

# An Open-Labelled Pilot Study of Riboflavin for the Treatment of Essential Tremor

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### OBJECTIVE

Can high dose Riboflavin ameliorate Essential Tremor?

### BACKGROUND

Essential Tremor, which has a genetic component, but no consistent pathology, may be caused by abnormalities in cellular energy production. Riboflavin is essential to the production of energy. The active forms FAD, FMN participate in metabolism, the degradation of drugs and toxins, and in activation of other vitamins particularly Niacin to NAD and NADP. Active transport brings Riboflavin into the blood-stream and a special carrier-mediated system brings Riboflavin into cells. If either mechanism is defective, then over supplementation of Riboflavin may ameliorate this defect.

### DESIGN AND METHODS

16 subjects from the age of 50 to 90 with ET were treated with doses of Riboflavin from 400-800 mg in an open labeled fashion. There was no change in concomitant tremor medications, if any. Evaluations were made at 4 week intervals and if the response was inadequate, the dose was increased to 600 mg at 4 weeks and then 800 mg at 8 weeks based on the patient's subjective evaluations and the examiners observations, utilizing the clinical rating scale for tremor by Fahn, Tolosa and Marin.

Demographic and Clinical Characteristics of Hand Tremor Patients

AGE	GENDER	CONCOMITANT TREMOR MEDS	RIBOFLAVIN DOSE	BASILINE TREMOR	TREATMENT EFFECT
50	F	None	800	Moderate	Yes*
50	M	Propranolol LA	400	Moderate	Yes*
60	F	Propranolol LA	400	Moderate	Yes*
66	M	None	400	Mild	No
74	M	None	400	Moderate	Yes*
75	F	None	600	Severe	No**
75	F	None	800	Severe	Yes*
75	F	None	400	Moderate	Yes*
82	F	Primidone, Propranolol, Topiramate	600	Severe	No
82	F	Primidone, Propranolol, Topiramate	800	Severe	No
87	M	Topiramate	600	Severe	Yes*
90	F	None	400	Moderate	Yes*

Baseline Tremor Scale	Mild Tremor Score 0.0-0.9
	Moderate Tremor Score 1.0-2.9
	Severe Tremor Score 3.0-4.0

\*Yes=Reduction of Tremor Score 1 or More Grades  
\*\*Improvement by Half Grade in One Hand

Demographic and Clinical Characteristics of Head Tremor Patients

AGE	GENDER	CONCOMITANT TREMOR MEDS	RIBOFLAVIN DOSE	BASILINE TREMOR	TREATMENT EFFECT
63	F	None	400	Mild	Yes*
74	F	None	600	Mild	Yes*
85	M	None	400	Moderate	No
88	F	None	800	Moderate	No

\*Yes=Reduction of Tremor Score 1 or More Grades

Patient Response to Riboflavin by Hand Tremor Severity



- Mild - No Improvement
- Moderate - One Grade Improvement of Both Hands
- Severe - No Improvement
- Severe - Improvement of One Grade in Both Hands
- Severe - Improvement of One Grade in One Hand

### RESULTS

10 of the 16 participants (2/4 with head tremor and 8/12 with hand tremor) had reductions in tremor severity. The improvement in TRS severity scores ranged from slightly improved (20%) to moderately improved (50%). Riboflavin was associated with enhanced ability to write, eat, drink and pour liquids in more than 50% of the patients. Physician ratings and patients own subjective evaluations were consistent with measured improvement. Riboflavin was well tolerated with no adverse events observed or reported.

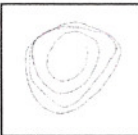
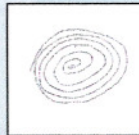


Figure left. 74 y/o male pt before treatment  
Figure right. Pt on 800mg Riboflavin



### CONCLUSION / RELEVANCE

Riboflavin may be beneficial in the treatment of ET and further evaluation is necessary using a double blind protocol.

### REFERENCES

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