

Phenols

This is a paper on phenols written by Karen Wheelwright, and reproduced with permission.

(Important Note: This paper is the result of my own research into Phenols as both myself and my children are extremely sensitive to Phenols. Therefore you should NOT take this information as Gospel - especially the recommendations of supplements, etc. Please use this as a starting point for your own investigations and consult your doctor before adding any supplements. - Karen Wheelwright July 2005)

Dr Rosemary Waring has found that potentially over 80% of autistic children have a deficiency in a key detoxification pathway. The pathway involves using sulfur in the form of sulfate (known as sulfation).

The enzyme involved is phenol sulfur-transferase (PST).

The PST sulfation pathway is necessary for the breakdown and removal of certain toxins in the body. This includes the processing of a type of chemical called a phenol. Phenols are a regular and necessary part of life. All foods contain some phenolic compounds. However, some foods have a much higher content than others do. Different lists of high phenol foods have a few discrepancies, however these ones seem to come up on most lists: Apples, Oranges (and other citrus), Grapes, Bananas, Chocolate, (and the phenol flavouring vanillin it normally contains).

If the sulfation pathway is not functioning well, a person may not be able to process out the phenolic compounds as fast as they consume them. There is a cumulative effect. When the phenols start backing up in the system, it can cause a myriad of negative reactions. **Symptoms of phenol intolerance include** night waking, night sweats, dark circles under eyes, irritability, hyperactivity, red cheeks/ears, lethargy, self-injurious behavior, inappropriate laughter, difficulty sleeping, diarrhoea, eczema, and other skin conditions. The symptoms of phenol intolerance and yeast may be very similar because they both involve the body trying to deal with toxins. Ie the yeast actually produce phenols.

This detoxification pathway processes other phenolic compounds including salicylates (salicylates are a subset of phenols), artificial food colorings, artificial flavorings, and some preservatives. Besides requiring PST, research has found the salicylates further suppress the activity of any PST enzyme present, making matters worse. Food dyes also have been shown to inhibit the PST enzyme.

You can unclog this 'bottleneck' in one of two ways. One is reducing the amount of phenols and toxins entering the body. This is the basis of the FAILSAFE diet and the **Feingold diet**. These diets remove the hard-to-process artificial colorings, flavorings and preservatives. It also removes the most problematic of the salicylate foods at the beginning of the program. Later in the program, you may be able to add these salicylate foods back after testing them one at a time. Not all foods with a high phenol level are also high in salicylates as not all phenols are salicylates. Whether a low salicylate and/or a low phenol diet is followed, is often a case of trial and error to see which products produce a troublesome reaction.

The second method of enhancing the detoxification process is to supply more sulfate. This increases the amount of toxins processed out. **Sulfate ions may not be absorbed well from the gut,** so simply giving more sulfur directly by swallowing supplements may not produce satisfactory results. Therefore a way to get sulphate into the body is **Epsom Salts baths.** Most people do see improvement with Epsom salts because the form of sulfur in the Epsom salts is already sulfate and readily available to the body.

Dr Waring has also conducted a study showing that both Magnesium and Sulphate levels in the body increase after Epsom Salts Baths. The recommendation is for 500-600gm of Epsom Salts in a hot bath (50 - 55°C) for at least 12mins, 2 to 3 times a week. (<http://www.mgwater.com/transdermal.shtml>)

Some other things to note:

Vitamin B6 (P5P) and Magnesium

Dr Rosemary Waring has also studied **the effect of Vitamin B6 on PST activity.** It was found that B6 in the form of P5P (pyridoxal-5-phosphate) inhibits PST activity. (This could be why some children show adverse effects when supplements high in P5P are started) However the same study showed that increasing Magnesium supplementation reverses this inhibition. It concluded that : "From the therapeutic point of view, Mg²⁺ ions should be supplied in at least a 2:1 ratio with P5P to reverse any inhibition and activate those sulfotransferases which respond to increased magnesium levels"

Molybdenum

Molybdenum is important in sulphur metabolism (the body needs it to convert sulphite to sulphate) and therefore may help support the PST system. And because normal wheat bread contains Molybdenum this can also be why some kids get worse regarding phenols and sulphites after starting the GFCF diet. (Molybdenum can also help lower copper levels)

Glycine

Glycine inactivates chemicals, including salicylates and phenols. In cases of acute salicylate poisoning, doctors administer the amino acid called glycine to help the liver remove the salicylates. Since glycine is also particularly beneficial for people with too much serotonin influence, and because it enhances bile production, it may be a good supplement to consider.

Panadol

Acetaminophen (Panadol, Tylenol) is used to test the PST system. Developed by Rosemary Waring, this test measures the "sulfation ratio" (SR) of acetaminophen sulfate to acetaminophen glucuronide in the urine after an oral test dose of acetaminophen (Tylenol), which serves as a phenolic chemical "probe." It requires an accurate dose of Tylenol (not always easy), and a timed urine collection.

A subjective test for PST efficiency is to observe a reaction to Tylenol or acetaminophen – either hyperactivity or lethargy.

Therefore Panadol should be avoided for kids with a PST problem (One source suggested that one or two minutes after a dose of Tylenol™, the entire supply of sulfate in the liver is gone!)

Swimming (Chlorine)

Chlorate is THE biological substance of choice to block sulfation. In one study higher chlorate concentrations were associated with those pools using hypochlorite solution as a disinfecting agent, while relatively low chlorate concentrations were found in pools treated with gaseous chlorine. Additionally, chlorate is known to inhibit hematopoiesis [the making of new blood cells], a problem with many of our kids. Additionally,

hypochlorite reportedly combines with any phenolic compound, even in very dilute solutions, to form an aromatic compound that can react in the body. This combining of chemicals can be very toxic to susceptible individuals. This is why EPSOM SALTS BATHS are recommended immediately after swimming.

Not Just Food

Be aware that phenols and other chemicals which can overload the PST system are not confined to food. These chemicals can also be absorbed through the skin or by breathing them in. Therefore you need to avoid them in personal care products such as Toothpaste, Shampoo, Soap, Washing Powder, Fabric Softener, Cleaning Products, Nail Polish and Remover, and even Toiletpaper! Also avoid air fresheners, etc. Even perfume is a problem. (http://www.herc.org/news/perfume/sweet_poison.htm) Also artificial colours and flavours in Prescription and over the counter medications and supplements. Also beware of coloured bubble baths, playdough and facepaint. Good information of which products to avoid (and which are safe to use) can be found on the FAILSAFE website: <http://www.fedupwithfoodadditives.info/>

Apples

On all the lists of high phenol foods, Apples generally appear at the top. Apples are a rich and very important source of phytochemicals, including flavonoids and phenols. . In the United States, 22% of the phenolic compounds consumed from fruits come from apples, making them the largest source of phenols in the American diet.

When compared to other fruits, apples ranked second in total concentration of phenolic compounds, and perhaps more importantly, had the highest portion of free phenols. Since free phenols are not bound to other compounds in the fruit, they may be more available for absorption into the bloodstream.

Yeast (Candida)

Because yeast actually produce phenols, they contribute to the total 'load' of phenols in the body. Therefore if a child has a yeast problem then they will be able to tolerate even less phenols from foods. Therefore by treating yeast infections, the child may be able to tolerate more of the phenol foods.

Tinned Food

(I researched this topic because both myself and my son had an extreme phenol type reaction after eating some tinned pears (the tin was lined with a white resin). This is what I found:

"Some produce manufacturers have "washed" the inside of their cans with a phenol solution, perhaps as early as 1965. This well-intentioned effort to chemically sterilize mass produced containers before filling them with food can be disastrous for some hypersensitive persons.

The dried film of phenol, a highly toxic bactericide, insecticide and fungicide, on the inside of the can enters into solution with the food during the cooking operation. Also Phenol-containing compounds (epoxy resins) are used on the inside of tin cans to prevent the metal from bleaching the colour of the food. Only a minute amount of the resins and other chemicals used to line cans gets into the food. Is this really enough to cause a reaction? Yes, it is!"

<http://www.mindfully.org/Plastic/Plasticizers/Can-Coatings-Contaminants1may98.htm>

Websites for more Information

Some websites with good (and easy to understand) info on this are:

[Dana's View](#)

[Talk About Curing Autism \(TACANOW\)](#)

A long discussion of this can be found here:

<http://www.newtreatments.org/fromweb/sulfur.htm>

And a really good Yahoo Group to join is the Yahoo Discussion Group: Sulfur Stories