

# “Effects of a New Ergothioneine / Vitamin D Supplement on Kidney Health and Quality of Life”

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## Summary

Ergo4Health™/Kidney (1), a proprietary natural formulation of mushrooms containing both L-ergothioneine and Vitamin D2 (2), has been clinically tested at two sites in participants with kidney dysfunction. The objective of the study was to measure the ability of Ergo4Health/Kidney to help maintain kidney health as measured by three well established biomarkers for kidney health (3): BUN (blood urea nitrogen), eGFR (estimated glomerular filtration rate) and creatinine over a one-year period. In addition to kidney function biomarker tests, participants at both clinical sites were administered a Kidney Quality of Life (KDQOL) survey (4) at 3 months. This paper includes interim data from the 3- and 6-month measurement points. The study is ongoing.

The clinical study was conducted at two sites: Bonaire, BES, and Medellin, Colombia. These sites were selected for this study based on their experience measuring kidney health. This is a one year clinical study, conducted by Physicians (Examiners). The participants were pre-enrolled and monitored to confirm that they exhibited mild to moderate kidney dysfunction and no significant co-morbidities – cancer, COPD, cirrhosis, heart failure, etc. A pre-enrollment baseline was established by following the participants for 3-4 months. The treatment period (1 year) was conducted by enrolling 60 participants who received 2 capsules of Ergo4Health/Kidney twice daily with measurements at baseline, 3, 6, 9 and 12 months. The 3- and 6-month data are summarized in Table 1 and Table 2. Kidney Health Quality of Life measurements were also obtained.

The conclusion at the 6-month interval, and supported by 3-month data, is that Ergo4Health/Kidney helps maintain kidney health in a population that has measurable kidney dysfunction.

## Background

While L-ergothioneine was discovered over a century ago (1909) (5), only recently (19) has much interest and research been conducted on the mechanism and potential health benefits of L-ergothioneine (6). L-ergothioneine is a master antioxidant (7, 8) found only in food and not created by the body.

Research has shown L-ergothioneine to be found in high concentrations in cells exposed to oxidative stress (9, 10).

A transporter protein for L-ergothioneine, ETT (9, 10), has been discovered as the key to enabling ingested L-ergothioneine (ET) to be used by the body (Figure 1).

Research has further shown that L-ergothioneine is found in abundance in cells exposed to the highest amounts of oxidative stress such as the kidney, brain, liver, etc. (11) where it is postulated to be most needed.

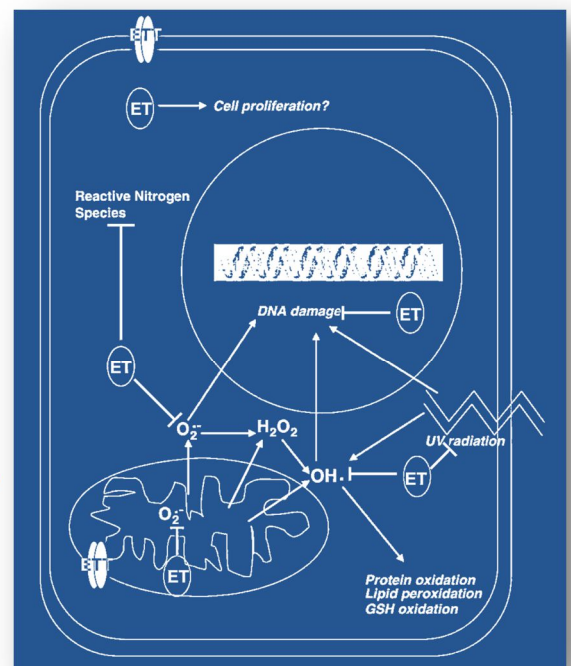


Figure 1 (10)

L-ergothioneine is cytoprotective (10) in that cells undergoing oxidative stress utilize L-ergothioneine in the mitochondria and cell nucleus due to its powerful ion scavenger ability and inhibition of further free radical generation; ions and free radical generation being contributors to cellular oxidative stress.

While there are several food sources of L-ergothioneine, mushrooms contain 45 times more L-ergothioneine than other food sources such as eggs, beans, nuts, liver, kidney meats (16). Mushrooms also are a good source of Vitamin D2 which is known to be essential for kidney health (15).

Ergo4Health/Kidney is made from *Pleurotus eryngii* (king oyster mushroom) using proprietary high intensity UV light technology (13). This process maximizes Vitamin D2 levels and maintains high L-ergothioneine content.

Furthermore, this process provides a convenient, commercially viable supply of L-ergothioneine and Vitamin D2.

Each 500 mg capsule of Ergo4Health/Kidney contains 0.75 milligrams of L-ergothioneine and 1,250 IU of Vitamin D2.

## Method

Participants were selected based on their kidney function CKD (Chronic Kidney Disease) stages 3 and 4. Participants had previously been under the care of the Physicians (Examiners) for 3-6 months. Normal medical care standard for CKD was continued unchanged throughout the study. A rolling enrollment was employed.

Exclusion criteria are subjects with chronic diseases such as cancer, COPD, cirrhosis and heart failure at the discretion of the Examiner.

The study was divided into 3 phases as outlined below.

A Baseline Period (Phase 1) consisted of 3 months of monitoring the following:

- Patient demographics and biometrics: age, sex, height, weight, blood pressure, heart rate, temperature.
- Etiology of kidney function / dysfunction.
- Comorbid conditions. Medications with doses.
- Changes in eGFR for 3-6 months before entering study.
- Labs: CBC, BUN, creatinine, electrolytes, calcium, phosphorus, magnesium, hepatic function panel, urinalysis, Protein / Creatinine ratio, eGFR.

Treatment Period (Phase 2) involved supplementation with two (2) 500 mg capsules of Ergo4Health/Kidney twice a day, morning and evening. Each 500 mg capsule contains 0.75 mg of L-ergothioneine and 1,250 IU of Vitamin D2.

Participants were evaluated at 3, 6, 9 and 12 months for the following lab tests: CBC, BUN, creatinine, electrolytes, calcium, phosphorus, magnesium, hepatic function panel, and urinalysis.

A preliminary analysis of the data at 6 months is presented according to the protocol. Biomarkers for kidney function, BUN, eGFR and creatinine, were measured amongst other laboratory measurements.

A Kidney Health Quality of Life (KDQOL) questionnaire developed by Rand Health Corporation (4) was administered at 3 months and results are presented herein.

Post-Treatment Period (Phase 3) will follow-up participants for 3 consecutive months.

## Discussion

Normal, healthy kidney function is important to rid the body of waste and excess fluid (3). As we grow older, have risk factors (hypertension, diabetes, etc.) or other diseases, our kidney function becomes compromised. Maintaining healthy kidney function is important to many other body systems such as blood (red and white blood cells), hormones that regulate blood pressure and production of Vitamin D for strong, healthy bones (3).

Table 1 summarizes the results and statistical analysis for the Bonaire site at 3 months (90 days) and 6 months (180 days). Statistical analysis is based on the following:

- Paired 2 sample for means t-test.
- 2 tailed P test to derive P value.

eGFR (estimated Glomerular Filtration Rate) is considered the best method to measure kidney function calculated from the blood creatinine test, age, body size and gender (3). Normal eGFR for adults is greater than 90 mL/min/1.73m<sup>2</sup> according to the National Kidney Foundation. This calculation is the standard for estimating reduced kidney function and actual numbers are only reported once values are less than 60mL/min/1.73m<sup>2</sup>.

Participants in this study on average had mild to moderate kidney dysfunction with a mean eGFR of 45.8 at baseline. The improvement seen at 90 days was statistically significant (p-value <0.05).

Creatinine is a waste byproduct that kidneys filter and excrete. In this study serum (blood) creatinine was measured. Creatinine levels alone are indicative of kidney function and are a subset of the eGFR measurement described above.

BUN (blood urea nitrogen) measures the amount of nitrogen in blood that comes from the waste product urea (18). A BUN test is done to see how well kidneys are working. If kidneys are not able to normally remove urea from the blood, BUN level rises. 10-20 milligrams per deciliter (mg/dL) is considered normal for adults. Participants in this study had mean BUN level of 77.25 at baseline and at 3 months had BUN mean level of 57.31 (26% improvement).

Table 1

Biomarker	eGFR						Creatinine						BUN					
	0	90	% Chg.	0	180	% Chg.	0	90	% Chg.	0	180	% Chg.	0	90	% Chg.	0	180	% Chg.
Day																		
N	25	25		21	21		25	25		21	21		22	22		13	13	
Mean	45.80	49.56	<b>8.21%</b>	46.14	49.24	<b>6.71%</b>	1.72	1.63	<b>-5.31%</b>	1.68	1.64	<b>-2.88%</b>	77.25	57.31	<b>-25.81%</b>	69.83	54.40	<b>-22.09%</b>
Std Dev	11.57	13.35	<b>15.47%</b>	10.48	13.85	<b>32.18%</b>	0.60	0.59	<b>-1.18%</b>	0.56	0.56	<b>-0.65%</b>	43.47	33.80	<b>-22.24%</b>	29.79	20.18	<b>-32.25%</b>
P-value		0.00535		0.158568				0.004106			0.423761			0.003256			0.088457	

Table 2 shows the combined data set for Bonaire and Colombia at 3- and 6- months. The data in this table reveals that kidney function is maintained in stage 3 and stage 4.

Table 2

Biomarker	eGFR						Creatinine						BUN					
	0	90	% Chg.	0	180	% Chg.	0	90	% Chg.	0	180	% Chg.	0	90	% Chg.	0	180	% Chg.
N	26	26		26	26		26	26		26	26		15	15		15	15	
Mean	40.91	44.16	7.95%	40.91	43.88	7.26%	1.93	1.90	-1.76%	1.93	1.88	-2.40%	67.24	50.98	-24.19%	67.24	53.18	-20.91%
Std Dev	14.64	17.19	17.41%	14.64	16.99	16.03%	0.78	0.88	12.78%	0.77	0.86	11.62%	28.46	20.80	-26.90%	28.46	18.99	-33.26%
P-value		0.010834			0.093621			0.367824			0.223091			0.056331			0.0722078	

A Kidney Health Quality of Life (KDQOL) questionnaire was completed by 20 of the participants. Statistical analysis (17) indicated there was a high correlation between the Quality of Life responses and the eGFR measurement and a statistically significant correlation to energy/fatigue (Table 3). The National Kidney Foundation considers eGFR the gold standard for overall kidney health assessment (3).

Table 3

Pearson's Correlation Statistics for Percentage change in eGFR versus Percentage Change in Quality of Life Measures.

		Percentage Change in eGFR
Percentage Change in	Pearson Correlation	0.456
Energy/Fatigue (Quality of Life)	p-value	0.043
	N	20

## **Conclusion**

A clinical study amongst participants with impaired kidney function was conducted to monitor the effects on kidney health of a new, all natural supplement, Ergo4Health/Kidney, consisting of a proprietary natural formulation of mushrooms containing both L-ergothioneine and Vitamin D2.

The results at 3 months and 6 months of this 1-year study show promising improvement in kidney function as measured by eGFR, BUN and creatinine, considered to be the best biomarkers to monitor kidney health.

The National Kidney Foundation reports that 1 out of 3 adults will develop kidney dysfunction due to age, risk factors or other diseases. Kidneys play a vital role in overall health by ridding the body of toxic wastes and fluids as well as regulating hormones that maintain normal blood pressure and production of Vitamin D for strong bones. Therefore, a new, all natural supplement that can help maintain kidney health is very promising. Furthermore, a readily available, cost effective and commercially viable manufacturing process has been developed for Ergo4Health/Kidney.

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