



# Summary of human studies on ProDen PlaqueOff®

SDC Swedencare AB, 18th December 2014



## Human studies on ProDen PlaqueOff<sup>®</sup>

### Initial studies - open pilot studies

- Can a seaweed preparation applied perorally improve periodontal status? A clinical pilot study. Marina Nordlund, Dental Clinic, Kungsholmen, Stockholm, Sweden.
- Removing dental calculus using a pill (2 month study). Berth Mattsson and Sune Wikner, Umeå Sweden.

### Placebo controlled study

- Effect of ProDen PlaqueOff<sup>®</sup> and oral hygiene on PLI/plaque. S. Wikner, Dental clinic Umeå.

### Controlled randomized cross-over designed study

- The effect of daily *Ascophyllum nodosum* algae (ProDen PlaqueOff<sup>®</sup>) intake on calculus, plaque and gingival health in human adults. Jan van Dijken, Umeå University, Umeå, Sweden.

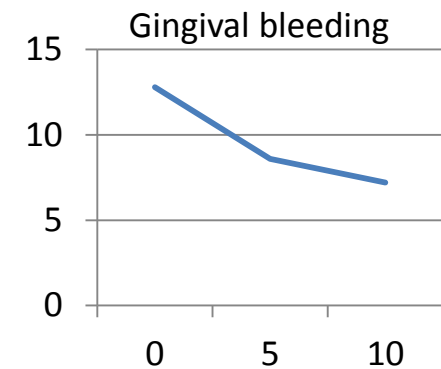
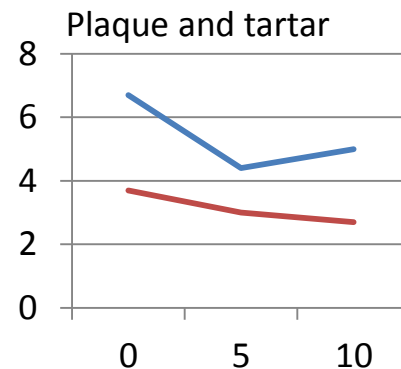
### Double blind, randomised, placebo controlled study

- The systemic effect of a food supplement on dental plaque and calculus. Sune Wikner, Christina Timander and Jan Bergström. Swedencare Umeå, Private Dental Practice Stockholm, and Institute of Odontology, Karolinska Institutet, Huddinge, Sweden.

## Can a seaweed preparation applied perorally improve periodontal status? A clinical pilot study. M. Nordlund, Stockholm, Sweden.

- Aim: To study the effect of the seaweed PlaqueOff on plaque, tartar and gingival bleeding, and thus on periodontal status.
- Type of study: Open pilot intervention study.
- Endpoints: Plaque, tartar, gingival bleeding.
- Responsible: Dentist Marina Nordlund.
- Place: M. Nordlund Dental Clinic, Kungsholmen, Stockholm, Sweden.
- Time: 2004.
- Participants: 22 humans (15 men and 7 women), selected randomly at the clinic. Average age 47, interval 26-91 years.
- Duration: 10 weeks.
- Product: ProDen PlaqueOff® tablets.
- Dosage: 2 tablets per day for 10 weeks.
- Analytical methods: Recording of plaque, tartar and gingival bleeding in selected parts of the teeth at the beginning and after 5 and 10 weeks. The quantity of plaque and tartar was graded 0-3. No tartar or plaque was graded as 0, if >2/3 of the gingival area was coated a grade 3 was given. Bleeding was recorded after use of a probe in gingival pockets (the method is internationally established). Statistics: Wilcoxon's one-sample test.
- Instructions to participants: Continue ordinary dental care regime.

- **Results: The results show that plaque, tartar and gingival bleeding are reduced perceptibly after taking the seaweed for 10 weeks. All positive changes are statistically assured ( $P < 0,01$ ). The main effect was seen during the first 5 weeks of supplementation.**





# Removing dental calculus using a pill. **ProDen** **PlaqueOff**<sup>®</sup>

**B. Mattsson and S. Wikner, Umeå  
Sweden.**

- Aim: To investigate if daily swallowing of a tablet with *Ascophyllum nodosum* (ProDen PlaqueOff<sup>®</sup>) influences dental plaque and calculus.
- Type of study: Open study.
- Endpoints: Plaque and calculus.
- Responsible: Dentists Berth Mattsson and Sune Wikner.
- Place: Dental practice, Umeå, Sweden.
- Participants: 30 adult calculus formers with calculus present at baseline.
- Duration: 2 month.
- Product: ProDen PlaqueOff<sup>®</sup> tablets.
- Dosage: 2 tablets per day for 2 month. Participants with calculus left after 10 weeks were asked to double the dosage for another 8 weeks.
- Analytical methods: The amount of supragingival calculus and plaque on teeth 26, 31 and 11 (Green & Wermillion index) was recorded at baseline and after 2 month by a dentist. Results were recorded as plaque (PLA) and calculus index (CAI).
- Patent: The result is the basis for two patent by SDC Swedencare

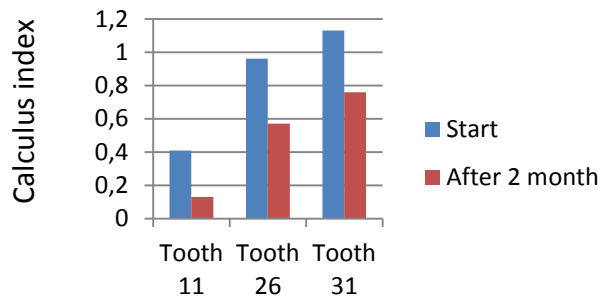


# Removing dental calculus using a pill.

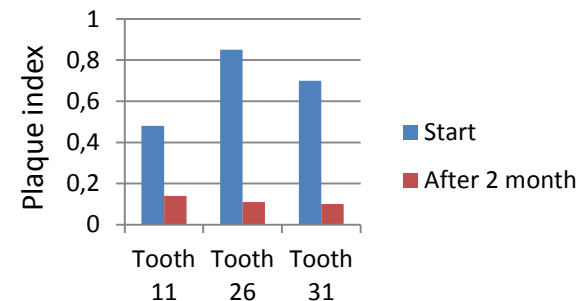
B. Mattsson and S. Wikner, Umeå  
Sweden.

**Results:** The extension of both plaque and calculus was strongly and significantly reduced on all examined teeth. In 16 persons calculus disappeared or the extension was reduced. In 12 persons only a little reduction was observed but the calculus was very soft and easy to remove. Mean reduction of calculus was 46% an plaque was 81%. For the persons that continued the study with a double dose for 8 weeks calculus was reduced.

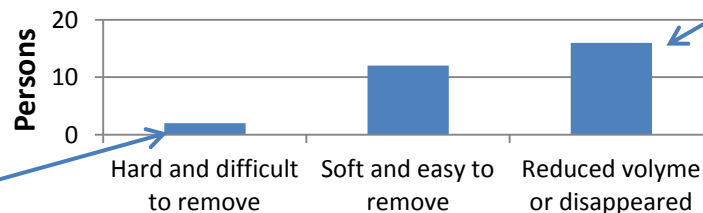
Calculus at baseline and after 2 month treatment.  $P < 0,01$



Plaque at baseline and after 2 month treatment.  $P < 0,001$



Quality of dental calculus after 2 month consumption of ProDen Plaque Off®



Also in these persons calculus disappeared when dosage was increased

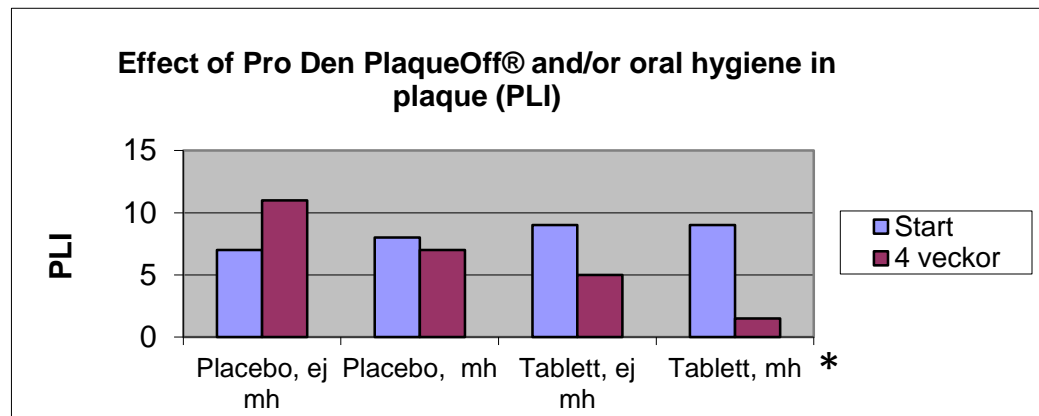
In >50% of the participants the calculus disappeared completely

## Effect of ProDen PlaqueOff® and oral hygiene on PLI/plaque. S. Wikner Dental Clinic Umeå

- Aim: To study the effect of the seaweed PlaqueOff and oral hygiene on PLI/plaque.
- Type of study: Placebo controlled study.
- Endpoints: PLI/Plaque.
- Responsible: Dentist Sune Wikner.
- Place: Sune Wikner Dental Clinic, Umeå, Sweden.
- Time: 1970.
- Participants: In total 143 persons, divided into four groups: Placebo and no oral hygiene 20 persons, placebo and oral hygiene 53 persons, active and no oral hygiene 20 persons, active and oral hygiene 50 persons.
- Duration: 4 weeks.
- Products: Active product ProDen PlaqueOff® tablets, containing 500 mg alga per tablet. Placebo tablets.
- Dosage: 4 tablets per day for 4 weeks.
- Analytical methods: Plaque (PLI) was measured before the start and after four weeks intervention.
- Instructions to participants: The participants with no oral hygiene stopped with teeth brushing and the other group continued their usual teeth brushing.

- **Results: In the placebo group PLI increased 57% in the group without teeth brushing and in the group with brushing PLI was nearly stable. In the active group without brushing PLI was reduced 44% and in the group with brushing it was reduced with 83%.**

\* Ej mh= no oral hygiene, Mh= oral hygiene



# The effect of daily *Ascophyllum nodosum* algae (ProDen PlaqueOff®) intake on calculus, plaque and gingival health in human adults.

J. van Dijken, S. Koistinen Umeå Univ., Sweden, P. Ramberg Sahlgrenska Univ. of Gothenburg, Sweden

Aim: To determine the effectiveness of the alga on calculus and plaque formation and on gingival health.

Type of study: Controlled randomized cross-over designed study

Endpoints: Calculus, plaque, gingival and bleeding on probing index.

Responsible: Professor Jan van Dijken.

Place: Umeå University, Umeå, Sweden.

Time: 2012-2013.

Participants: 61 adult persons of which 55 continued.

Duration: 6 month.

Product: Active product ProDen PlaqueOff® capsules, control products calcium phosphate tablets.

Dosage: 2 capsules/tablets per day .

Analytical methods:

- Supragingival calculus: scored at the lingual surfaces of the six anterior mandibular teeth with Volpe-Manhold index (V-M)
- Gingival index: according to Löe and Sillness on a 0-3 scale (L&S).
- Bleeding on Probing index: according to Ainamo and Bay (BoP)
- Plaque index: Quigley-Hein plaque index on a 0-5 scale (Q-H).
- L&S, BoP and Q-H index: were scored on distal surfaces of teeth 16, 14, 11, 31, 34 and 36.
- Statistics: Student paired t-test.

Instructions to participants: Continue ordinary dental care regime.



## The effect of daily *Ascophyllum nodosum* algae (ProDen PlaqueOff®) intake on calculus, plaque and gingival health in human adults.

	Intake group	Mean	SD	P
Calculus index (mm) Volpe-Manhold	Alga	0.50	0.45	<0.0001
	Control	0.95	0.54	
		Medium	Range	
Gingival index Löe and Sillness	Alga	0	0-2	0.13
	Control	1	0-2	
Gingival bleeding Ainamo & Bay	Alga	0	0-1	0.024
	Control	1	0-1	
Plaque index Ouigley-Hein	Alga	1	0-4	0.008
	Control	2	0-4	

### Results/Conclusions:

- compared to the control -

- A highly significant reduction of supragingival calculus was seen in the active group.
- Significantly less bleeding on probing was registered after intake of the active product.
- Significantly less plaque was scored after intake of the active product.
- The alga intake had a systemic effect on oral health.
  
- In the active group 52 out of 55 participants showed a lower calculus formation.
- The mean calculus score/site was reduced by 52% in the active group.

Publication: "A randomized controlled clinical study of the effect of daily intake of *A. nodosum* alga on calculus, plaque and gingivitis." J. van Dijken et al. Accepted for publication in *Clinical oral investigations* 2014





**The systemic effect of a food supplement on dental plaque and calculus. S. Wikner, C. Timander and J. Bergström. Institute of Odontology, Karolinska Institutet, Sweden**

**ProDen** **PlaqueOff**<sup>®</sup>

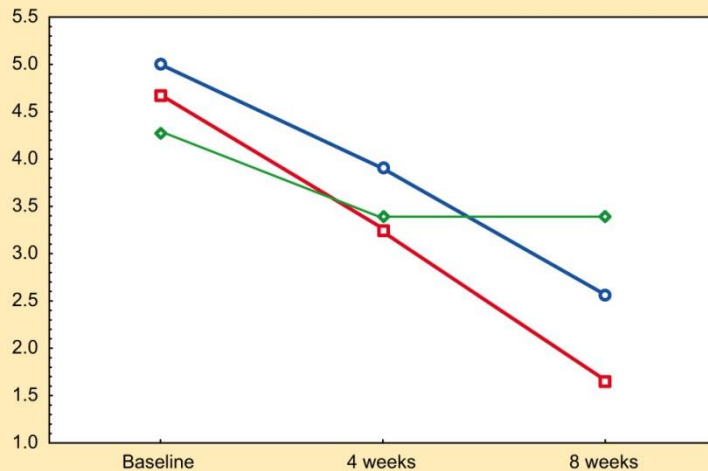
- Aim: To explore the effect of tablets with *Ascophyllum nodosum* on supragingival plaque and calculus.
- Type of study: Double blind, randomised, placebo controlled study.
- Endpoints: Plaque and calculus.
- Responsible: S. Wikner, C. Timander and J. Bergström.
- Place: Karolinska Institutet, Huddinge and private practice Stockholm, Sweden.
- Participants: 105 persons were included and divided in three intervention groups: Placebo, low dose, high dose. 89 persons completed the study (47 women and 42 men, mean age 45 years, interval 23-68 years).
- Duration: Eight weeks.
- Product: Active product i.e. tablets containing low (125 mg) or high (250 mg) dose of the alga and control product i.e. placebo tablets. All tablets were wax coated to minimise perioral adsorption.
- Dosage: Two tablets per day for four weeks and thereafter 3 tablets per day for another 4 weeks.
- Analytical methods: The amount of supragingival calculus and plaque on teeth 26, 31 and 11 using Green & Vermillion Oral Health Index Short Form was recorded at baseline, after 4 weeks and after 8 weeks. Results were recorded as plaque (PLA) and calculus index (CAI). Statistics: Difference between groups were tested by means of 1-factor ANOVA and comparison over time by repeated measures ANOVA.
- Instructions to participants: Continue ordinary dental care regime.



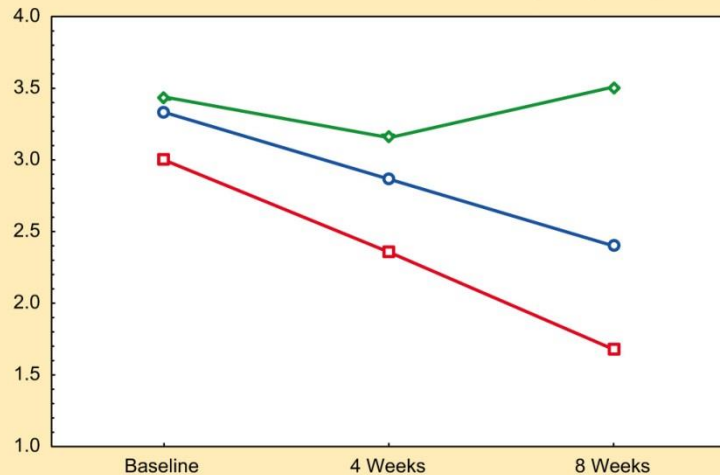
# The systemic effect of a food supplement on dental plaque and calculus. S. Wikner, C. Timander and J. Bergström. Institute of Odontology, Karolinska Institutet, Sweden

- **Results:** Significant reduction on plaque levels compared to control were observed after eight weeks in both the low and high dose algal groups with a reduction of 49% and 66%, respectively. Significant reduction in supragingival calculus levels were observed after four weeks and improving after eight weeks. The effects appears to be dose dependent.
- **Conclusion:** A food supplement containing the brown alga *Ascophyllum nodosum* reduces the amount of supragingival plaque and calculus in humans.

Plaque Change over Time 2-way interaction  $F(4,170)=3.98; p<.0041$



Change in Calculus over Time 2-way interaction  $F(4,170)=3.36; p<.0112$



—○— LA = 250 mg/day w1-4, 375 mg/day w5-8.

—□— HA = 500 mg/day w1-4, 750 mg/day w5-8.

—◇— PLACEBO



## The systemic effect of a food supplement on mutans Streptococci. S. Wikner, C. Timander and J. Bergström. Institute of Odontology, Karolinska Institutet, Sweden.

- Aim: To explore the effect of tablets with *Ascophyllum nodosum* mutans streptococci.
  - Type of study: Double blind, randomised, placebo controlled study.
  - Endpoints: Mutans streptococci.
  - Responsible: S. Wikner, C. Timander and J. Bergström.
  - Place: Karolinska Institutet, Huddinge, Sweden.
  - Participants: 105 persons were included and divided in three intervention groups: Placebo, low dose, high dose. 89 persons completed the study (47 women and 42 men, mean age 45 years, interval 23-68 years).
  - Duration: Eight weeks.
  - Product: Active product i.e. tablets containing low (125 mg) or high (250 mg) dose of the alga and control product i.e. placebo tablets. All tablets were wax coated to minimise perioral adsorption.
  - Dosage: Two tablets per day for four weeks and thereafter 3 tablets per day for another 4 weeks.
  - Analytical methods: *S. mutans* was analysed in saliva at baseline and after 8 weeks with “the strip mutans method”. The scores for presence of *S. mutans* was divided into 0, 1, 2, and 3 where score 0 had very low levels of *S. mutans* and score 3 had very high levels of *S. mutans*. Statistical method chi square.
  - Instructions to participants: Continue ordinary dental care regime.
- Results: The number of *S. mutans* did not change with time in the placebo group. In the low dose group the number of participants with the highest *S. mutans* score, dropped from 18 to 11, and in the high dose group from 13 to 6. The drop was significant in both active groups. In the placebo group the number with high *S. mutans* score was 8 at start and 10 after eight weeks.**



## Magnitude of effect on calculus

Studie	Participants	Dose mg	ProDen PlaqueOff®	Placebo	Effect of ProDen PlaqueOff® compared to placebo. Reduced calculus %
			Difference from start %	Difference from start %	
Nordlund	22	500	-26,5	*	*
Mattson & Wikner	30	500	-41,0	*	*
Wikner, Timander & Bergström	89	250	-27,3	+3,2	29.9
Wikner, Timander & Bergström	89	500	-43,4	+3,2	54,0
Van Dijken	89	500	nd	nd	47

\*No placebo product used  
nd=not determined



## Magnitude of effect on plaque and bleeding on probing (B on P)

Studie	Participants	Dose mg	ProDen PlaqueOff <sup>®</sup>	Placebo	Effect of ProDen PlaqueOff <sup>®</sup> compared to placebo. Reduced plaque %
			Difference from start %	Difference from start %	
Nordlund	22	500	-27,0	*	*
Mattson & Wikner	30	500	-82,4	*	*
Wikner, Timander & Bergström	89	250	-50,0	-20,9	34,4
Wikner, Timander & Bergström	89	500	-63,8	-20,9	46,7

\*No placebo product used

Studie	Participants	Dose mg	ProDen PlaqueOff <sup>®</sup>
			Difference from start (B on P) %
Nordlund	22	500	-42,5



## Conclusions from human studies on ProDen PlaqueOff®

Conclusion:  
All studies showed a consistent and significant reducing effect on calculus, plaque and gingivitis of ProDen PlaqueOff® compared to a control and/or after treatment compared to baseline. A dose-response effect was indicated.

### Initial studies - open pilot studies

- M. Nordlund: 22 participants. Statistical significant reduced effect on plaque, tartar and gingival bleeding after 10 weeks. Main effect was seen after the first 5 weeks of supplementation.
- B. Mattsson & S Wikner: 30 participants. Extension of plaque and calculus was strongly and significantly reduced after 2 month, with 46 and 81% reduction, respectively.

### Placebo controlled study

- S. Wikner: 143 participants. In the placebo group plaque increased 57% in the subgroup without teeth brushing and in the subgroup with brushing plaque was nearly stable. In the active group without brushing, plaque was reduced 44% and in the subgroup with brushing it was reduced with 83%.

### Controlled randomized cross-over designed study

- J van Dijken: 61 participants. A highly significant reduction of supragingival calculus, significant less bleeding on probing and plaque was seen in the active group compared to the control. 52 out of 55 participants showed a lower calculus formation in the active group with a mean calculus reduction score/site of 52%.

### Double blind, randomised, placebo controlled study. Dose response

- S. Wikner, C. Timander and J. Bergström: 105 participants. Significant reduction on plaque levels compared to control were observed after eight weeks in both low and high dose algal groups with 49% and 66% reduction, respectively. Significant reduction in supragingival calculus levels were observed after four weeks and improving after eight weeks. The effect appears to be dose dependent. Significant drop of *S. mutans* in active groups