

Treating PTSD during Sleep (SES)

— closed-loop AI delivers sound at the targeted sleep stage —

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Background

PTSD has a high lifetime prevalence and greatly impairs quality of life and social functioning. Standard exposure therapy requires confronting trauma while awake, causing high distress and dropout, and pharmacotherapy is prone to relapse. A non-invasive, low-burden treatment is needed.

Previous Technology

Conventional exposure and drug therapies intervene during wakefulness, imposing burden with variable outcomes. Although sleep helps reorganize memory and emotion, no practical method existed to control when - and at which sleep stage - to deliver a stimulus, so sleep had not been harnessed for treatment.

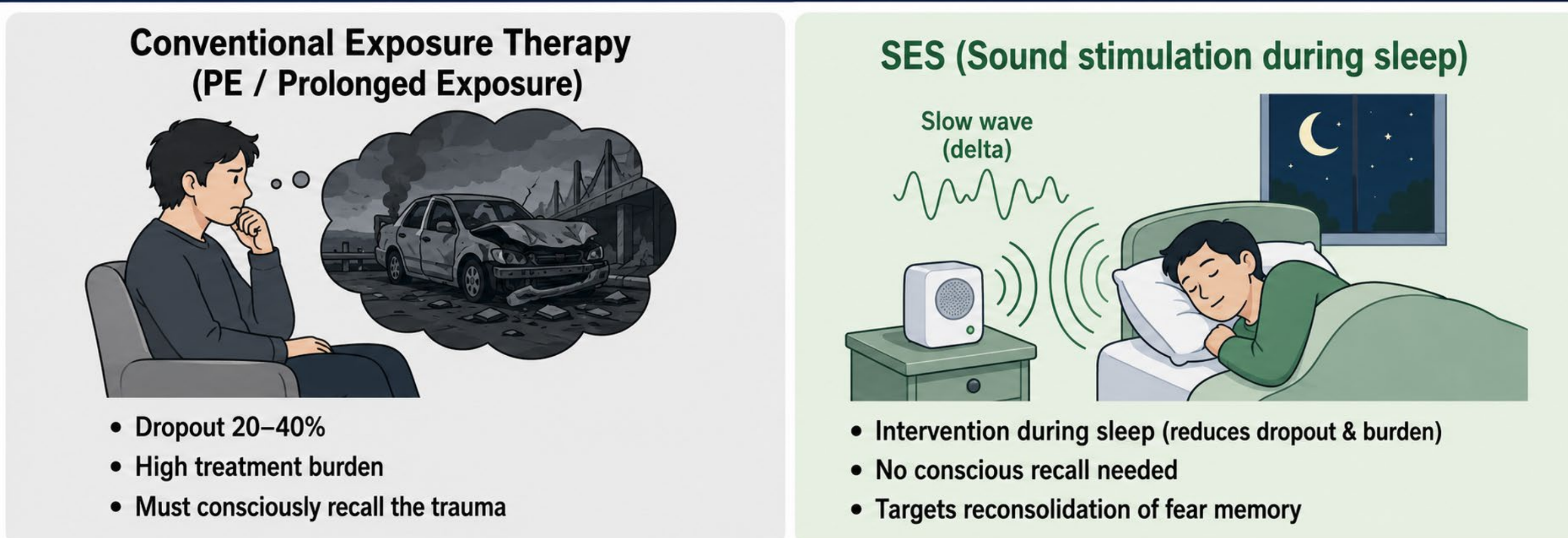
Technical Significance

1. Points

Our concept (SES) presents personalized trauma-related sounds during sleep, avoiding the awake-state stimulation used in conventional therapy, to soften fear responses.

A closed-loop AI stages sleep from EEG and plays sound only in the targeted brain state. It was first implemented as an investigator-initiated clinical study (jRCT1030230706), conducted overnight in-lab.

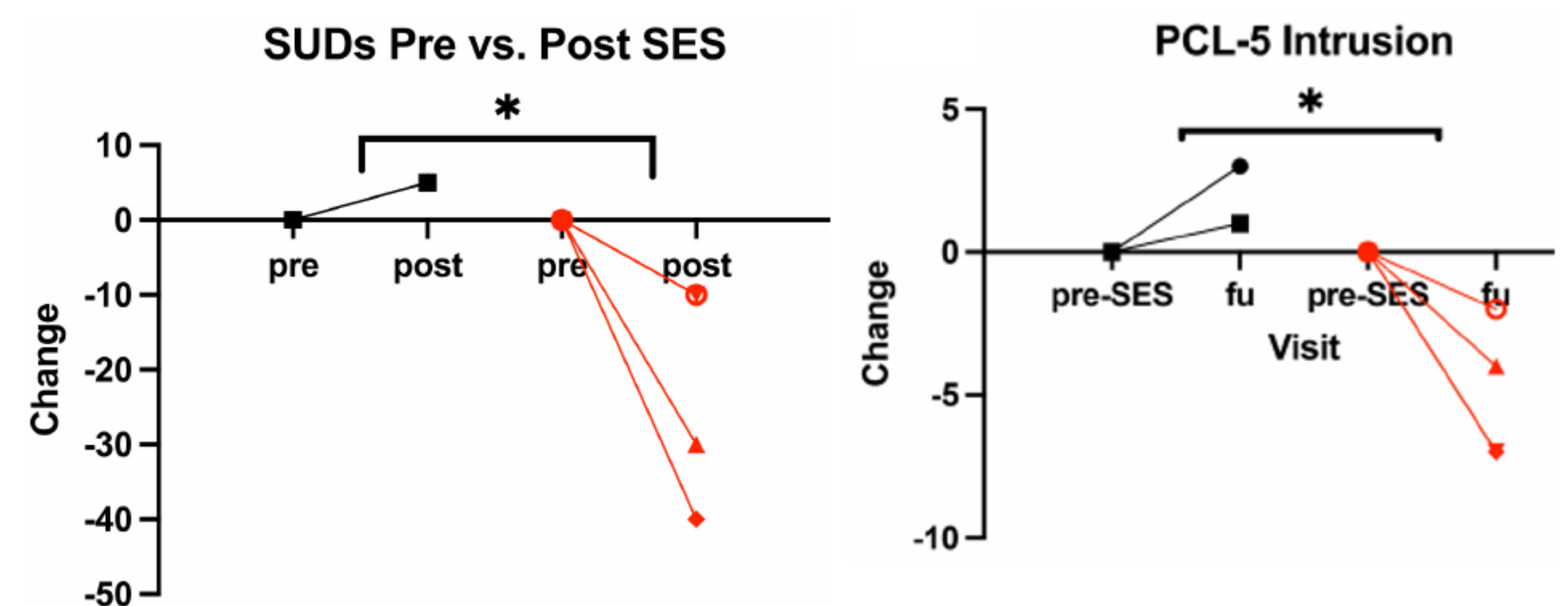
Low-intensity trauma-related sound during slow-wave sleep → target the reconsolidation window → gently rewrite fear memory



A new concept that processes PTSD memory with low burden during sleep — without awake exposure

2. Results

- Sound stimulation completed in 6 patients; 0 adverse events from stimulation
- Subjective distress (SUDs) decreased significantly after sound stimulation (* $p < 0.05$)
- PTSD intrusion symptoms also improved significantly (PCL-5, * $p < 0.05$)



Source: overnight clinical study jRCT1030230706, medRxiv preprint



medRxiv論文

Significance

Reduces PTSD symptoms using only sound during sleep. The closed-loop AI enables safe, automated home use as a software medical device (SaMD + sound library).

Future Prospective

Possible Applications

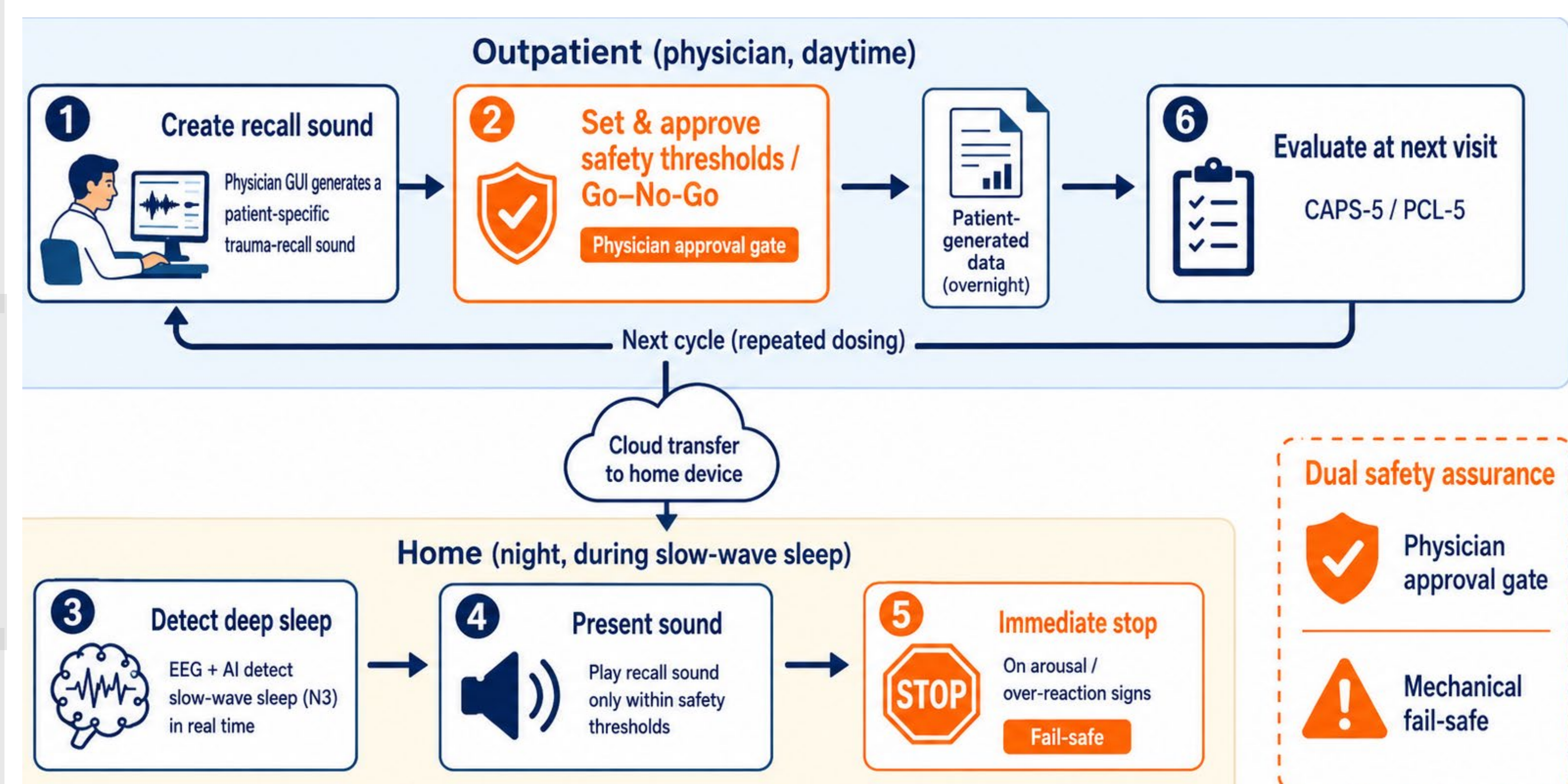
- Home-based (decentralized, DCT) PTSD treatment
- A sleep-based platform for modulating emotion and memory
- Extension to fear/anxiety-related symptoms and sleep-associated emotion regulation
- Automated sound stimulation combined with home wearables

Possible Collaboration

- Companies developing or commercializing SaMD / digital therapeutics (DTx)
- Pharma / device companies in PTSD and anxiety disorders for combination or co-development

Publications & IP

- SES/PTSD investigator-initiated clinical study: jRCT1030230706 (preprint on medRxiv; under review)
- Patent "System for creating trauma-recall sounds"



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