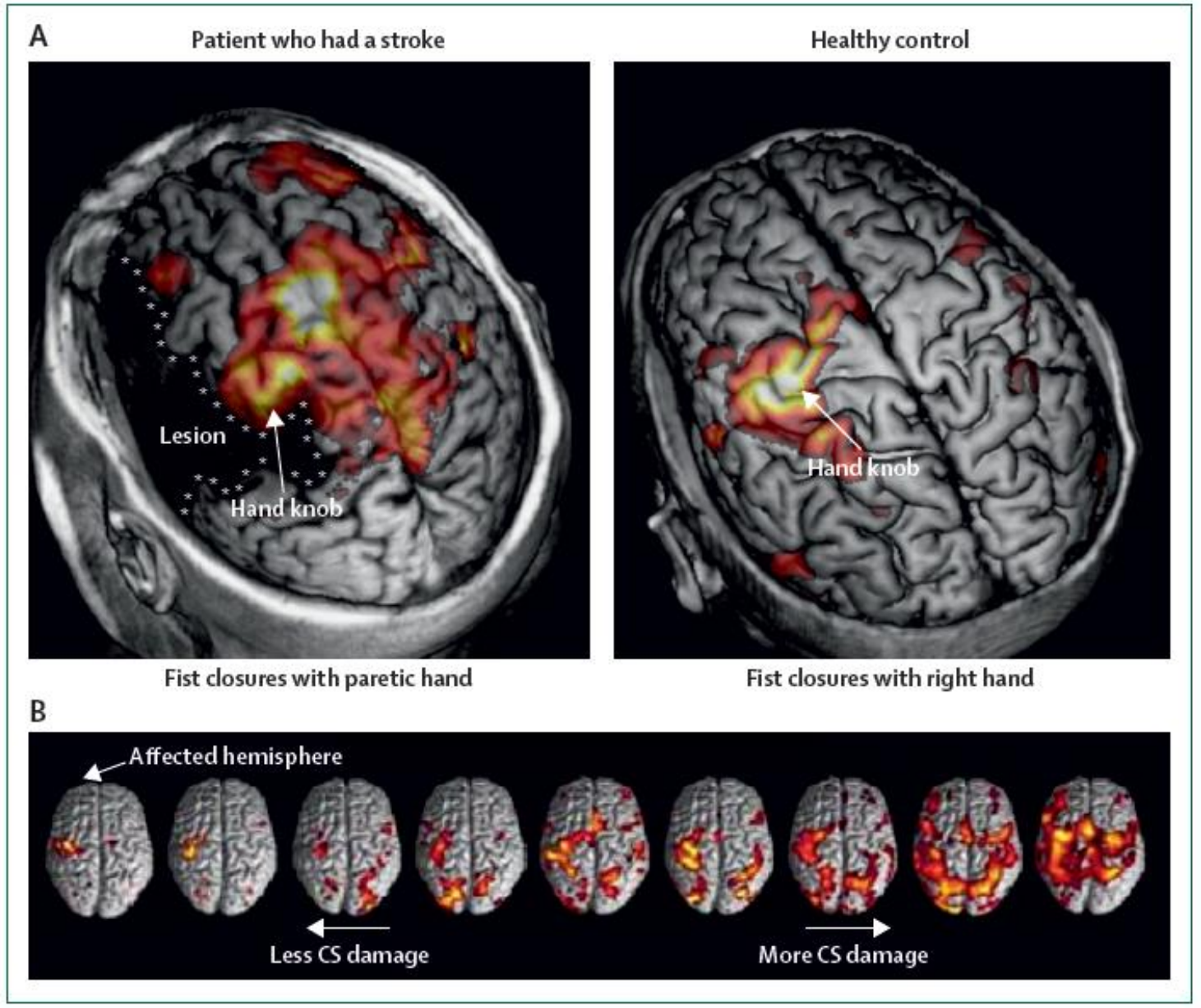



***Figure 2:*** **Hypothetical pattern of recovery after stroke with timing of intervention strategies**
Colour coding of the intervention strategies matches the coding in figure 1.

*Lancet* 2011; 377: 1693–702




*Lancet Neurol* 2014; 13: 206–16

# 2 – store studier - review

Review

## Advances and challenges in stroke rehabilitation

*Cathy M Stinear, Catherine E Lang, Steven Zeiler, Winston D Byblow*

*Lancet Neurol* 2020; 19: 348–60

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**Department of Medicine** (Prof C M Stinear PhD), **Department of Exercise Sciences** (Prof W D Byblow PhD), **University of Auckland, Auckland, New Zealand**;

**Stroke remains a leading cause of adult disability and the demand for stroke rehabilitation services is growing. Substantial advances are yet to be made in stroke rehabilitation practice to meet this demand and improve patient outcomes relative to current care. Several large intervention trials targeting motor recovery report that participants' motor performance improved, but to a similar extent for both the intervention and control groups in most trials. These neutral results might reflect an absence of additional benefit from the tested interventions or the many challenges of designing and doing large stroke rehabilitation trials. Strategies for improving trial quality include new approaches to the selection of patients, control interventions, and endpoint measures. Although stroke rehabilitation research strives for better trials, interventions, and outcomes, rehabilitation practices continue to help patients regain independence after stroke.**

| | Intervention type | Intervention target | Intervention duration | Trial duration | Primary endpoint time | Follow-up after the primary endpoint |
|---|---|---|---|---|---|---|
| **Acute** | | | | | | |
| AMOBES; Yelnik et al (2017)[6] | Training | Upper and lower limb impairment | 2 weeks | 90 days | End of trial: 90 days after | None |
| CARS; Muresanu et al (2016)[13] | Pharmacological | Upper limb capacity | | | | |
| Cramer et al (2017)[14] | Pharmacological | Lower limb capacity | | | | |
| **Subacute** | | | | | | |
| ICARE; Winstein et al (2016)[4] | Training | Upper limb capacity | | | | |
| EXPLICIT; Kwakkel et al (2016)[5] | Training | Upper limb capacity | | | | |
| Pomeroy et al (2018)[7] | Training | Upper limb capacity | | | | |
| EVREST; Saposnik et al (2016)[8] | Technological | Upper limb capacity | | | | |
| VIRTUES; Brunner et al (2017)[9] | Technological | Upper limb capacity | 4 weeks | 4 months | End of intervention; up to 4 months after stroke | 3 months after randomisation |
| Adie et al (2017)[10] | Technological | Upper limb capacity | | | | |
| Cramer et al (2019)[12] | Technological | Upper limb impairment | | | | |
| DARS; Ford et al (2019)[15] | Pharmacological | Lower limb capacity | | | | |
| STEPS; Bath et al (2017)[17] | Neuromodulation | Swallowing impairment | | | | |
| **Chronic** | | | | | | |
| RATULS; Rodgers et al (2019)[11] | Technological | Upper limb capacity | | | | |
| EVEREST; Levy et al (2016)[26] | Neuromodulation | Upper limb impairment | | | 6 months after stroke | |
| NICHE; Harvey et al (2018)[18] | Neuromodulation | Upper limb impairment | 6 weeks | 8 months | End of trial; up to 20 months after stroke | None |

*Table 2:* **Summary of design features of multicentre randomised controlled motor rehabilitation trials**

## Fysioterapi

- neuromuskulær stimulation (AMOBES)
- funktionel styrketræning
- constraint-induced movement therapy (EXPLICIT)

## Farmakologi

- iv Cerebrolysin (CARS)
- monoklonale antistoffer
- cardidoopa-levodopa (DARS)

## Teknologi

- virtuel reality + gaming (EVREST)
- telerehabilitering
- robotter (RATULS)

## Stimulation

- elektrisk pharyngeal stimulation (STEPS)
- elektrisk epidural stimulation (EVEREST)
- rTMS (NICHE)

# Få antallet af gentagelser op!!!

# 3 – constraint-induced movement therapy

## Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 Months After Stroke

The EXCITE Randomized Clinical Trial

JAMA. 2006;296:2095-2104

*Original Article*

## Effects of Unilateral Upper Limb Training in Two Distinct Prognostic Groups Early After Stroke: The EXPLICIT-Stroke Randomized Clinical Trial

Neurorehabilitation and
Neural Repair
1–13
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DOI: 10.1177/1545968315624784
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Gert Kwakkel, PhD[1,2], Caroline Winters, MSc[1], Erwin E. H. van Wegen, PhD[1], Rinske H. M. Nijland, PhD[2], Annette A. A. van Kuijk, MD, PhD[3], Anne Visser-Meily, MD, PhD[4], Jurriaan de Groot, PhD[5], Erwin de Vlugt, PhD[6], J. Hans Arendzen, MD, PhD[5], Alexander C. H. Geurts, MD, PhD[3], and Carel G. M. Meskers, MD, PhD[1], on behalf of the EXPLICIT-Stroke Consortium

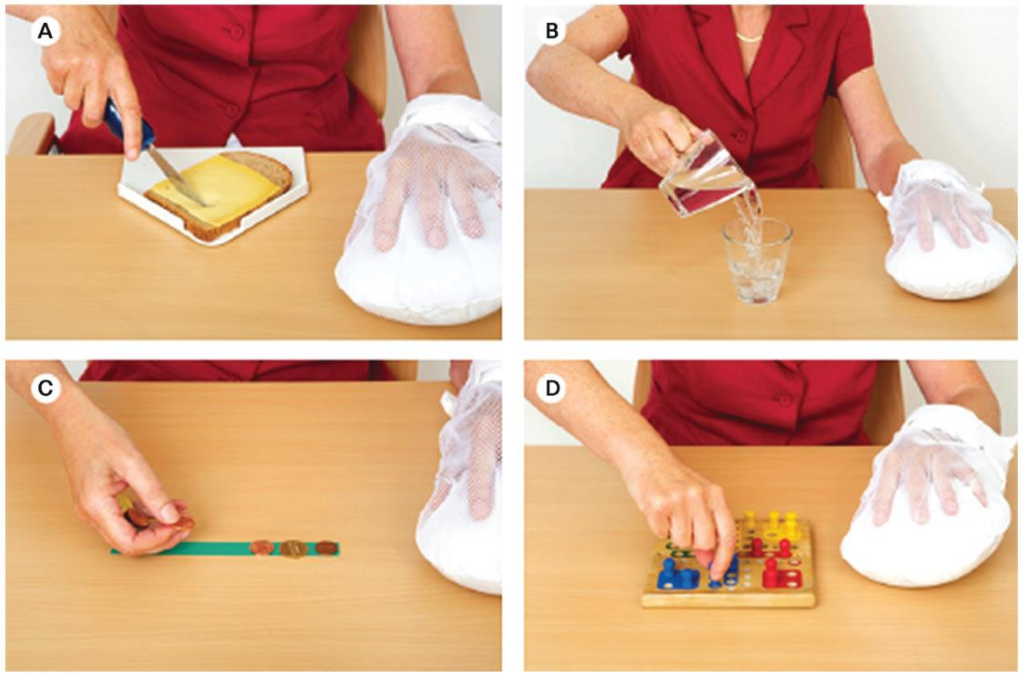
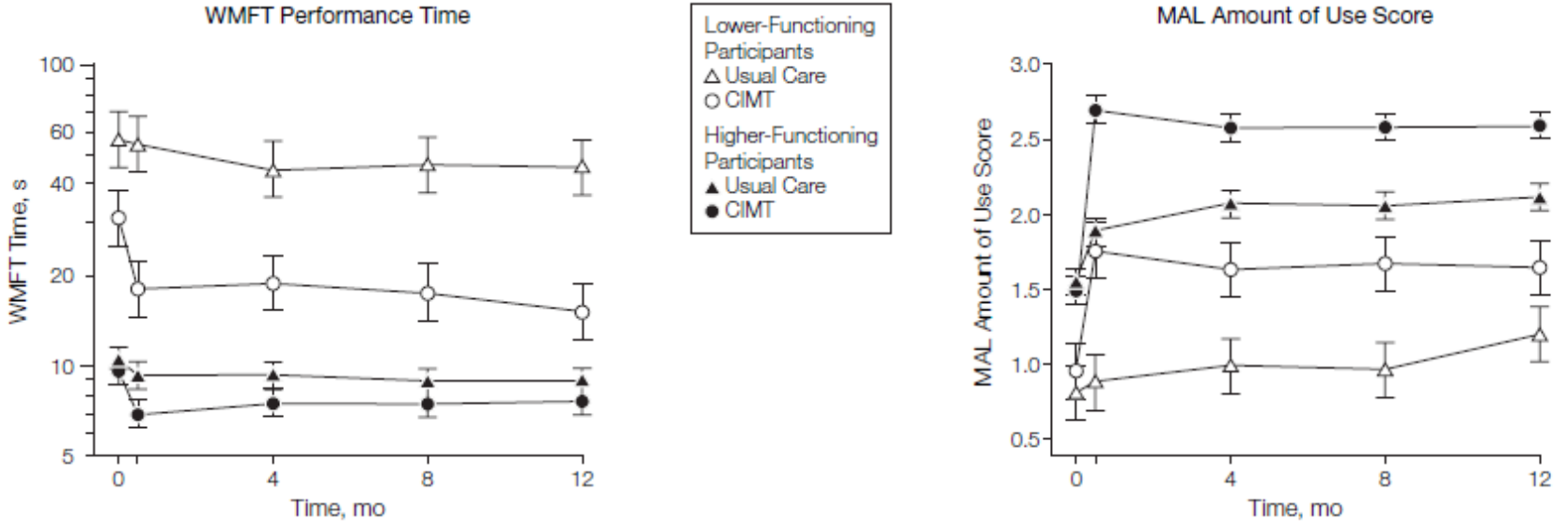



FIGURE 9-2

**Constraint-induced movement therapy. The paretic upper extremity is trained while the nonaffected limb is constrained (here, by a mitten). For example, while the nonparetic upper extremity is constrained with a mitten, the patient uses the paretic upper extremity to practice cutting bread (*A*), pouring water (*B*), handling buttons (*C*), and moving game pieces on a board (*D*).**

Reprinted with permission from Kwakkel G, et al, Lancet Neurol.[14] © 2019 Elsevier Ltd.

**Figure 2.** Back-Transformed Mean WMFT Performance Time and Mean MAL Amount of Use Scores




| | | | | | |
|---|---|---|---|---|---|
| Lower Functioning, No. | | | | | |
| Usual Care | 22 | 19 | 18 | 18 | 16 |
| CIMT | 23 | 20 | 17 | 17 | 15 |
| Higher Functioning, No. | | | | | |
| Usual Care | 93 | 85 | 75 | 74 | 70 |
| CIMT | 82 | 78 | 72 | 67 | 65 |

| | | | | | |
|---|---|---|---|---|---|
| Lower Functioning, No. | | | | | |
| Usual Care | 22 | 19 | 18 | 18 | 16 |
| CIMT | 23 | 20 | 17 | 17 | 15 |
| Higher Functioning, No. | | | | | |
| Usual Care | 94 | 84 | 75 | 74 | 70 |
| CIMT | 82 | 78 | 72 | 69 | 65 |

Data provided at baseline (0 months), 2 weeks later (posttreatment for the CIMT group), and at 4-month intervals. Bars indicate 1.0 SE of the least-square mean. First column indicates total sample available to contribute to database at baseline and subsequent columns indicate actual sample by group at each time point. CIMT indicates constraint-induced movement therapy; MAL, Motor Activity Log; WMFT, Wolf Motor Function Test.

| Principper | |
|---|---|
| | intensitet, gradueret, opgavespecifik |
| | sætte den raske arm ud af spillet (constrained) |
| | overføringsværdien |

# 4 – vagus stimulation

## Vagus nerve stimulation paired with rehabilitation for upper limb motor function after ischaemic stroke (VNS-REHAB): a randomised, blinded, pivotal, device trial

*Jesse Dawson, Charles Y Liu, Gerard E Francisco, Steven C Cramer, Steven L Wolf, Anand Dixit, Jen Alexander, Rushna Ali, Benjamin L Brown, Wuwei Feng, Louis DeMark, Leigh R Hochberg, Steven A Kautz, Arshad Majid, Michael W O'Dell, David Pierce, Cecília N Prudente, Jessica Redgrave, Duncan L Turner, Navzer D Engineer, Teresa J Kimberley*

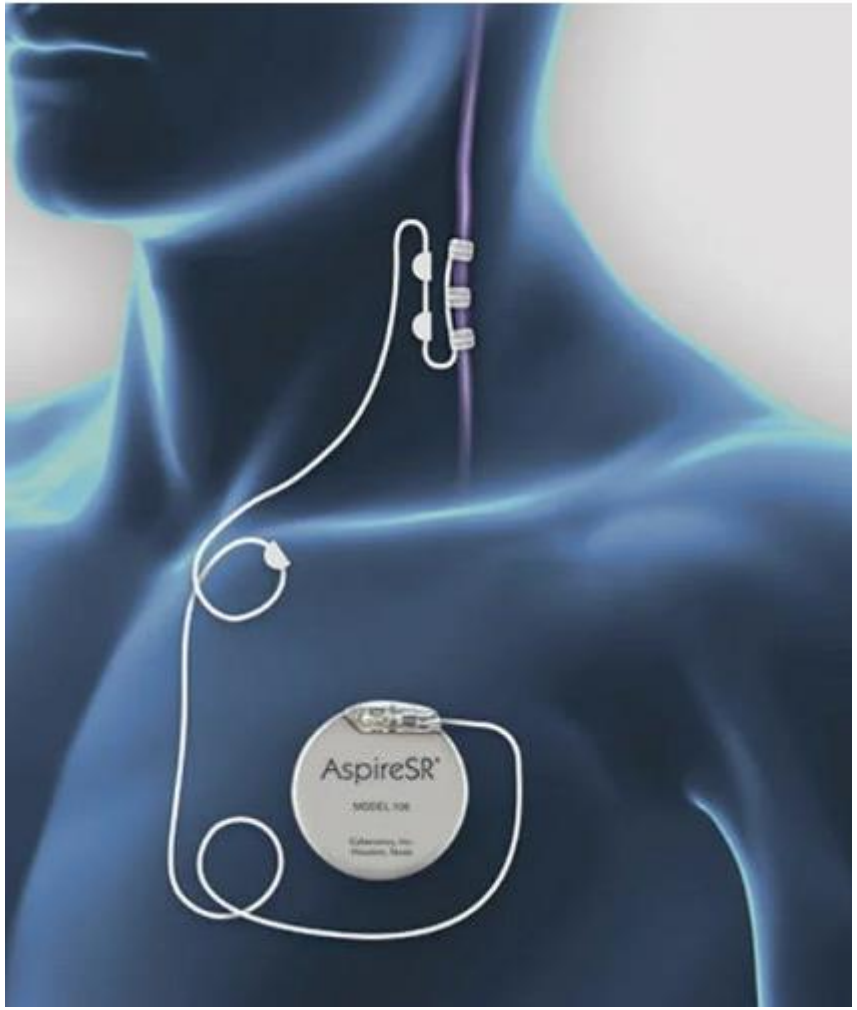
### Summary

**Background** Long-term loss of arm function after ischaemic stroke is common and might be improved by vagus nerve stimulation paired with rehabilitation. We aimed to determine whether this strategy is a safe and effective treatment for improving arm function after stroke.

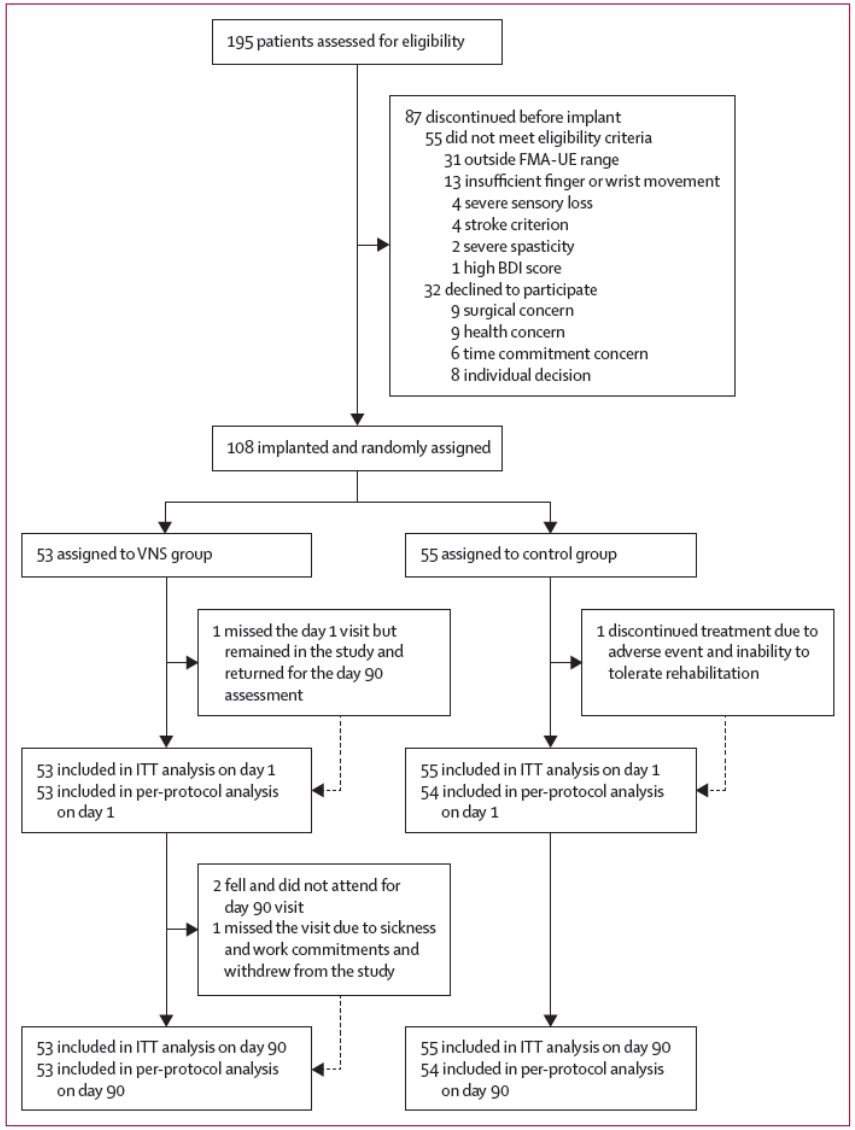
*Lancet* 2021; 397: 1545–53

See Comment page 1520

Institute of Cardiovascular and Medical Sciences, College of




kolinerge og monoaminerge modulationer af motorisk cortex




| | VNS group (n=53) | Control group (n=55) |
|---|---|---|
| Age, years | 59·1 (10·2) | 61·1 (9·2) |
| Sex | | |
| Male | 34 (64%) | 36 (65%) |
| Female | 19 (36%) | 19 (35%) |
| Race* | | |
| White | 42 (79%) | 43 (78%) |
| African American | 9 (17%) | 9 (16%) |
| Asian, Indian, or other | 1 (2%) | 4 (7%) |
| Not reported | 1 (2%) | 1 (2%) |
| Time since stroke, years | 3·1 (2·3) | 3·3 (2·6) |
| Handedness | | |
| Right | 48 (91%) | 50 (91%) |
| Left | 4 (8%) | 5 (9%) |
| Ambidextrous | 1 (2%) | 0 |
| Side of paresis | | |
| Right | 25 (47%) | 26 (47%) |
| Left | 28 (53%) | 29 (53%) |
| FMA-UE baseline score | 34·4 (8·2) | 35·7 (7·8) |
| WMFT-Functional score | 2·71 (0·70) | 2·83 (0·65) |

Data are n (%) or mean (SD). Some percentages can add up to more than 100% due to rounding. VNS=vagus nerve stimulation. FMA-UE=Fugl-Meyer Assessment-Upper Extremity. WMFT=Wolf Motor Function Test. *Participants could select more than one option for race.

***Table:* Baseline demographics and characteristics of the intention-to-treat population**

# vagus-stimulation + træning

vagus-stimulation

30 hz - 0,5 s – 0,8 mA

30 hz - 0,5 s – 0,0 mA

6 ugers træning på hospital

+

hjemmetræning

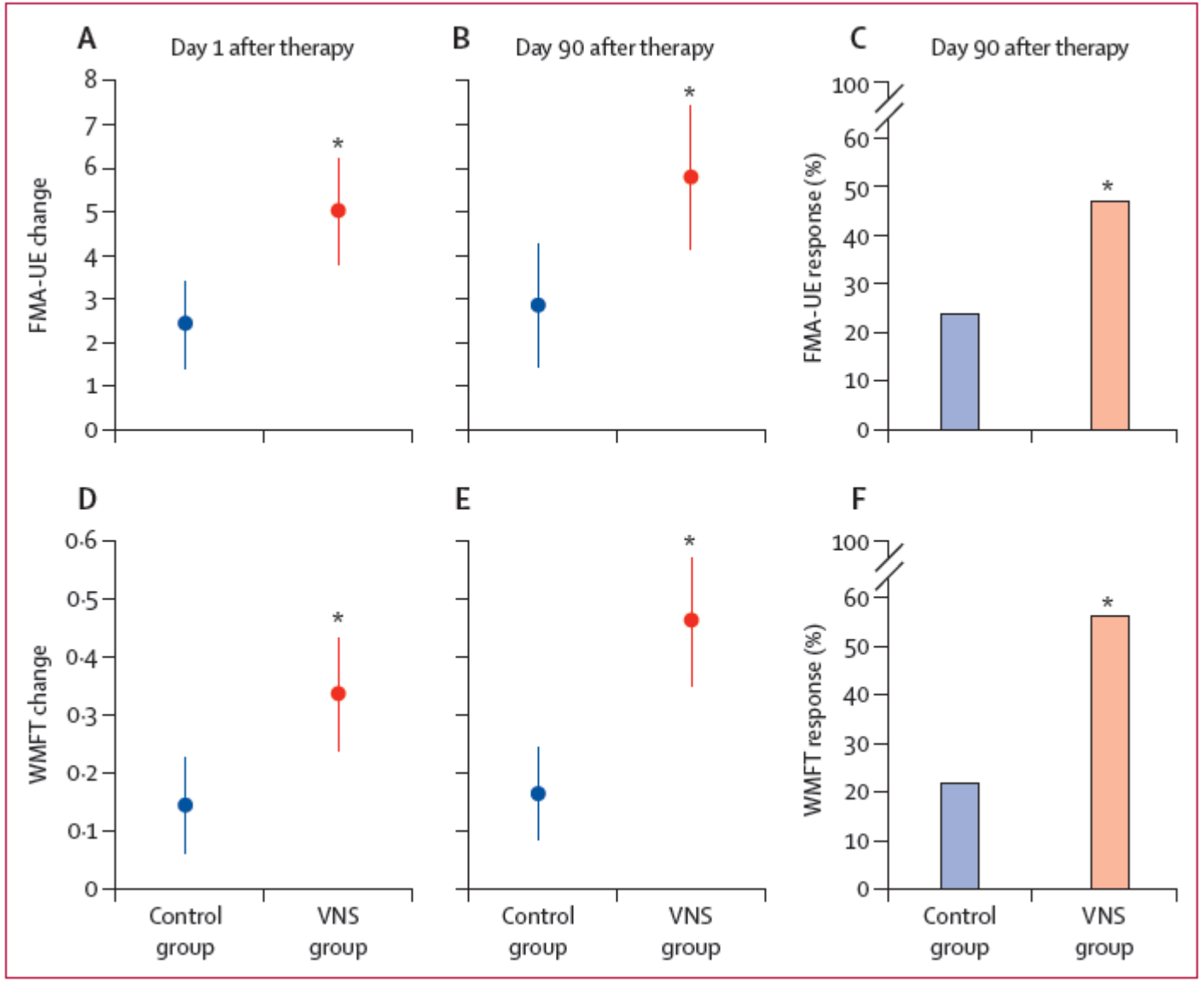



*Figure 2:* **Response and change in FMA-UE and WMFT scores**

# 5 – timing

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

## Body-Weight–Supported Treadmill Rehabilitation after Stroke

Pamela W. Duncan, P.T., Ph.D., Katherine J. Sullivan, P.T., Ph.D., Andrea L. Behrman, P.T., Ph.D., Stanley P. Azen, Ph.D., Samuel S. Wu, Ph.D., Stephen E. Nadeau, M.D., Bruce H. Dobkin, M.D., Dorian K. Rose, P.T., Ph.D., Julie K. Tilson, D.P.T., Steven Cen, Ph.D., and Sarah K. Hayden, B.S., for the LEAPS Investigative Team

N Engl J Med 2011;364:2026-36.

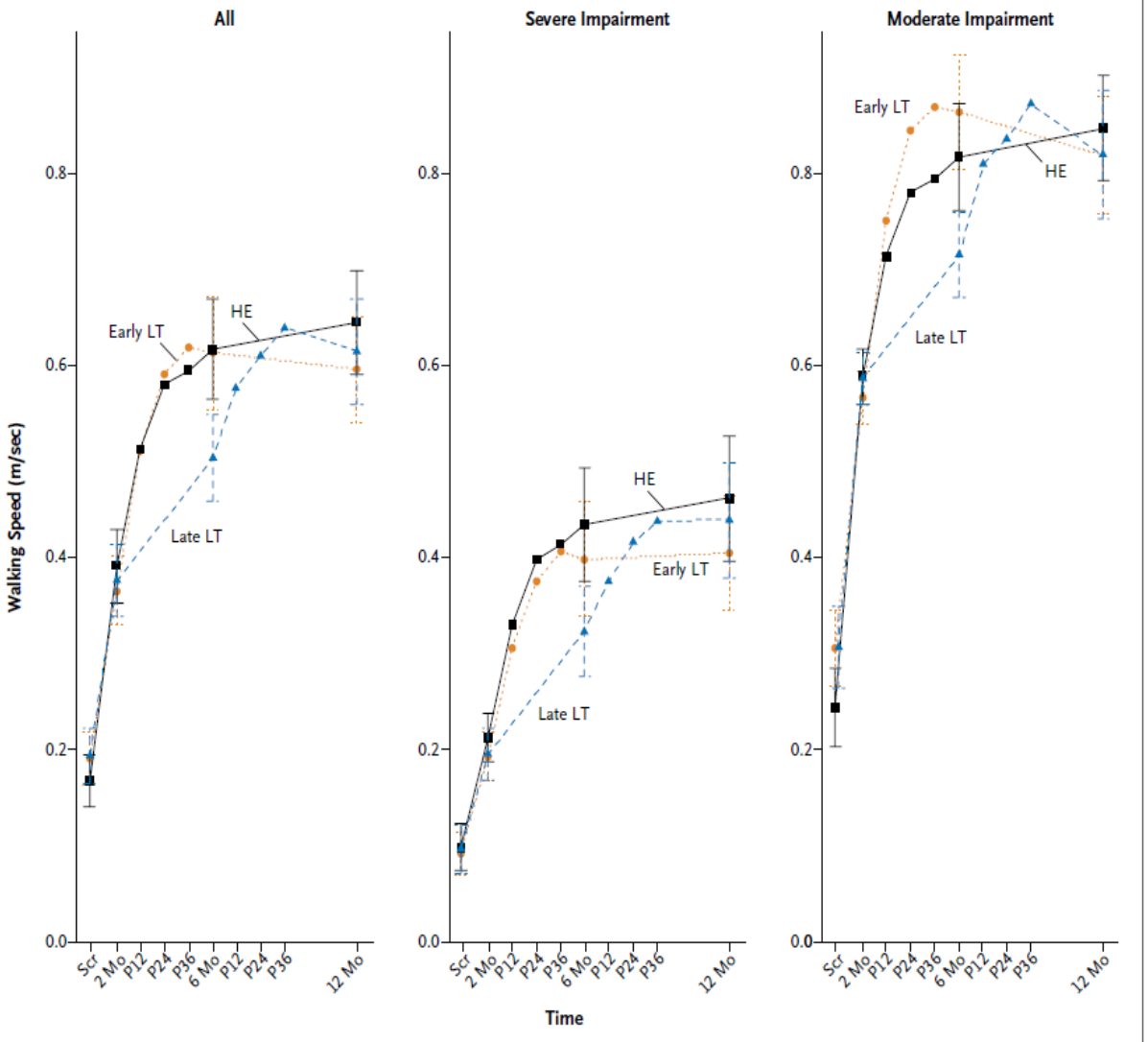



**Figure 1. Timing of Locomotor Training and Changes in Walking Speed 1 Year after Stroke.**

Screening (Scr) was performed at a mean (±SD) of 26.0±11.6 days after stroke. Randomization was performed at baseline, 2 months after stroke. I bars indicate 95% confidence intervals. HE denotes home exercise, LT locomotor training, and P12, P24, and P36 post-training assessments at weeks 12, 24, and 36, respectively.