Brainstorm in a teacup? Theanine MEG

Company
Neurobrands (US)

Problem/opportunity
To analyse the anti-stress and brain effects of a proprietary theanine drink.

Scholey was approached to design and clinical trials to evaluate the efficacy of the product for using brain imaging.

Background
Theanine is a component of tea which is believed to contribute to its 'refreshing' properties. A number of studies have shown that theanine ingestion reduces anxiety and stress. The direct effects of theanine on the brain have previously been established in a series of neuroimaging methods using electroencephalography (EEG). EEG measures electrical activity associated with brain activity and has a longstanding history (the first EEG study was published in 1929). It has excellent temporal resolution – that is it measures ongoing brain activity at the millisecond level (as opposed to functional magnetic resonance imaging fMRI which captured activity over a second or so). EEG does not have good spatial resolution, that is it does not accurately locate *where* brain changes are occurring, as the skull smears the electrical signal.

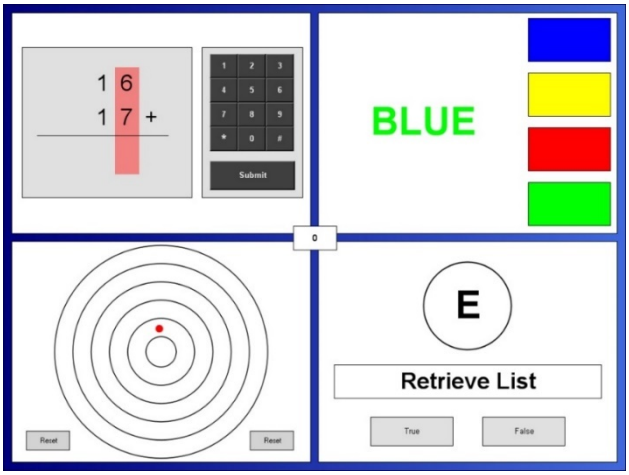
Magnetoencephalography can be used to assess brain activity following tea consumption.

Unlike electrical signals, the associated changes in magnetic fields are unchanged by bone. This is the principle underlying magnetoencephalography (MEG) shown left in a Nature feature including this research. So MEG can be used to better localise where brain activity originates while maintaining high temporal resolution.

Solution
The first pharmaco-MEG trial of a natural product was designed and conducted to evaluate the acute brain, cognitive and mood effects of the theanine drink. The trials were conducted according to Good Clinical Practice standards.

Our role

We oversaw the trial. Participants visited the lab twice. They were given drinks containing theanine or a placebo at each visit.



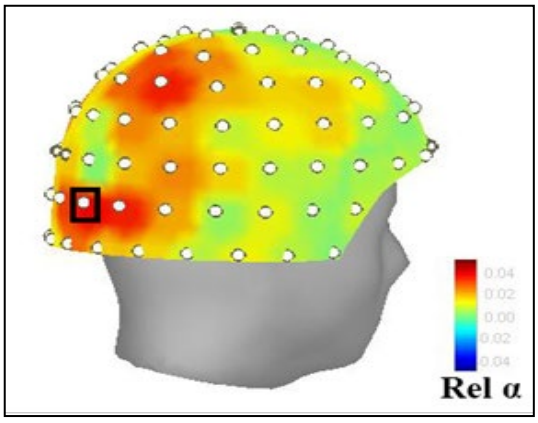
Following the drink, mild stress was induced by asking participants to perform the Purple multi-tasking framework (MTF, left). The MTF was developed by our colleague Professor Mark Wetherell. Participants simultaneously performed four cognitive tests for twenty minutes. This reliably increases self-rated stress and anxiety and reduces calmness. It can also increase levels of the stress hormone cortisol.

Following this they underwent brain scanning using Swinburne's MEG facility (one of only two in the Southern hemisphere).

Outcomes

Compared with placebo, theanine

- reduced stress induced by the MTF at 1 h
- reduced the increased cortisol induced by the MTF at 3 h
- increased focal alpha waves in in posterior brain regions (right) – an effect which was more pronounced in those with higher baseline trait anxiety
- These results were subsequently published [1]
- The study featured in a Nature 'Outlook' piece [2]



References

1. White DJ, de Klerk S, Woods W, Gondalia S, Noonan C, Scholey AB (2016) Anti-stress, behavioural and magnetoencephalography effects of an l-theanine-based nutrient drink: A randomised, double-blind, placebo-controlled, crossover trial. *Nutrients* **8**.

2. Gilbert N (2019) The science of tea's mood-altering magic. *Nature* **566,** S8-S8.

Tags

Theanine, Neuroimaging, MEG, brain, cognitive and mood effects, Clinical trial