NT_487

Menthyl lactates amazing moonlighting function on body odor control

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Introduction:

Our armpit forms one of the most complex small environments on the human body; humid, warm and constantly supplied with nutrition from our sweat glands. The human armpit microbiome represents a high diversity, but has a downside for us, which is malodor formation (Natsch, 2015). Responsible for that are bacteria and/or metabolic compounds, like small volatile odorous acids due to bacteria metabolic processes (Weatherly, 2017; James 2013).

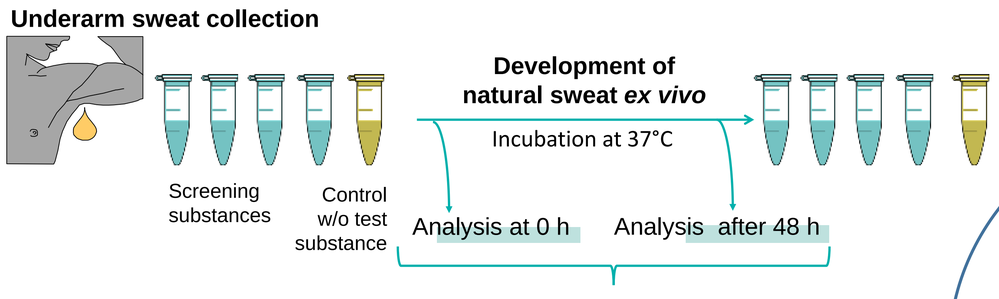
CONVENTIONAL METHODS VS. **SYMRISE INNOVATION**

- Broad approach
- Sweat reduction by blockage of the sweat glands
- Broad antimicrobials
- Strong impact on microbiome weakens the ecosystem

- **Targeted approach**
- **Focus on odor reduction**
- **Minimal impact on sweat microbiome**
- **Maintaining a robust and balanced ecosystem**

Materials & Methods:

Our *ex vivo* sweat model allows us for the first time to find ingredients reducing the malodor of natural human sweat and gives a broad view of the sweat development over 48 h. The fresh sweat from the underarm of 8 subjects is collected, pooled, and aliquoted for investigation. At the beginning and the end of the experiment the *ex vivo* sweat is analyzed on three different levels to link the odor development to the metabolite and microbiome development:



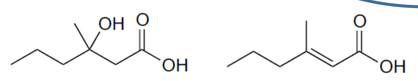
Refreshing sensory profile AND deodorant benefits

1. Evaluation of odor intensity

Odor intensity was evaluated by a sniffing panel of 8 volunteers, to evaluate the efficacy of a putative deodorant ingredient.

2. Metabolite detection by GC-MS/HPLC-MS

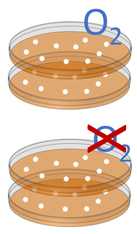
Odor formation from sweat is linked to the production of small volatile acids by microbial activity.
GC-MS analysis allowed us to get a broad view of the volatile acid composition. Additionally, we quantified the abundance of the specific compounds which are typically involved in sweat odor formation.



3-Hydroxy-3-methyl-hexanoic acid (HMHA) — *3-Methyl-2-hexenoic acid (3M2H)*

3. Microbiome profiling

Dilution series of *ex vivo* sweat was plated in duplicates and incubated at 37 °C either under aerobic or anaerobic conditions, to evaluate the development of bacteria over 48 h. After incubation the colony forming units (CFU) were determined.

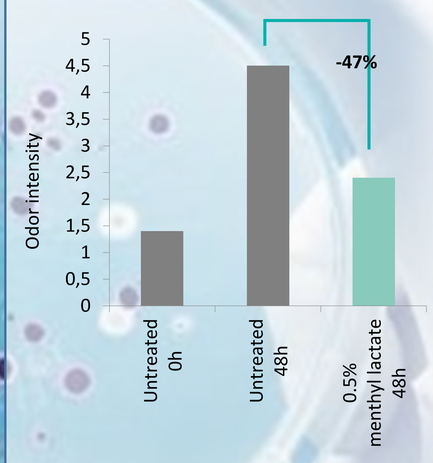


Samples were taken from the *ex vivo* model for DNA isolation and 16S rRNA gene sequencing, to reveal the composition of the sweat microbiome.

With our state of the art *ex vivo* sweat model we are able to combine an efficacy screening with a mode of action study in one experiment!

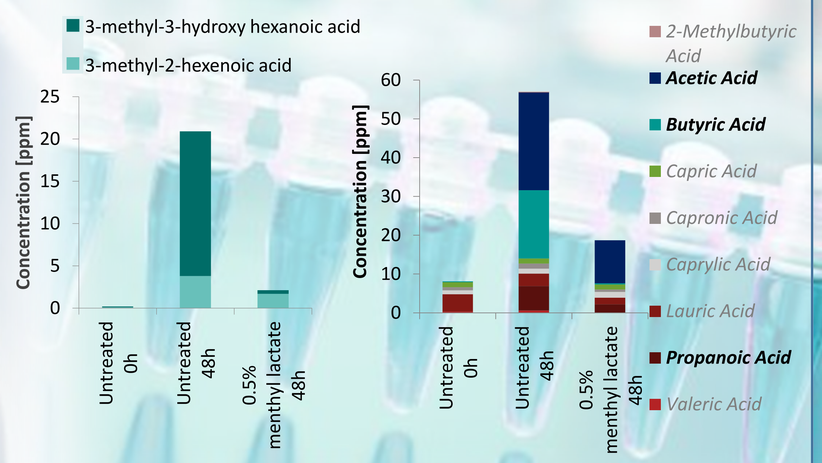
Results & Discussion:

1. Odor Evaluation



After 48 h the odor of sweat incubated with 0.5 % menthyl lactate is 47 % less intense compared to untreated sweat control.
[0 = no odor; 5 = strong odor]

2. Metabolite composition



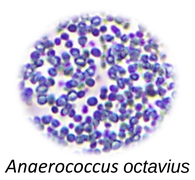
HPLC-MS analysis shows that odor related compounds are not formed when the sweat is incubated with 0.5% menthyl lactate.

GC-MS analysis shows that less volatile acids are formed in sweat incubated with 0.5 % menthyl lactate. Especially, acetic, butyric, and propanoic acid formation is reduced.

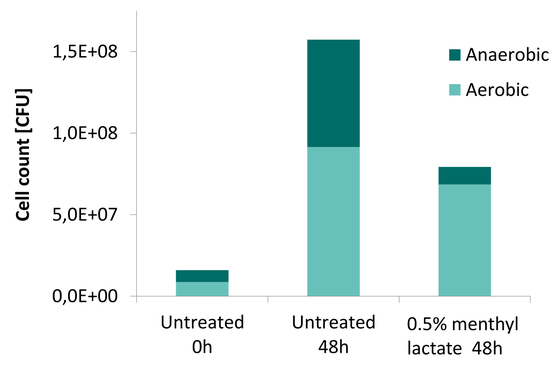
Menthyl lactate addition reduces sweat odor for up to 48 h AND results in less formation of volatile adorous acids

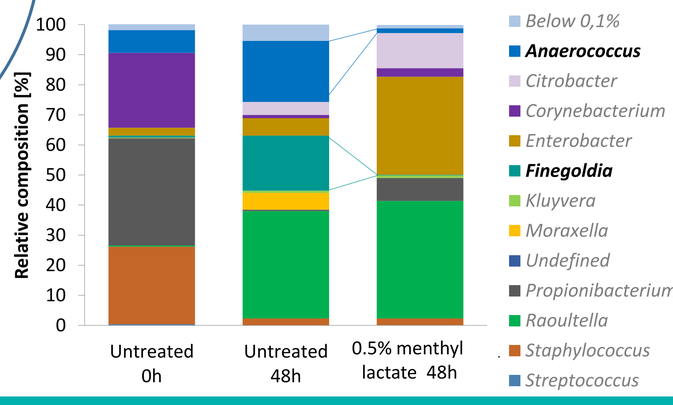
3. Sweat microbiome composition

In sweat incubated with 0.5 % menthyl lactate the number of anaerobic bacteria does not increase over time, whereas the anaerobic bacteria grow nicely in untreated sweat.



Anaerococcus octavius

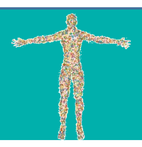




The microbiome of the sweat incubated with menthyl lactate also reveals a reduced number of anaerobic bacterial genera. The main reduced genera are *Anaerococcus and Finegoldia.*

→ Menthyl lactate prevents growth of anaerobic bacteria. Especially the genera *Anaerococcus* and *Finegoldia* are reduced in comparison to untreated sweat.

Conclusion:



MINIMAL IMPACT → MAXIMAL FRESHNESS

Menthyl lactate is mainly used as cooling agent, but it has an amazing moonlighting function. A hidden function, helping to reduce the sweat odor without disturbing our armpit and takes care of our microbiome by helping to specifically reduce bacteria relevant for odor development.

Our *ex vivo* sweat model allowed us to discover this amazing ability of menthyl lactate, which is the first of a complete new class of effective cosmetic ingredients with a refreshing sensory profile and deodorant benefits.

Acknowledgements:

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References:

- Natsch A (2015) What makes us smell: The biochemistry of body odor and the design of new deodorant ingredients, CHIMIA 69: 414-420
- James AG, Austin CJ, Cox DS, Taylor D, Calvert R. (2013) Microbiological and biochemical origins of human axillary odour. FEMS Microbiol Ecol. 83(3):527-40
- Weatherly LM, Gosse JA. (2017) Triclosan exposure, transformation, and human health effects. J Toxicol Environ Health B Crit Rev. 20(8):447-469