

## Statistical Analysis

### Comparison of PSA Levels: Before and After Treatment with Peenuts®

The following study was conducted at The Prostate Center, Sarasota, Florida by Dr. Ronald Evan Wheeler. The purpose of the study was to test for a significant difference in the PSA (Prostate Specific Antigen) levels of twenty prostate cancer patients treated with the herbal formula Peenuts®. The age range of the patients was 43 years old to 72 years old. These patients were studied over a variable period from 5 months to 64 months. The study took place from April 1999 to September 2004.

#### Data:

Patient	Age	PSA at Diagnosis (ng/ml)	Months	PSA at Follow-Up (ng/ml)
1	61	8.5	64	2.9
2	68	7	60	2.8
3	43	4.7	30	2.1
4	65	11.7	38	7.6
5	64	2.9	60	1.5
6	55	2.1	34	3.0
7	56	7.3	33	4.2
8	70	6.9	19	5.1
9	68	5.8	31	4.9
10	56	9.1	47	4.9
11	61	3	24	0.8
12	48	3.2	13	2.2
13	69	6.2	10	3.2
14	56	4.4	24	1.9
15	74	11.4	28	10.9
16	63	6.8	33	1.9
17	71	6.6	12	4.7
18	64	14.4	14	1.9
19	70	8.4	5	3.0
20	72	4.4	11	5.0
<b>Totals</b>	<b>1254</b>	<b>134.8</b>	<b>590</b>	<b>74.5</b>
<b>Mean</b>	<b>62.7</b>	<b>6.74</b>	<b>29.5</b>	<b>3.73</b>

ng/ml = nanograms per milliliter

### Descriptive Statistics:

<i>PSA at Diagnosis <math>\emptyset_0</math></i>		<i>PSA at Follow-Up <math>\emptyset</math></i>	
Mean	6.74	Mean	3.725
Standard Error	0.718052923	Standard Error	0.526351644
Median	6.7	Median	3
Mode	4.4	Mode	1.9
Standard Deviation	3.211230294	Standard Deviation	2.35391611
Sample Variance	10.312	Sample Variance	5.540921053
Kurtosis	0.319273095	Kurtosis	3.59465374
Skewness	0.720065776	Skewness	1.668528589
Range	12.3	Range	10.1
Minimum	2.1	Minimum	0.8
Maximum	14.4	Maximum	10.9
Sum	134.8	Sum	74.5
Count	20	Count	20

The null hypothesis:  $H_0$  that  $\emptyset = \emptyset_0$

The alternative hypothesis:  $H_1$  that  $\emptyset < \emptyset_0$

Level of significance:  $\alpha = 0.05$

Test statistic: T test

t-Test: Two-Sample Assuming Unequal Variances

	<i>PSA at Diagnosis</i>	<i>PSA at Follow-up</i>
Mean	6.74	3.725
Variance	10.312	5.540921053
Observations	20	20
Hypothesized Mean Difference	0	
df	35	
t Stat	3.386473378	
P(T ≤ t) one-tail	0.000880968	
t Critical one-tail	1.689572855	
P(T ≤ t) two-tail	0.001761936	
t Critical two-tail	2.030110409	

## SUMMARY

Statistical evaluation for the change in Prostate Specific Antigen, PSA levels was significant using the t-Test. The decision is to reject the null hypothesis that there was no change in PSA levels. There was a significant decrease in the PSA levels (ng/ml) of the patients after treatment with the herbal formula Peenuts®. The P value for  $P(T \leq t)$  one-tailed T test is 0.000880968. The dosage of the herbal formula Peenuts was two capsules daily.

There are twenty subjects in the study. Two subjects, Patient Number 6 and Patient Number 20 had slight increases in their PSA levels. The other eighteen patients all had decreased PSA levels. Therefore 90% of the patients treated with the formula had decreased PSA levels.

Patient Number 18 had the largest decrease from PSA 14.4 ng/ml at diagnosis to PSA 1.9 ng/ml at follow-up after 14 months. Considering this subject to be an outlier, we re-evaluated the data using 19 patients. The results are as follows:

t-Test: Two-Sample Assuming Unequal Variances

	<i>PSA at Diagnosis</i>	<i>PSA at Follow-Up</i>
Mean	6.33684211	3.821053
Variance	7.45356725	5.653977
Observations	19	19
Hypothesized Mean Difference	0	
df	35	
t Stat	3.02893837	
$P(T \leq t)$ one-tail	0.00229453	
t Critical one-tail	1.68957285	
$P(T \leq t)$ two-tail	0.00458906	
t Critical two-tail	2.03011041	

At the significance level of  $\alpha = 0.05$ : the P one-tailed test ( $T \leq t$ ) is 0.00229453. Thus, there is a significant decrease in the PSA level with these 19 subjects.

Statistical evaluation of the herbal formula Peenuts® has a significant effect in reducing PSA levels in this subject group. Prostate Specific Antigen is a common measure in the prediction of Prostate Cancer. The herbal formula Peenuts® can help to lower PSA levels in most subjects. Treatment with the standard dosage of two capsules of Peenuts® daily may also be used as preventive nutrient in an effort to alter the natural history of Prostate Cancer in future studies.

Microsoft Excel Data Analysis Tools were used in the statistical calculations.