

# EnduraCell® – Understanding Nutrigenomic Therapy in the ASD Patient

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## Overview

The specific cause or causes of Autism Spectrum Disorder remain unknown, although there are several theories which try to explain its more frequent occurrence in recent years. For parents whose children are inexplicably affected by this condition, there is much distress accompanied by an endless search for treatments which will help their child.

## Potential Avenues for therapy

One area which is now being explored by research scientists is associated with the way brain cells protect themselves from harm. As part of normal day-to-day function, human cells are exposed to a wide variety of toxic assaults. Most of these come from chemicals which are released when foods are digested; human cells may also be exposed to a large number of environmental chemicals. When defence mechanisms and repair processes function as they should, these potentially toxic compounds are handled in a way that they are safely eliminated from the body.

In healthy human cells, there are complex mechanisms which defend cells against such assault. It seems that in some people, these protective mechanisms are not functioning as they should and this would seem to be the case in people diagnosed with ASD.

In the last decade, our understanding of how human genes govern cell function has grown dramatically. Some researchers look for specific genes that could cause ASD. However, another body of research is more focused on looking at genes which are defective in handling the basic processes of cell defence. This approach has opened up a whole new avenue of potential therapy; it is this approach that underpins the application of sulforaphane, the bioactive compound derived from broccoli sprouts - EnduraCell®

## Nutrigenomics

A relatively new scientific discipline, Nutrigenomics is based on our understanding of how particular bioactive compounds derived from plants are capable of activating chemical 'switches' in human cells. One of these switches, known as Nrf2, plays a significant part in the activation of cell defences mechanisms; in fact, around 2000 different protective genes are known to be activated in this way.

The word 'nutrigenomics' is derived from 'nutri' meaning 'food' and 'genomics' referring to the human genome. The genome is a general term to describe the genes and the DNA contained in all the 25,000 genes which each of our cells contain.

## Sulforaphane

The active compound found abundantly in 100% whole enzyme-active broccoli sprouts is *Sulforaphane* (*pr. Sul-4-a-fane*). Sulforaphane has been shown to be the most powerful naturally-occurring activator of Nrf2, the switch which governs activation of cell defence. It is due to this

property of sulforaphane that EnduraCell is being prescribed regularly by clinicians treating patients with ASD. You can read more about sulforaphane by downloading the ebook, “Switched On” [here](#).

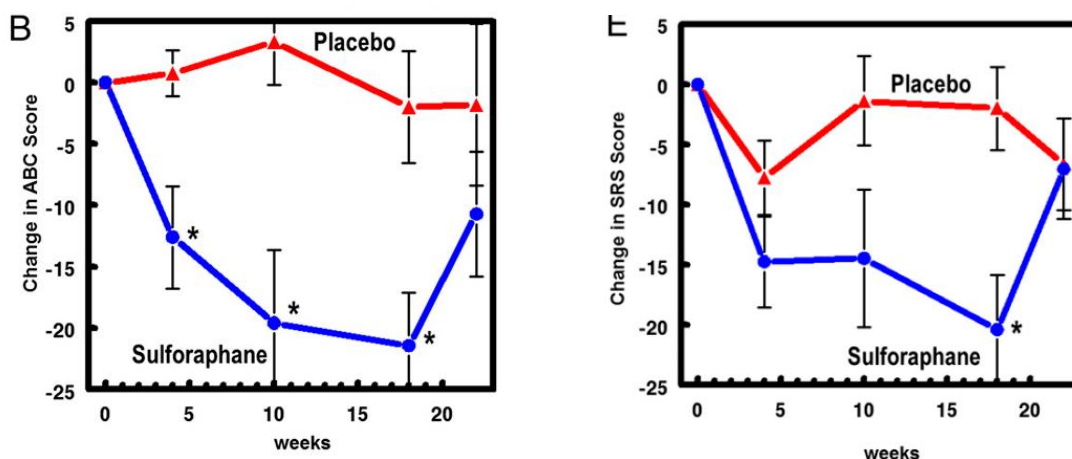
## Clinical Trial using Sulforaphane in ASD

Recently published (October 13, 2014) in the [Proceedings of the National Academy of Sciences](#) is a small clinical trial wherein Broccoli sprout-derived Sulforaphane was used as the active intervention in a placebo-controlled randomised study in 45 males aged 13-27 over 18 weeks.

### Findings:

Within a few weeks, those taking the broccoli sprout supplements showed **substantial behaviour improvement**, rated by **social interaction, abnormal behaviour and verbal communication** (34% improved when rated by the Aberrant Behaviour Checklist – ABC and 17% on the Social Responsiveness Scale - SRS). On discontinuation of the treatment, total scores on all scales rose to pre-treatment levels within 4 weeks.

### The Results



These graphs taken from the published study show the effect of sulforaphane in the ABC and SRS scores. Equally apparent is the loss of positive effect on these scores when sulforaphane is discontinued. This means that the effect of sulforaphane gradually diminishes soon after the supplement is stopped.

### How much EnduraCell could provide a similar effect?

The clinical trial used an experimental broccoli blend not yet available. The table below is an estimate of the equivalent amount of EnduraCell required to match this effect.

Body weight of male participant	Equiv. EnduraCell Powder Dose/ day (approx.)	Equiv. EnduraCell BioActive Dose/ day (approx.)
45 kg	1.8 grams	2-3 capsules
90 kg	3.6 grams	3-4 capsules
> 90 kg	5.4 grams	5-6 capsules

Essentially, the daily dose used corresponds to 1 gram of EnduraCell for every 25 kg body weight. If your child is less than 45 kg as shown in the chart, simply calculate accordingly.

## What else do human cells require to function normally?

When sulforaphane 'switches on' protective genes, these genes go to work to produce thousands of enzymes needed for the complex web of biochemical processes in which healthy human cells are engaged. Many of these enzymes in turn use a variety of micronutrients as if they are spark plugs to 'kick start' the chemical reactions. These micronutrients include various vitamins, minerals and trace elements. As a result, diets which are lacking in these vital micronutrients may not supply everything the cells need to be able to activate these genes efficiently when sulforaphane is present.

Because those with ASD do not always eat well, they may not have adequate levels of certain essential micronutrients in their cells. For this reason, we have formulated a product named 'DefenCell' which acts as our Core nutrigenomic supplement. A daily dose of DefenCell contains the recommended levels of many cytoprotective micronutrients together with 1000 mg of sulforaphane-yielding EnduraCell. When using DefenCell, it is advisable to add additional EnduraCell as required.

## Other Effects

Sulforaphane has also been studied in connection with gastrointestinal disorders. There are studies showing its benefits in eliminating the *Helicobacter pylori* bacterium which can produce stomach ulcers. It has also been used to help counter Irritable Bowel Syndrome (IBS).

As many parents would be aware, intestinal dysbiosis (overgrowth of abnormal intestinal organisms) is common in those with ASD. Although the clinical trial did not investigate this aspect of the condition, Sulforaphane can also assist in normalising intestinal function.

## Are there any Side Effects?

One of Sulforaphane's actions is to activate genes which code for the major detoxification enzymes. In some people, it appears that the detoxification process can be activated too quickly and in so doing, can release waste materials at a rate which makes the individual feel unwell – intestinal disturbance, fatigue, headache and so on. Where it is suspected that this may be occurring, one simply needs to reduce the dose to slow down the process. As the symptoms subside, it is advised to gradually build the dose back up to the recommended therapeutic level over a few weeks.

In addition, where bacterial overgrowth is significant, sulforaphane is thought to produce a "die-off" reaction, so that large number so bacteria are destroyed and their wastes emptied into the intestine. Again, slowing down the process with a smaller dose will ease these symptoms.

## Improving the Diet

Improving the diet of a person with ASD can be very challenging and it is often easier to give in to the child's demands for 'junk' food than to persevere with healthier options. The importance of a varied whole food plant-rich diet that avoids processed foods cannot be over stated. Try this excellent website for tips on feeding vegetables to fussy eaters: [www.vegiesmugglers.com.au](http://www.vegiesmugglers.com.au)

## Where do I start?

If you are ready to start yourself or your child on a course of treatment, record body weight and check the chart for the amount of EnduraCell you will need daily.

The recommended daily dose for DefenCell of four (4) capsules per day delivers 1 gram of EnduraCell. For dosage purposes, we classify an average adult as being 12 years of age and over. An adult requires 4 capsules of DefenCell daily, taken as 2 capsules twice daily with water.

As an example, a person who weighs 100 kg would require 1 gram of EnduraCell for every 25 kg body weight. Therefore, this person would need 4 grams daily.

#### The prescription would be:

<b>DefenCell</b> (provides 1 gram EnduraCell daily)	4 capsules daily (1 gram)
+ EnduraCell powder (1 scoop = 1 gram)	3 scoops daily (3 grams)
<i>OR</i>	
+ <b>EnduraCell BioActive</b> capsules (700mg per capsule)	4 capsules daily (2.8 grams)

### Are there any contraindications?

Because Sulforaphane acts by sending signals to the 'switches' within the cells, taking large doses of antioxidant vitamins will mask the signal so that the sulforaphane won't have any effect.

Because there are theories that suggest that large doses of antioxidants will help treat ASD, some people take supplemental doses of so-called 'antioxidant' supplements.

#### Supplements to avoid are:

Vitamin C	N-acetyl cysteine (NAC)
Vitamin E	'Antioxidant' formulations
Vitamin A	

### Can I just grow broccoli sprouts?

Although any fresh green vegetable provides valuable nutrition, you have no way of knowing whether you have a variety of seed that yields sufficient Sulforaphane to match the amounts used in the clinical trial. Fresh sprouts contain an enzyme inhibitor which can prevent the production of Sulforaphane when you consume it.

### Can I take Broccoli Sprout 'Extracts'?

Some supplements are marked as 'extracts' of broccoli seed or sprout. These have had their essential myrosinase enzyme deactivated in manufacture and are virtually worthless as a source of sulforaphane. They are sometimes marked as containing 'sulforaphane glucosinolate'; there is no such chemical compound – this is a marketing term intended to have you believe you have a sulforaphane-yielding supplement.

### Why is EnduraCell different?

EnduraCell is manufactured from a 100% whole myrosinase-active broccoli sprout powder which complies with Australia's stringent Therapeutic Goods Administration (TGA) guidelines; as such, EnduraCell is regulated as a medicine. EnduraCell is a nutraceutical-grade supplement, not a food-grade supplement. As a nutraceutical-grade supplement, EnduraCell is regulated as a medicine.