

# Could a single essential oil in a cream-based cosmetic be a new way to improve sleep quality while protecting skin against external stressors?

SS\_99

Duroux, Romain<sup>1\*</sup>; Jain, Anshul<sup>2</sup>; Tabert, Matthias<sup>2</sup>; Attia, Joan<sup>1</sup>

<sup>1</sup> R&D, IFF-Lucas Meyer Cosmetics, 31036 Toulouse, France; <sup>2</sup> IFF, Union Beach, NJ, United States

\*romain.duroux@lucasmeyercosmetics.com



## INTRODUCTION

Over recent years an increasing number of reports document difficulties with initiating or maintaining healthy sleep patterns. Disruption of sleep patterns due to lifestyle-stressors create negative acute and chronic health outcomes with personal and economic consequences on society.<sup>1</sup> A lack of sleep also degrades the quality of skin with an increase of the release stress hormone or inflammatory cytokines which exacerbate signs of ageing.<sup>2</sup> Essential oils (EOs) are widely used as a treatment for health and wellbeing functions, including improvement of sleep quality. Thanks to its composition, EOs can also be effective on skin with anti-acne, skin-lightening or sun protection properties for instance. However, EOs are often use as a blend at high concentration.<sup>3</sup>

The present study introduces a novel dual approach to identify materials able to improve sleep deficiency related signs on skin. We demonstrates that single EOs administered at low dosage levels without smell perception in a face cream application, can have a dual effect with an improvement of sleep quality and a protective effect on skin cells against external stressors.

## MATERIALS & METHODS

### Clinical evaluation of essential oils over sleep studies

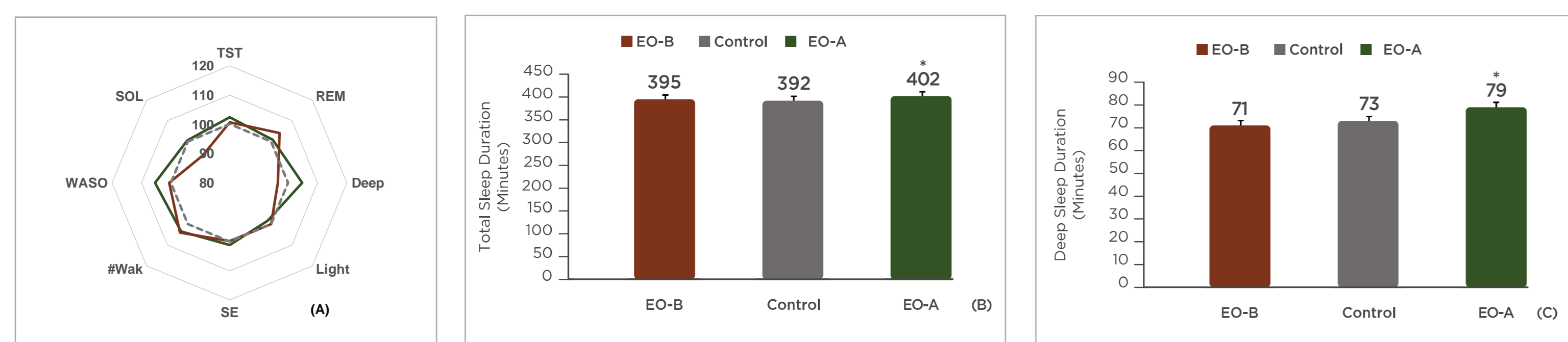
Two separate sleep studies have been conducted with 2 EOs in each study. 32 healthy participants (16 males, 22-56 years) with self-reported mild sleep disturbances caused by lifestyle factors, but no diagnosis of a clinical sleep disorder were recruited. An in-context, randomized, counterbalanced design using an unscented control was used. Participants applied the materials at bedtime in their sleep environment for 3 consecutive weeks. Sleep measurements were performed with the SleepScore Max device (SleepScore Labs, Carlsbad, CA).

### In vitro evaluation of EO-A and EO-C in Normal Human Dermal Fibroblasts (NHDF)

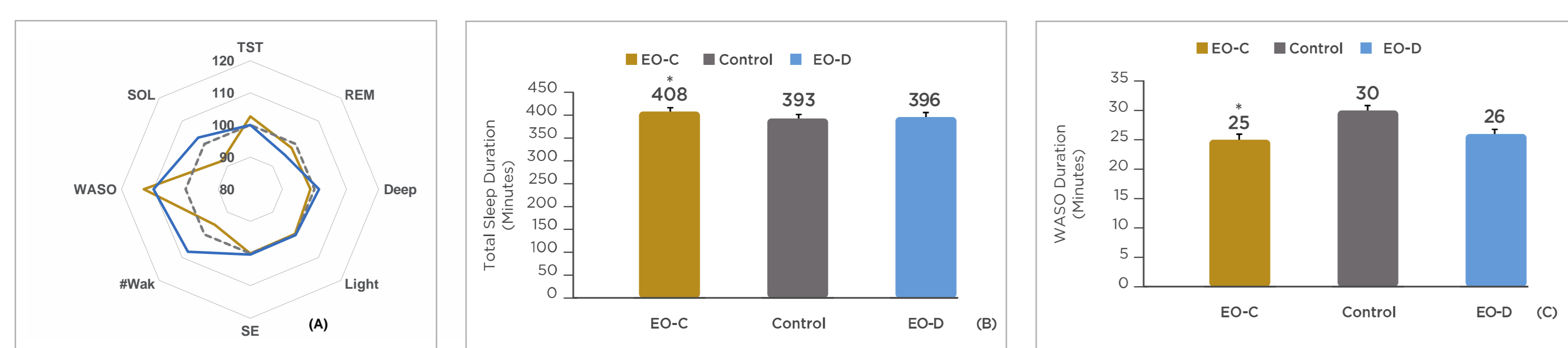
To assess the anti-inflammatory effect on NHDFs, cells were exposed to IL-1 $\alpha$  (2pg/mL) in the presence of EOs for 24h. The amount of IL8 and IL6 cytokines production was then measured by ELISA. Regarding the anti-oxidant effect of EOs, NHDFs were exposed to pyocyanin (100  $\mu$ M) for 30min before adding the EOs for an additional 2h. The amount of Reactive Oxygen Species (ROS) production was then measured by fluorescence.

## RESULTS & DISCUSSION

### Clinical evaluation of essential oils over sleep studies



While EO-B (0.005%) showed no significant effect on the different sleep parameters (A), EO-A (0.0025%) significantly increased total sleep duration as compared to unscented control (B). Participants on average slept for 6.5 hours with placebo as compared to 6.7 hours with EO-A. This effect can be primarily attributed to a significant increase in Deep Sleep duration (C) (73 minutes with placebo vs 79 minutes with EO-A).



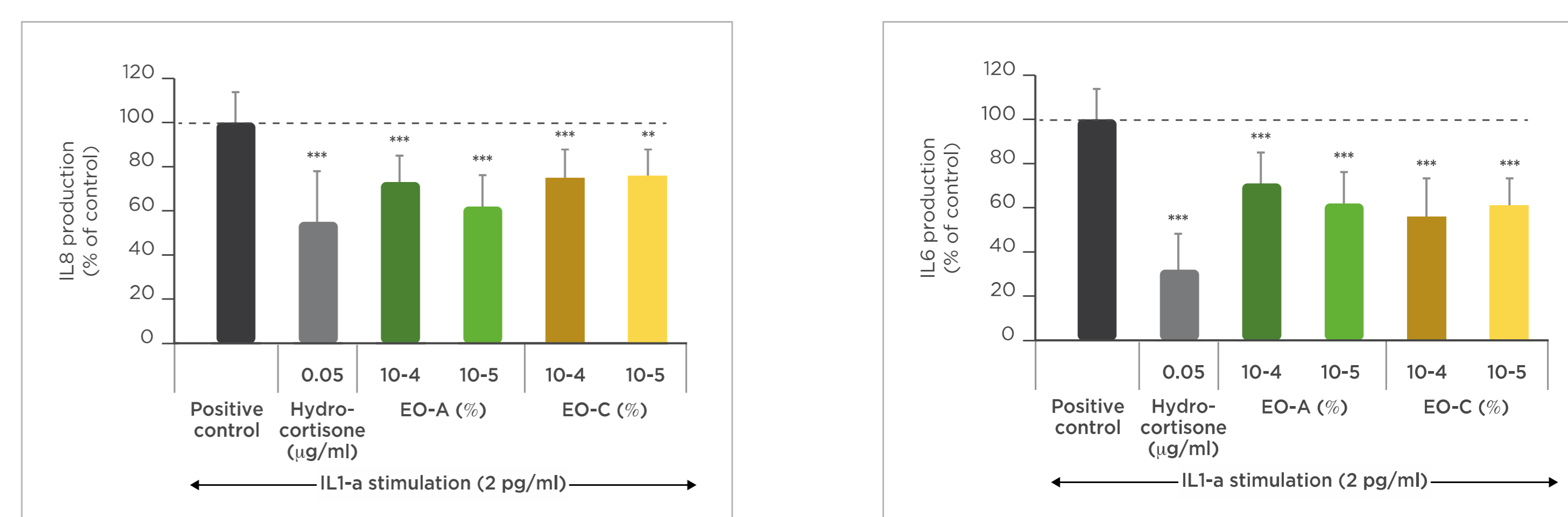
EO-C (0.005%) improved Total Sleep Duration by 15min (B) compared to unscented control (393 min vs 408 min). A reduction of the time spent awake during the night was also observed for EO-C (C) where participants on an average also spent 5 minutes less awake (WASO). EO-D (0.005%) showed no significant effect on the any of the sleep parameters as compared to the unscented control.

**Both EO-A and EO-C improve sleep quality when formulated in a face cream with no smell perception.**

## RESULTS & DISCUSSION

### In vitro evaluation of EO-A and EO-C NHDFs culture

#### Effect of EOs on IL8 and IL6 production in NHDF

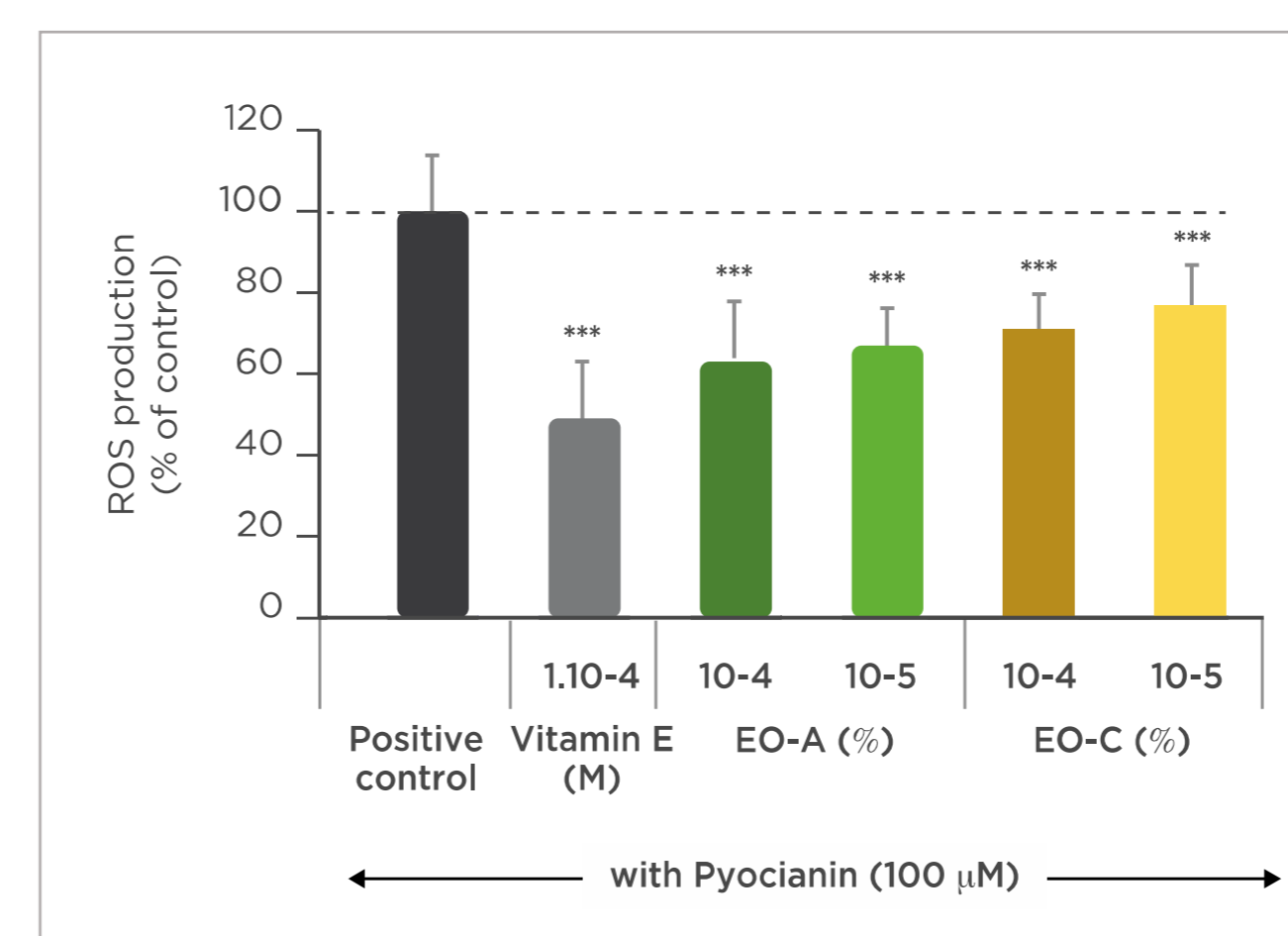


Treatment with EO-A at 10<sup>-4</sup> % and 10<sup>-5</sup> % significantly reduced the IL8 cytokines release by 27% and 38%, respectively. EO-C also demonstrated IL8 decrease by 25% and 24% at 10<sup>-4</sup> % and 10<sup>-5</sup> %, respectively.

At 10<sup>-4</sup> % and 10<sup>-5</sup> %, a decrease of IL6 synthesis by 29% and 38% for EO-A, and by 32% and 39% for EO-C has been found, respectively

**EO-A and EO-C present anti-inflammatory effects on NHDFs with a significant decrease of IL6 and IL8 production.**

#### Effect of EOs on ROS production in NHDF



At 10<sup>-4</sup>% and 10<sup>-5</sup> %, EO-A allowed to reduce ROS production exposed to pyocyanine by 37% and 34%, respectively. EO-C also demonstrated its capacity to reduce ROS production but less importantly compared to EO-A, with a decrease by 29% and 23% at the 2 tested concentrations.

**EO-A and EO-C present anti-oxidant properties with a significant decrease of ROS production on NHDFs**

## CONCLUSIONS

Poor sleep quality can not only have consequences for personal and economic health, it can also affect our skin integrity with an increase of interleukins and ROS release. In the present study, we have demonstrated that two essential oils with no perceptible smell are efficient *in vitro* on skin cells but also *in vivo* regarding volunteers sleep quality. Overall, our data assume that a dual approach using a single EO formulated at a low dosage in a face cream, can be used to prevent signs of fatigue and ageing

## ACKNOWLEDGMENTS

The authors gratefully thanks SleepScore Labs for providing the biometric sleep measurement platform and sleep staging data used in this study.

## REFERENCES:

- Shochat T (2012) *Impact of lifestyle and technology developments on sleep*. Nat Sci Sleep 4:19-31
- Kahan V, Andersen ML, Tomimori J, Tufik S (2010) *Can Poor Sleep Affect Skin Integrity?* Med. Hypotheses 75:535-537
- Ali B, Al-Wabel NA, Shams S, Ahamad A, Khan SA, Anwar F (2015) *Essential oils used in aromatherapy: a systemic review*, Asian Pac J Trop Biomed 5:601-611