

# Supplementation with encapsulated vegetable and fruit juice concentrate improves microcirculation and ultrastructure in skin

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## Background

The objective of the study was to determine changes in skin parameters during the intake of an encapsulated vegetable and fruit juice concentrate. Skin hydration properties, skin barrier function (TEWL), skin thickness and density as well as microcirculation (capillary blood flow) were determined during the study.

## Methods

Skin hydration measurements were carried out with the Corneometer CM 825 and transepidermal water loss (skin barrier function) was measured with the Tewameter. Skin thickness and density was analysed by DermaScan® B ultrasound. Additionally microcirculation by means of O2C device was determined at all measuring points.

## Study Design

52 female volunteers between 40 to 65 years participated in the study as test subjects, complying with all inclusion and exclusion criteria. Test subjects were randomly assigned to either the test group or the placebo group. The study was performed as a double-blind study. All tests were performed prior to first intake of the fruit and vegetable capsules as well as after 6 weeks and after 12 weeks..

Table 1

Treatment allocation	
Group 1	26 test subjects consumed 4 capsules fruit and vegetable concentrate capsules per day
Group 2	26 test subjects consumed 4 placebo capsules per day

Measurements were at day 0, week 6 and week 12.

## Statistics

Within the treatment groups each combination of 2 time points was compared using the Wilcoxon signed-rank test. For the pre-st differences each combination of 2 groups was compared using the Wilcoxon rank sum test. Percentage changes and p-values (\*p<0.05 is considered to be statistically significant) were determined at all measuring points.

## Results

### 1. Results of the skin hydration

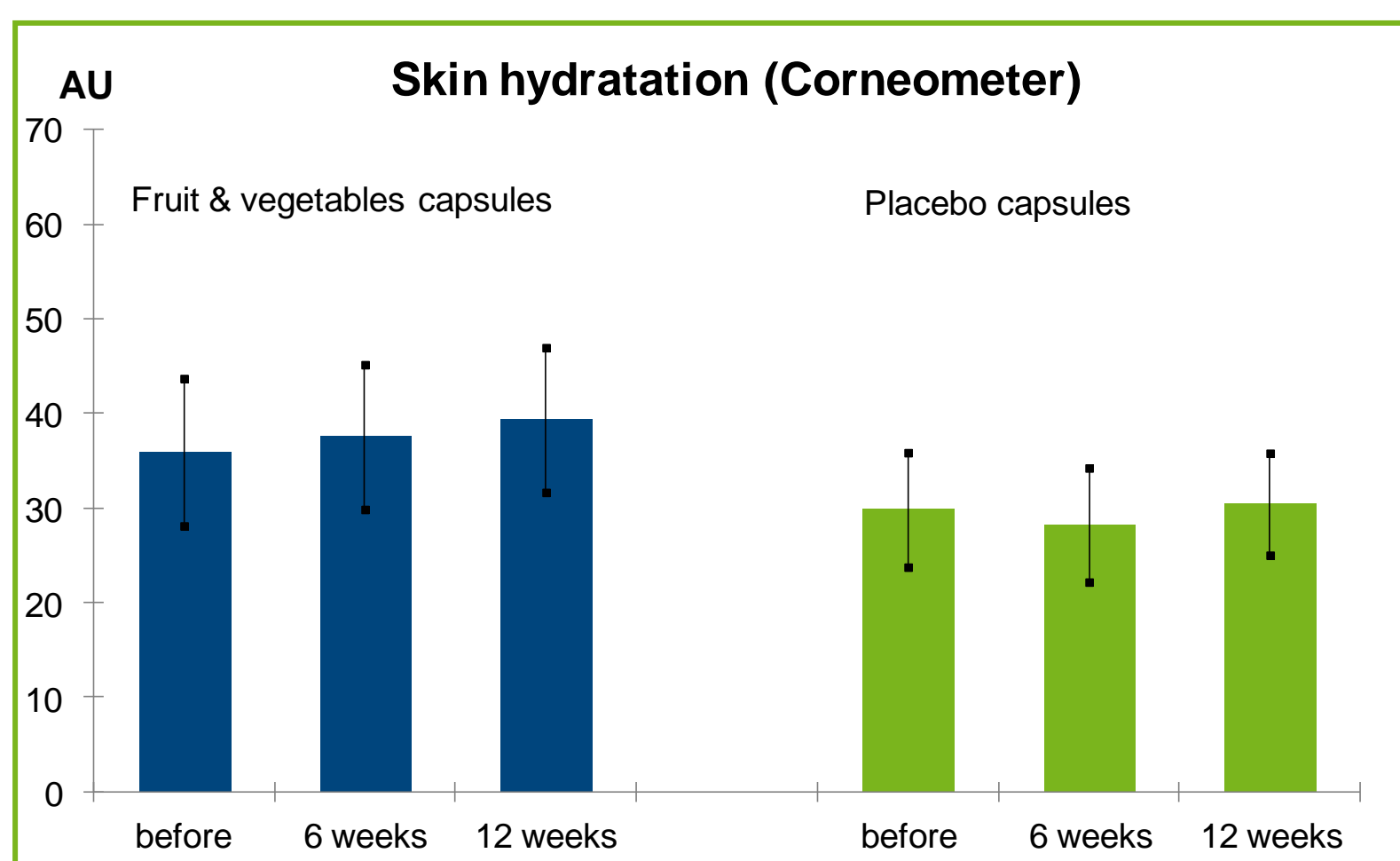


Figure 1

Table 2: Significant improvement of skin hydration by 9% after 12 weeks.

Skin hydration, Corneometer			
Fruit & Vegetables	increase	+ 9 %	p<0.05
Placebo	increase	+ 2 %	ns

Percental change of means from week 0 to week 12.



Figure 2: Measurement of skin hydration.

### 2. Increase in capillary blood flow



Figure 3: Measurement of capillary blood flow and oxygen saturation of hemoglobin at two depth.

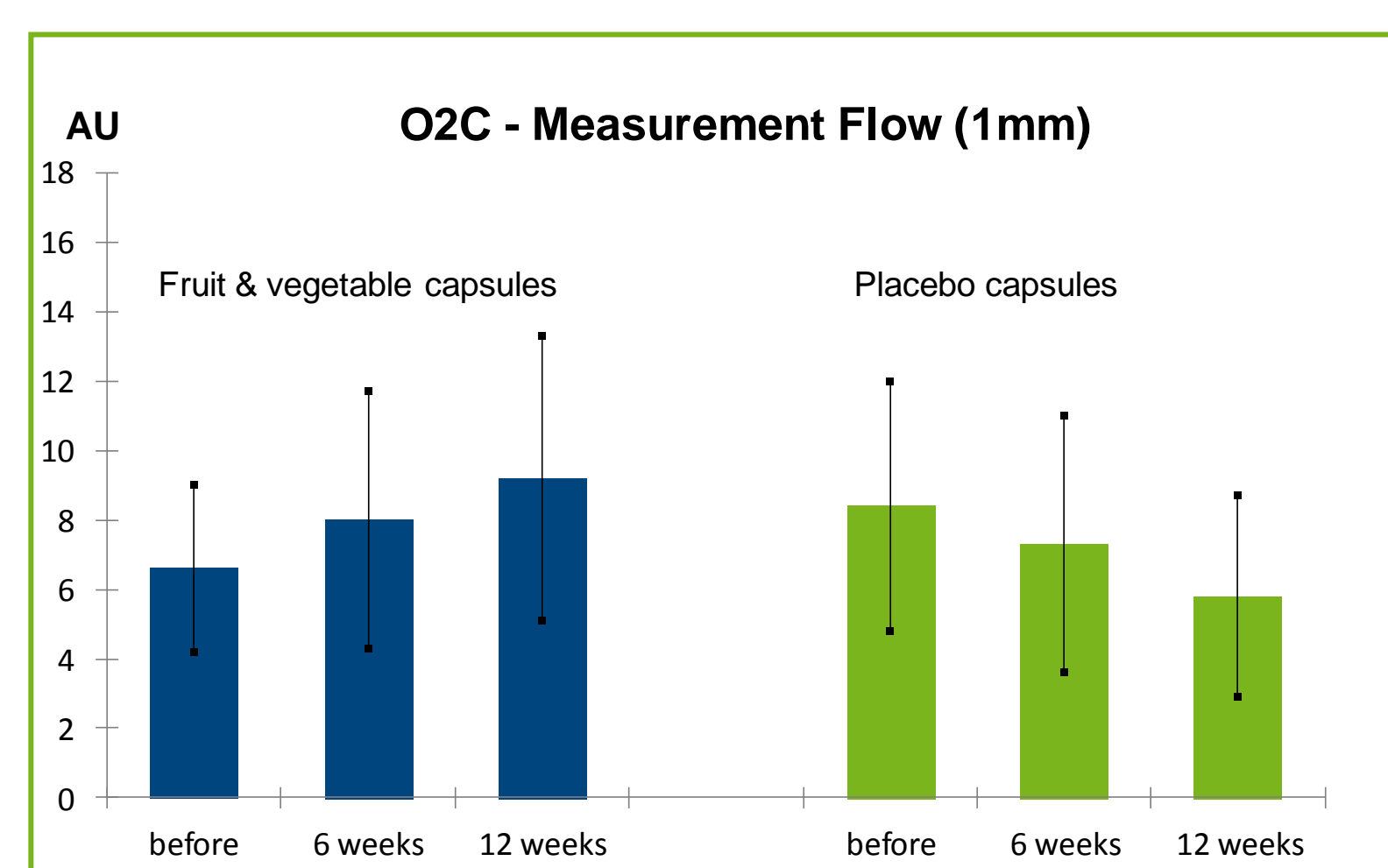


Figure 4

Table 3: Significant increase of 39% in microcirculation (capillary blood flow).

Microcirculation (capillary blood flow), O2C device		
after 12 weeks	Fruit & Vegetables	Placebo
Flow [%] 1 mm	+ 39 %*	- 31 %
Flow [%] 8 mm	+ 16 %*	- 25 %

\* Statistically significant changes (p<0.05)

### 3. Decrease in transepidermal waterloss (TEWL)

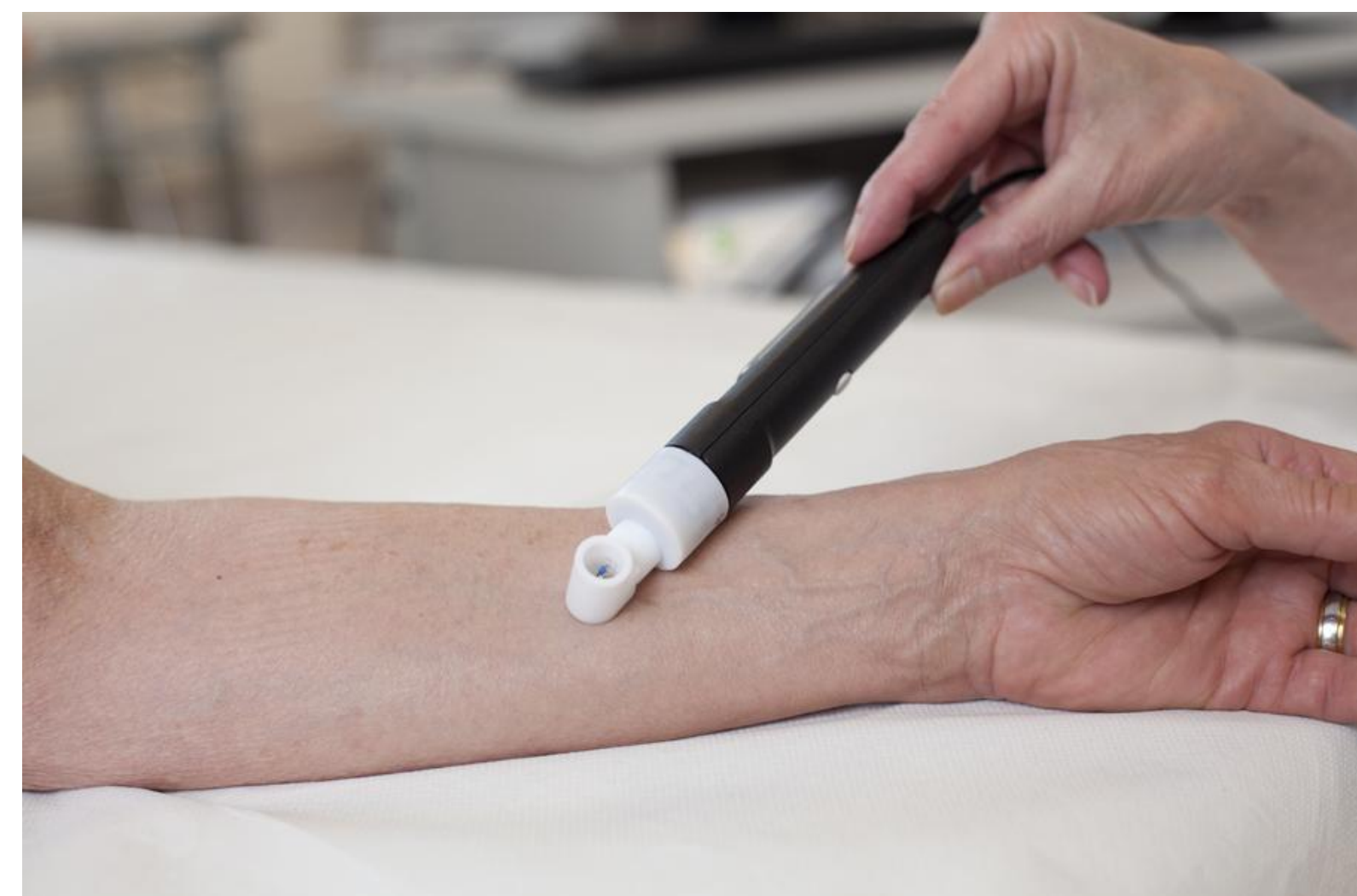


Figure 5: Measurement of skin barrier function.

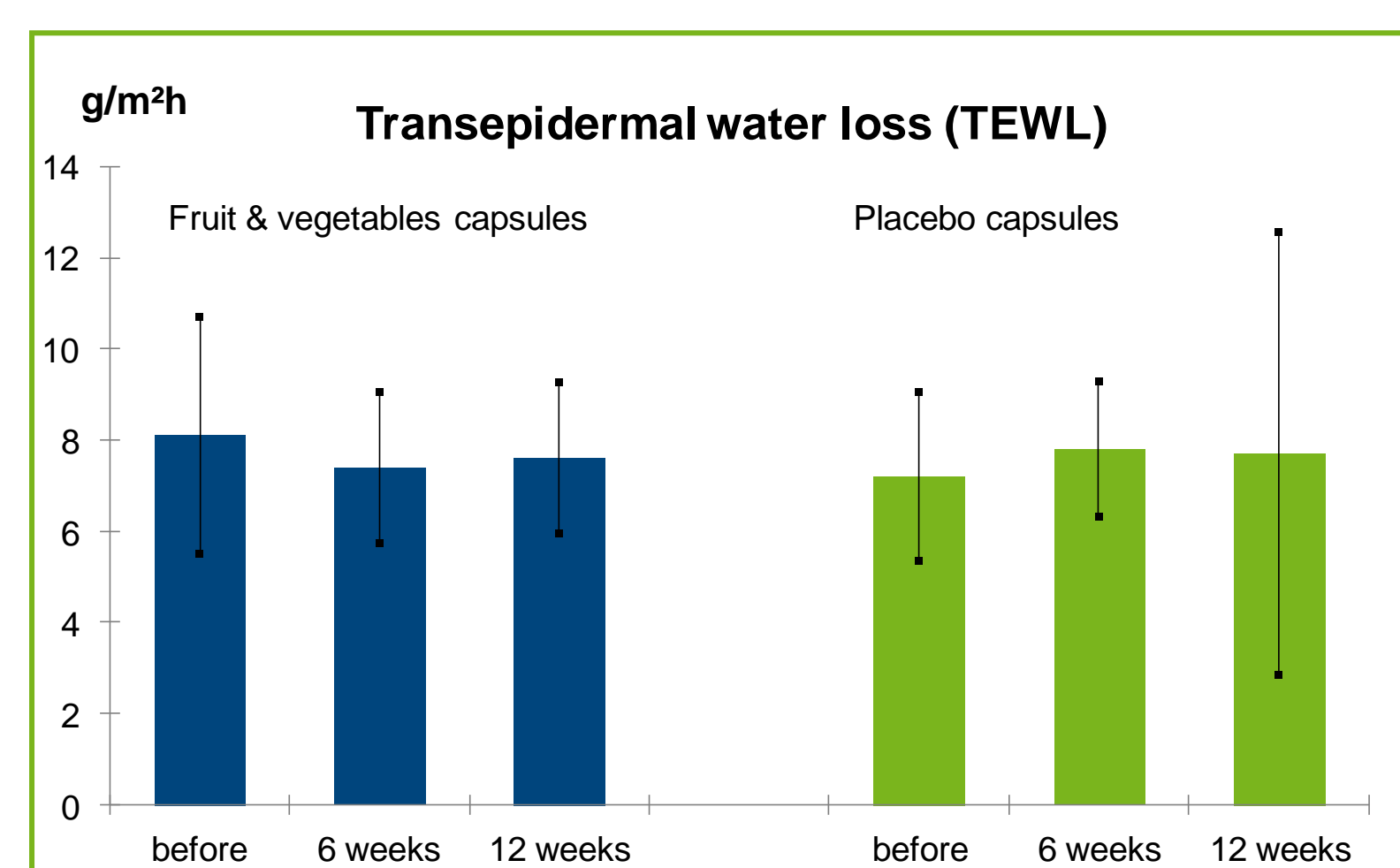


Figure 6

Table 4: Decrease in transepidermal water loss (TEWL) by 6% after 12 weeks. This correlates with an improved skin barrier function.

Transepidermal water loss (TEWL), Tewameter			
Fruit & Vegetables	decrease	- 6 %	ns
Placebo	increase	+ 7 %	ns

Percental change of means from week 0 to week 12

### 4. Skin density by means of ultrasound before and after 12 weeks of supplementation

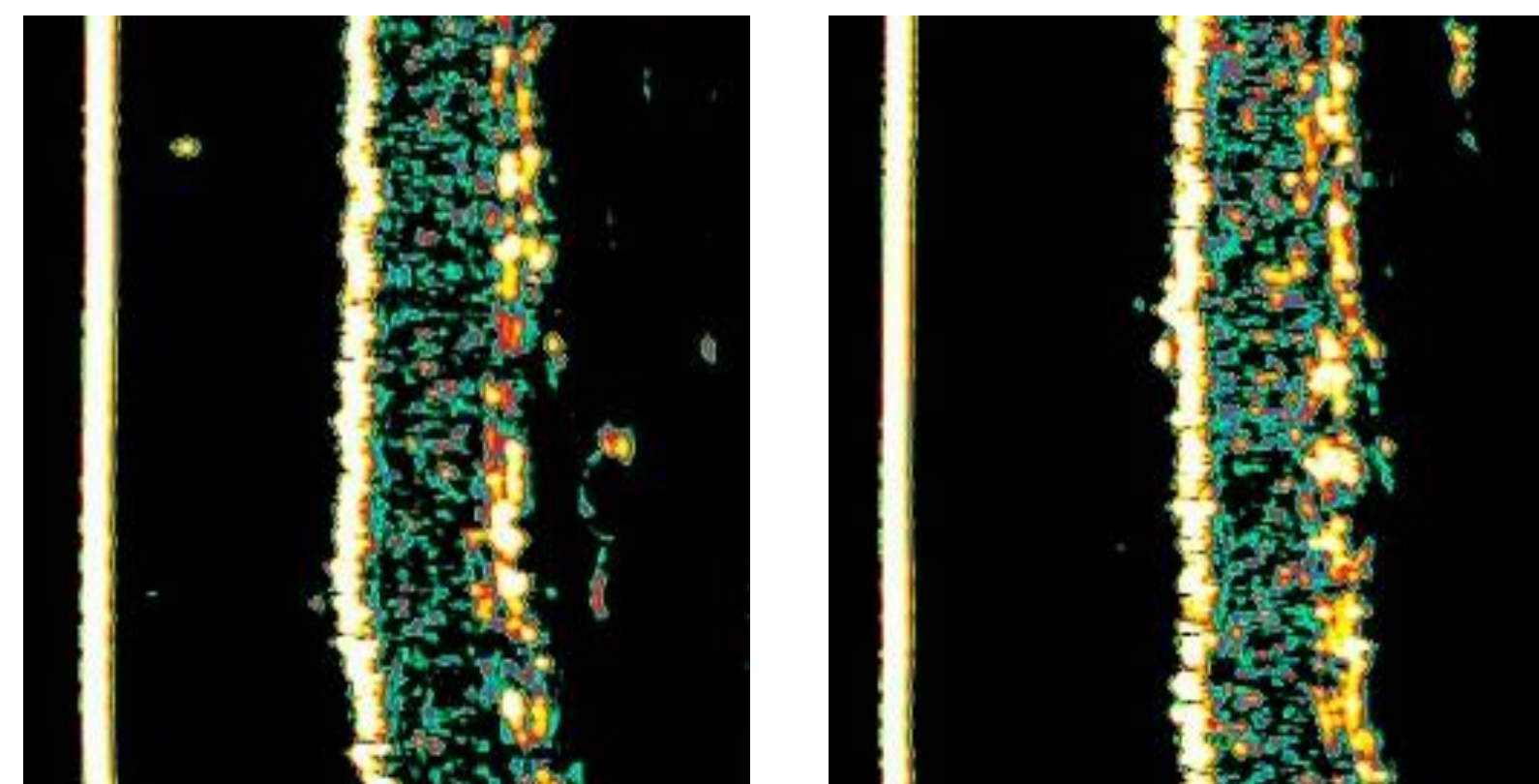


Figure 7: High frequency ultrasound images: Lighter colours correspond to a strong reflection and dark colours to a weak reflection. This way slight differences in the reflection behaviour and in tissues can be made visible by the colour representation.

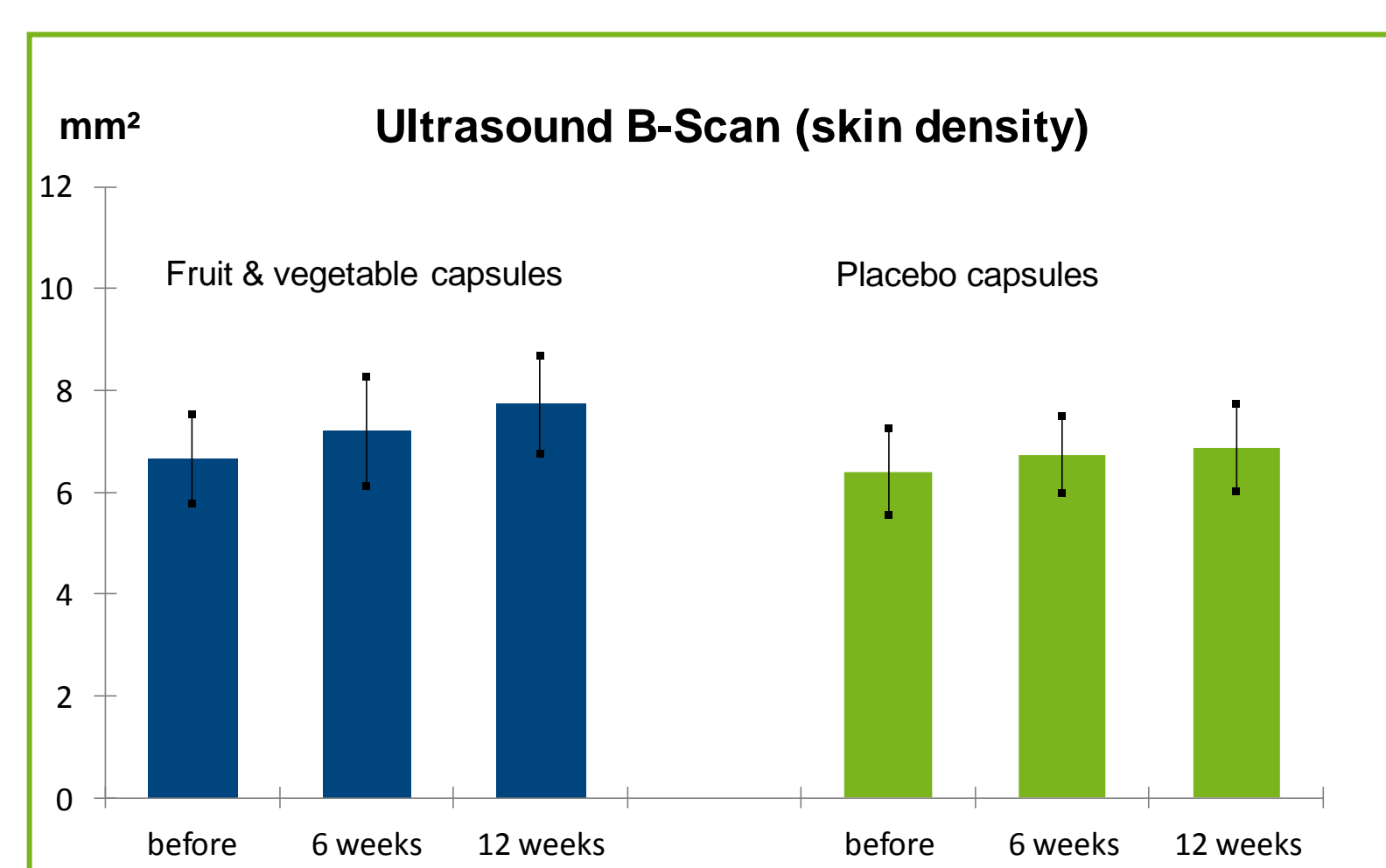


Figure 8

Table 5: Significant improvement of the skin density by 16% measured by ultrasound measurement:

Skin density (pixel density), Ultrasound B-Scan			
Fruit & Vegetables	increase	+ 16 %*	*p<0.05
Placebo	increase	+ 7 %	ns

Percental change of means from week 0 to week 12

Table 6: Significant improvement of the skin density by 6%, measured by ultrasound measurement.

Skin thickness [mm], Ultrasound B-Scan			
Fruit & Vegetables	increase	+ 6%*	*p<0.05
Placebo	increase	- 2 %	ns

Percental change of means from week 0 to week 12

## Conclusion

Classic parameters like skin hydration and skin barrier function were improved. Furthermore, ultrastructure of the skin showed anti-aging effects, too. Microcirculation (capillary blood flow) showed an improvement measured at 1 mm and 8 mm depth. The placebo group showed only minor or no positive effects over the test periods.

## References

- De Spirit S, Sies H, Tronnier H, Heinrich U (2003) An encapsulated fruit and vegetable juice concentrate increases skin microcirculation in healthy women. *Skin Pharmacol Physiol* 25: 2-8.
- Heinrich U (2011) Supplementation with Nutraceuticals improves skin health. *7th Annual Conference of the European Nutraceutical Association (ENA)* 58: 49-58.

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