



神戸大学

Keeping older adults mobile and sharp

Gut-brain-targeted abdominal ultrasound × oral exercise mimetics

Exercise-like benefits for people who cannot exercise

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Background

- ~36 million aged 65+; care needs driven by dementia & musculoskeletal decline – each accelerating the other
- Exercise helps both – but the frail, in pain or hospitalised cannot do it
- Our answer: two gut-mediated seeds usable without exercise

Previously Technology

- Anti-dementia drugs: cost, dosing burden, eligibility
- Rehab / exercise therapy: the patient must perform it
- Supplements: weak human functional evidence
- EMS: needs one electrode per muscle

Technical Significance

1. Points

Acting on the gut reaches the brain via the circulation (gut-brain axis). Both seeds are designed for people who cannot exercise.

[Seed 1] Abdominal ultrasound (non-invasive, external)

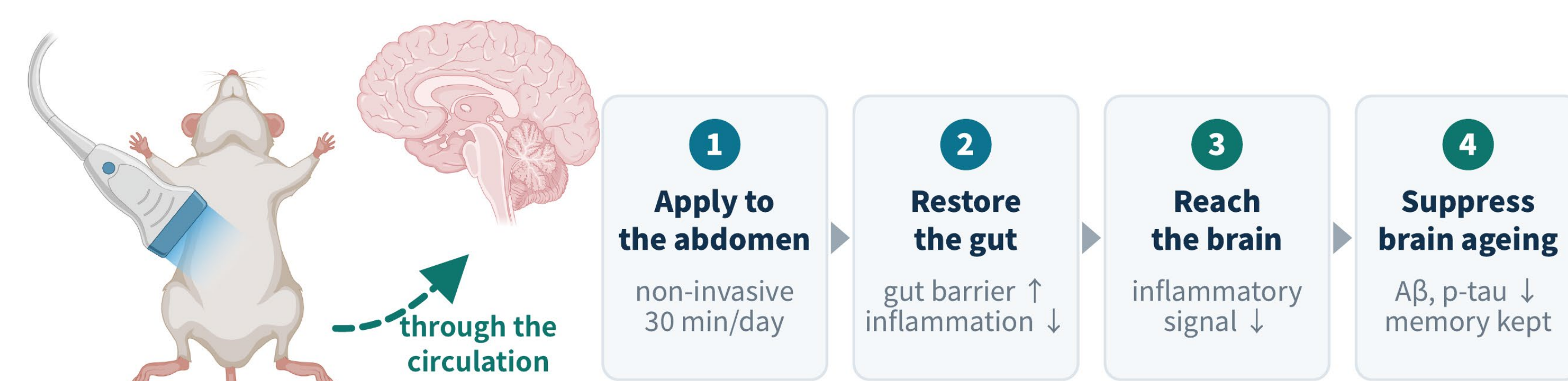
A commercial therapy device used as-is – no new hardware; gel and a probe on the abdomen.

Conditions: 1 MHz, pulsed (20% duty), 1.0 W/cm² – therapy-grade / 30 min × 30 days = 1 course

[Seed 2] Oral exercise mimetics (drug repositioning)

- Apigenin: a flavonoid from parsley; improves endurance and mitochondrial function
- Doxazosin: an existing antihypertensive; protects muscle, bone and cartilage

Study design: senescence-accelerated mice, four groups (drug ± × exercise ±), 4 weeks



applied externally

Acting on the gut reaches the brain through the circulation – this is the gut-brain axis.

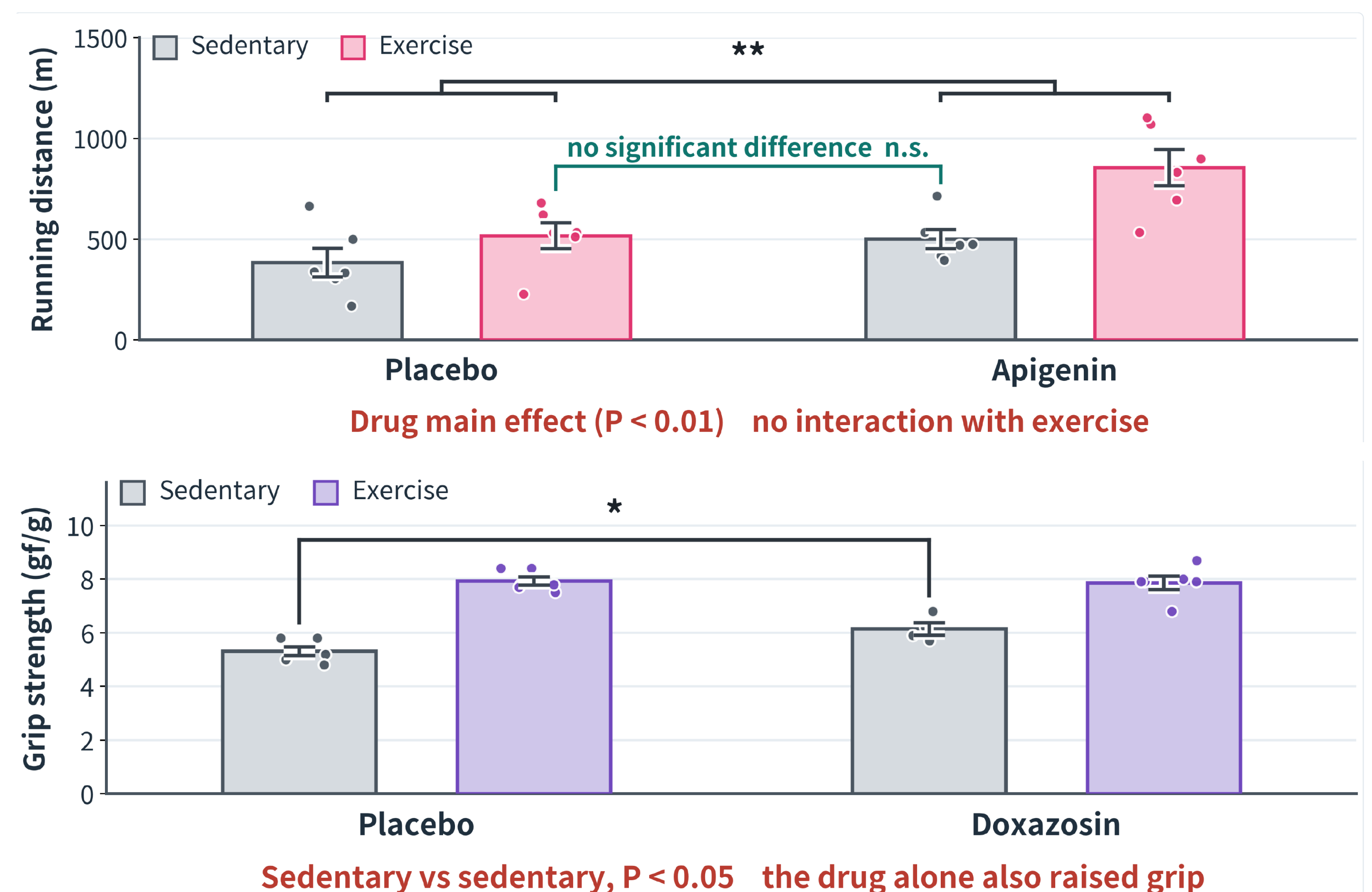
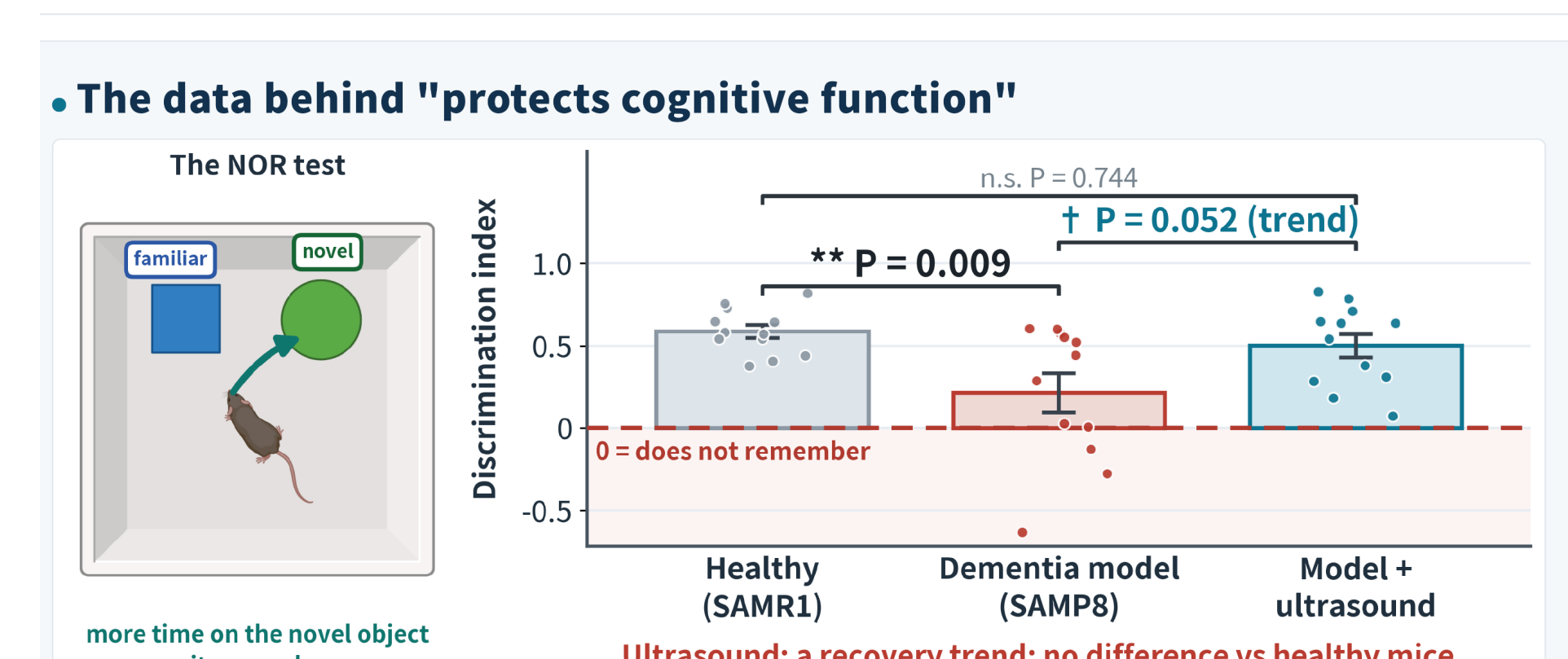
* Details (SAMP8, under review) and human extrapolation: available under NDA.

Significance

Doxazosin raised grip only in sedentary animals and added nothing on top of exercise – a substitute, not an add-on.
Apigenin alone did not differ from placebo + exercise. Proving equivalence is the first joint project we propose.

2. Results

[Seed 1] Cortical amyloid- β and hippocampal p-tau **reduced**, PSD-95 **restored**. Behaviour (NOR): recovery trend $P=0.052$, no difference vs healthy mice $P=0.744$ (under review)



Future Prospective

Possible Applications

Partners to deliver exercise-like benefits, without exercise:

- Non-drug programmes in care facilities & home care
- Function maintenance in hospital / post-op periods
- A new function for ultrasound healthcare devices
- A functional-food route in Japan (apigenin)
- Confidential data available under NDA

▼ Papers & press release – scan with your phone



Paper ①
Mimetics

Redox Biol. 2026



Paper ②
Pathology

GeroScience 2025



Paper ③
Ultrasound

Bone 2023



Press release
Kobe Univ.

30 Apr 2026



Laboratory
website

kobe-u.ac.jp

Possible Collaboration

- Device makers: protocol optimisation & implementation
- Pharma / healthcare: repositioning co-development
- Food & ingredients: apigenin formulation & testing
- We provide: animal models + behaviour/pathology/bone/muscle analysis

● Seeking joint research & co-development

Publications & IP

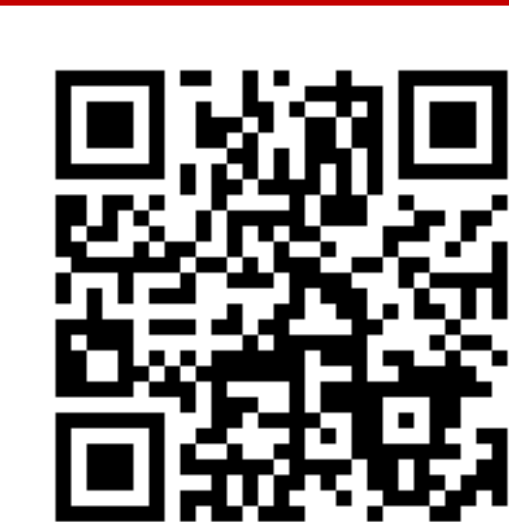
- Redox Biology 2026 (exercise mimetics, peer-reviewed)
- GeroScience 2025 (EMS × brain) / Bone 2023 (ultrasound × bone)
- Ultrasound × dementia model: under peer review
- 2 Japanese patents filed (unpublished) * QR codes: bottom left

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