



“Per-Patient” Analysis of the 2009 Published UF Clinical Study

19 February, 2013

A 2009 published human clinical study evaluated the effect of 4 weeks daily usage of 10^8 CFU ProBiora3® oral probiotic on the reduction in levels of key pathogenic micro-organisms in the oral cavity¹. The original analysis was completed using group mean values, and large decreases and encouraging trends were found. Some of the finding of the original study included:

- An average decrease in the levels of *S. mutans* by six folds within a month of use, reducing the risk from moderate to low according to the CAMBRA index for this group of test subjects
- An average of >300 fold decrease in the levels of *Campylobacter rectus* within a month of use
- An average of >100 fold decrease in the levels of *Porphyromonas gingivalis* within a month of use

However, due to the small sample population (n=19) and typical log variability in biological bacterial counts, these observed decreases were not statistically-significant when using the sample mean statistics.

To more clearly demonstrate the beneficial effect of ProBiora3® use, the data generated in this study was recently reanalyzed by an independent biostatistician on a “per-patient” basis using each patient’s four week baseline values (bacterial counts before taking ProBiora3®) as the negative control to the end of study bacterial counts (after taking 4 weeks of 10^8 CFU ProBiora3®). This type of analysis copes with problems associated with large patient-to-patient variability, as was originally observed. This analysis included all subjects that were carriers for the bacterial species of interest (i.e. counts present at either the baseline or the end of the study). Notable results of this analysis are listed below (Handfield et al., submitted for publication). (p-values are for testing the null hypothesis

$H_0: \pi=50\%$):

- 84% of population saw a decrease in the levels of *S. mutans* (16/19 $p=0.0029$) within a month of use
- 100% of population saw a decrease in the levels of *Campylobacter rectus* (19/19 $p<0.001$) within a month of use
- 71% of carriers saw a decrease in the levels of *Porphyromonas gingivalis* (10/14 $p=0.1088$) within a month of use

Microbe	Decrease Response ²	Lower Confidence Interval for Decrease (%)	Upper Confidence Interval for Decrease (%)
<i>A. actinomycetemcomitans</i>	2/ 2 (100%)	15.81	100.00
<i>C. Rectus</i>	19/19 (100%)	82.35	100.00
<i>P. Gingivalis</i>	10/14 (71.4%)	41.90	91.61
<i>P. Intermedia</i>	8/19 (42.1%)	20.25	66.50
<i>S. Mutans</i>	16/19 (84.2%)	60.42	96.62
<i>T.forsythia</i>	1/1 (100%)	2.50	100

¹ *Journal of Applied Microbiology*, 2009; 107: 682-690.

² number of patients responding over the total number of patients that were colonized (and percentage)