

# Human Clinical Trial on the Detoxification Action of Spanish Black Radish in Men

Based on the paper: An open label pilot study to evaluate the efficacy of Spanish Black Radish on the induction of phase one and two enzymes in healthy male subjects. Evans M, Paterson E, Barnes DM. December 9, 2014. BMC Complementary and Alternative Medicine. 14:475. Doi: 10.1186/1472-6882-14-475



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# Human Clinical Trial on the Detoxification Action of Spanish Black Radish in Men

Standard Process scientists have investigated Spanish black radish extracts in mice<sup>1</sup> and liver cells<sup>2</sup> in addition to studying the chemical makeup of this cruciferous vegetable<sup>3,4</sup> in detail. To further our understanding of Spanish black radish, Standard Process organized a study to explore how consumption of a supplement made from this radish affects detoxification in healthy humans.<sup>5</sup>

- 20 healthy men (age 25 to 35)
- Single treatment arm (6 tablets of Spanish Black Radish per day)
- Challenged with 1000 milligrams (mg) acetaminophen
- 4 week study

- Lower serum 17 $\beta$ -estradiol at week 4 suggests phase one enzyme induction
- Phase two metabolites in plasma decreased and urine metabolites increased, suggesting efficient metabolism and clearance of the test chemical

## STUDY DESIGN

Acetaminophen is metabolized in the liver through pathways that involve phase two detoxification enzymes. These pathways – conjugation, sulfation, and glucuronidation – produce metabolites that can be measured in blood and urine.

Subjects were asked to avoid cruciferous vegetables for 14 days prior to the start of the four-week study.

## START OF THE TRIAL

On the first day of the trial, the 20 male subjects were given a 1,000 mg dose of acetaminophen.

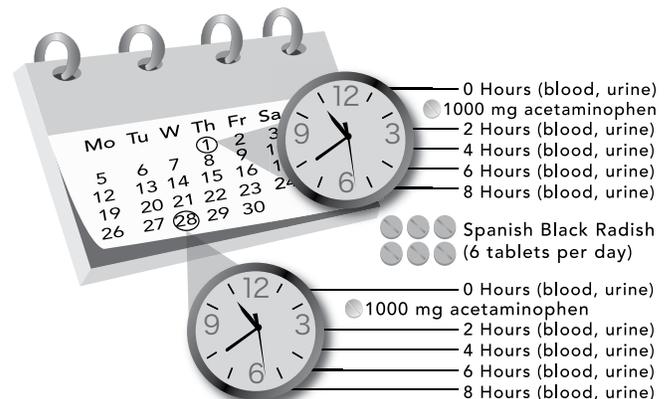
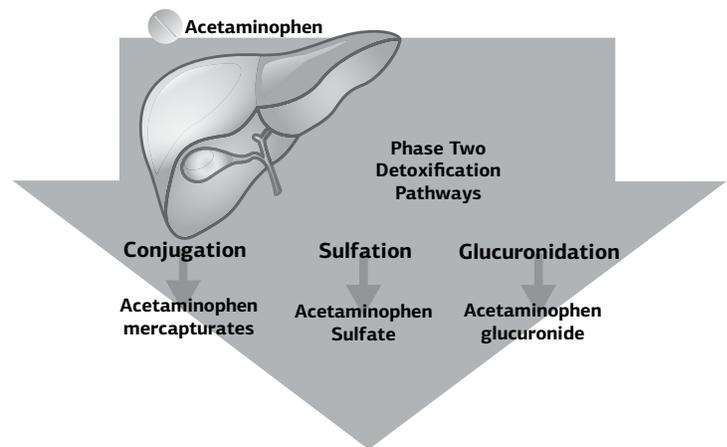
Researchers collected blood and urine pre-dose and 2, 4, 6, and 8 hours after the acetaminophen challenge to see how quickly the test chemical was cleared from the blood and excreted in the urine.

After these baseline measures, subjects were asked to take 6 tablets (2,220 milligrams) of Spanish Black Radish per day for four weeks. At that time, the subjects were again challenged with acetaminophen and evaluated for how quickly it was cleared from the body.

To determine if phase one enzymes were also up-regulated, the scientists measured serum 17 $\beta$ -estradiol, a hormone present at very low levels in men, in the same two hour increments both at the beginning of the study and end.

## REFERENCES

1. *Nutrition and Cancer*. 2012. 64(7):1038-48.  
Phase one and two enzyme expression increased in mice consuming a diet containing Spanish black radish. Toxin clearance from blood was faster and vulnerable cell populations were better protected compared to control mice.
2. *J Agric Food Chem*, 2007, 55(16):6439-46.  
Spanish black radish increased activity of phase one and two detoxification enzymes in the human HepG2 cell line.
3. *J Food Sci*, 2011, 76(1):C185-92.  
Eight radish varieties were evaluated for phytochemical composition/biological activity.
4. *J Food Sci*, 2011, 76(3):C504-11.  
Raphasatin, the primary glucosinolate metabolite in Spanish black radish, induces mouse detoxification enzymes.
5. *BMC Comp Alt Med*, 2014, 14:475  
An open label pilot study to evaluate the efficacy of Spanish Black Radish on the induction of phase one and two enzymes in healthy male subjects.



# RESULTS

Compared to baseline, phase two enzyme products in plasma decreased while urinary phase two enzyme products increased after four weeks of consuming Spanish Black Radish.

## PHASE TWO DETOXIFICATION

This indicates increased acetaminophen elimination and suggests the phase two enzymes responsible for these metabolites were up-regulated.

## PHASE ONE DETOXIFICATION

When compared to baseline, the amount of 17β-estradiol in serum at week four decreased at all time points, suggesting phase one enzymes were indeed up-regulated by consumption of the supplement. Testosterone was unaffected.

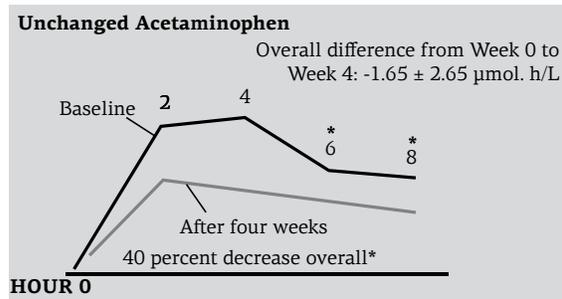
# DISCUSSION

Phase one and phase two detoxification enzymes work together to help the body breakdown and manage compounds that need to be removed. A balanced reaction is important in order to maintain the body's normal detoxification processes.

**This research confirms that Spanish Black Radish can contribute to the body's normal, balanced phase one and phase two detoxification processes and, using acetaminophen as a model, support the elimination of natural toxins from the body.**

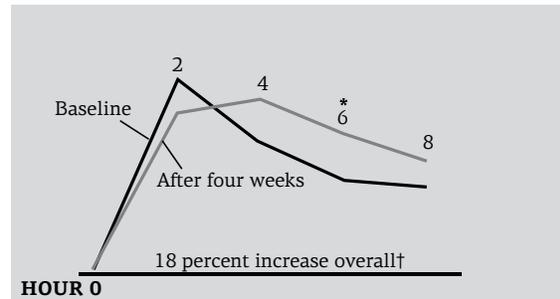
### IN PLASMA

NAPQI-GSH- no statistically significant change

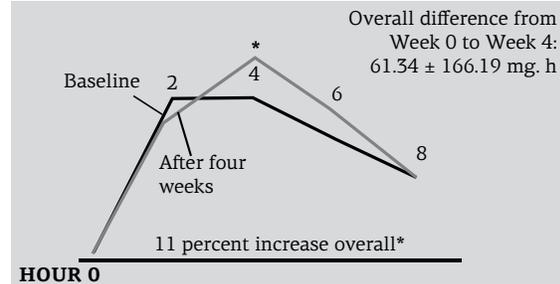
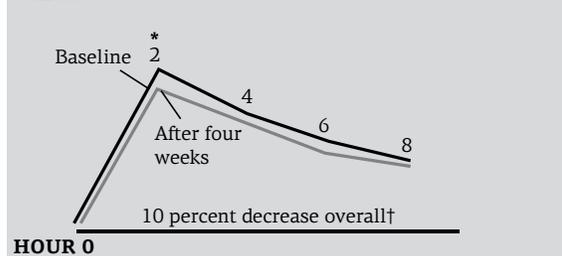


### IN URINE

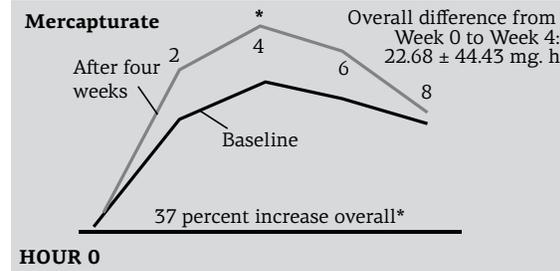
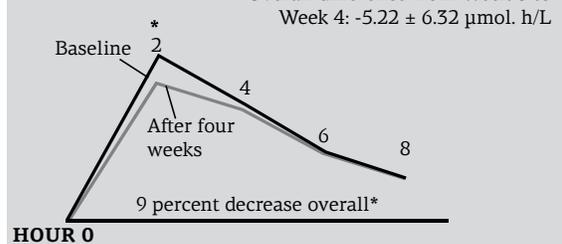
Glucuronide - no statistically significant change



### Sulfate



### Glucuronide



### Estradiol-17β



\* Statistically Significant  
 † Not Statistically Significant

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