

## Correspondence

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### Letter to the Editor

#### Simply avoiding reactivating fear memory after exposure therapy may help to consolidate fear extinction memory

Enhancing the efficiency of psychotherapy has become a central issue in its recent development as cost-effective approaches and many studies have shown that it is indeed possible to increase the efficacy of psychological treatment. In the recent study of Kleim *et al.* (2014), going to sleep immediately after exposure increased the efficacy of the treatment of spider phobia, compared to staying awake after a session. The authors explain this effect by the benefits of sleep on memory consolidation found in earlier studies. Therefore, if exposure is followed by sleep, the spider non-fearful memories will be better reactivated when competing with spider fearful memories.

Kleim *et al.* (2014) used a 90 min-long documentary about European cities for the awake condition. We can assume that this documentary contains some cues associated with spiders, as spiders can be found in most modern homes. Thus, this experiment may have compared a post-exposure period devoid of spider cues, that is a 90-min sleep period where less than 20% of recorded sleep gave the opportunity to dream and have nightmares about spiders, to a post-exposure period that may have contained spider fear-associated cues. These cues could reactivate spider fear memories and thus impair memory consolidation of non-fearful spider memories.

It is considered that fearful memories consolidate progressively into persistent traces through synthesis of new proteins (McGaugh, 2000). When retrieval of a consolidated fear memory occurs, this memory returns transiently to a labile state, thus requiring a new protein synthesis to persist further (Nader *et al.* 2000). This unstable period, called a consolidation window, lasts a few hours. Exposure therapy is based on the experimental fear extinction model that helps to develop new, non-fearful memories that follow the same consolidation process. During this labile state, the memory is amenable to enhancement or disruption (Nader *et al.* 2000). Monfils *et al.* (2009) elegantly demonstrated that when fear extinction training occurs within the consolidation window of a learned fear (i.e. within 6 h after triggering fear), fear memory is disrupted and later permanently attenuated. We can deduce, therefore, that it is important for phobic

subjects to avoid reactivating fear memories during the consolidation period of non-fear memories.

The study of Kleim *et al.* (2014) emphasizes that, to ensure that the next 6 h needed for memory consolidation will not be disturbed by exposure to phobic cues (and reactivate the fear), behaviour therapists must enquire about post-exposure session activities of treated patients.

We need further studies assessing the specific positive effects of sleep, in the post-exposure period, compared to the vigilant state in a phobic cue-free environment, to determine whether it might be considered a necessary condition for better consolidation of non-fear memories.

### Declaration of Interest

None.

### References

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R. DARDENNES<sup>1</sup>, N. ALANBAR<sup>2</sup>, A. DOCTEUR<sup>3</sup>, S. M. DIVAC<sup>3</sup> AND C. MIRABEL-SARRON<sup>3</sup>

<sup>1</sup>Faculty of Medicine, University Paris Descartes, Paris, France

<sup>2</sup>Centre of Psychiatry and Neurosciences, Sainte-Anne Hospital, Paris, France

<sup>3</sup>Hospital Sainte-Anne, Paris, France

Address for correspondence: Prof. R. Dardenne, CMME, 100 rue de la Santé, 75674 Paris Cedex 14, France. (Email: r.dardenne@ch-sainte-anne.fr)

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### Letter to the Editor

#### Simply avoiding reactivating fear memory after exposure therapy may help to consolidate fear extinction memory – a reply

We thank Dr Dardenne and colleagues (Dardenne *et al.* 2014) for their thoughtful and informed comments