

## Phenol Information

### Introduction

Phenols are chemicals found in basically all foods. The “phenol” category contains quite a few subgroups, both food and non-food. For example, salicylate is a subgroup of phenol. There are other chemicals found in foods that can cause similar symptoms as phenols, including amines, even though they are not technically “phenol”.

For some children, their bodies have difficulty processing the phenols into useful or at least non-harmful substances. This condition is called PST deficiency. So you need to reduce your child’s phenol intake, or help his body process them. Otherwise they build up to levels which can affect his behavior and physical condition.

Here are the Feingold definitions of phenols and salicylates.

Phenols – “A group of natural and synthetic compounds that are ingested or produced to varying degrees by the body or by microbes in the intestine contain a benzene ring with one or more hydroxyl (OH) groups attached to it. When this attachment occurs, they become phenolic compounds. These compounds possess unique chemical properties. They are very soluble both in organic solvents (like alcohol, ether, and the fatty components of the body) and in water (aqueous solution), where they are strongly acidic. They exert toxic effects in the brain, where normally certain enzymes prevent their accumulation.”

Salicylates – “Salicylate is a natural chemical made by many plants. It is chemically related to aspirin, which is a derivative of salicylic acid. It is believed the plant uses it as protection from insects. Although natural salicylates are found in wholesome foods, some individuals have difficulty tolerating even small amounts of them. The reaction to a natural salicylate can be as severe as that to synthetic additives if

a person is highly sensitive. Some people are troubled by only one or two, while others are sensitive to all of them.”

You can obtain more information about phenols and salicylates at the Feingold site.

### **Scientific Description**

1. Benzene: a benzene ring is six carbon atoms connected together to form a ring (hexagon). Benzoates are another chemical group to consider. It is drawn as a hexagon with a circle inside. If nothing else is connected to the carbon atoms in the ring, then the carbons are connected to hydrogen atoms.

Benzene Image

2. Phenol: a phenol is a benzene ring connected to a hydroxyl group (and OH group - one oxygen and one hydrogen atom bonded together). Phenols are everywhere in nature and food so you can not eliminate them totally from the diet.

Phenol Image

3. Salicylate: a salicylate is a benzene ring plus an OH group plus a carbohydrate group (a COOH group). We could also say it is a phenol plus a COOH group. Look at the first picture of the two listed here.

Salicylate Image

4. Amine: a amine is a nitrogen atom connected to 3 hydrogens OR a derivative of this (N plus 2 hydrogens and something; N plus 1 hydrogen and 2 somethings). An amine might be connected to a benzene ring, a phenol, a salicylate, or many other things.

Amine Image

Notice that ammonia is the core amine structure of N plus 3 Hs. Many of the neurotransmitters are amines. Amino acids are all amines (by definition). Histamine is an amine.

### **Symptoms of phenol sensitivity**

Some typical symptoms indicating your child may have a phenol problem are [not all of these need be present]: dark circles under the eyes, red face/ears, diarrhea, hyperactivity, aggression, headache, head banging or other self-injury, inappropriate laughter, difficulty falling asleep at night, and night waking for several hours. The typical adult symptom of phenol intolerance is chronic fatigue syndrome, which is the opposite symptom that most children have, although some children do present as always tired/lethargic, instead of hyper with sleep and other issues.

### **List of high phenol foods**

Here is a short list of high phenol foods, which you would want to eliminate or at least reduce to prevent overload, is food dyes, tomatoes, apples, peanuts, bananas, oranges, cocoa, red grapes, colored fruits, and milk.

Here is the Feingold list of highly phenolic/high salicylate foods: Avoid anything -- food, toiletries, cleaning supplies, art supplies -- that has any of the following ingredients: Synthetic/artificial colors and flavors [for example, FD&C colors, vanillin], BHA, BHT, TBHQ, [all the preceding are made from or related to petroleum], Natural Flavoring (may contain salicylate), Natural Coloring (may contain salicylate), Aspirin and products containing aspirin or salicylic acid, Salicylates, Almonds, Apples, Apricots, Berries (all), Cherries, Chili powder, Cider & cider vinegar (apples), Cloves, Coffee, Cucumbers & pickles, Currants, Grapes & raisins, Nectarines, Oranges, Paprika, Peaches, Peppers (bell & chili), Plums, Prunes, Tangerines, Tea, Tomatoes, Wine & wine vinegar (grapes), Oil of wintergreen (methyl salicylate). Other items to consider are perfumes and fragrances, nitrites and nitrates, monosodium glutamate [MSG],

Hydrolyzed Vegetable Protein [may contain MSG], sulfites/sulfiting agents, benzoates, and corn syrup [made from hydrogen sulfide + corn starch and many other added chemicals].

Allergy Dietician list of amine foods

Sue Dengate's Failsafe Diet

Managing Dietary Amines and MSG

Histamine and Amine Intolerance

Lutein, a pigment, can also cause symptoms similar to phenol

Sara's Autism Diet

### **High doses of vitamin B6 and phenol**

Here is information about mega doses of Vitamin B6 and/or P5P, found in a few vitamin supplements, which can aggravate the PST problem of some children [make it even more difficult for the child to process phenols], so if you are supplementing with mega doses of B6 and/or P5P, you can consider reducing the dosage to see if your child's phenol difficulty is improved.

“The phosphate form of vitamin B6 (pyridoxal 5- phosphate or PLP) is the active form required for enzyme activity. Vitamin B6 is phosphatized in the intestine and the phosphate form is not taken orally. Pyridoxal phosphate is not taken orally unless enterically coated because it is destroyed by the digestion process.”

Inhibition of phenol sulfotransferase by pyridoxal phosphate.

The biologically abundant cofactor, pyridoxal-5-phosphate (PLP), is a potent inhibitor of bovine phenol (aryl) sulfotransferase (PST). Preincubation of purified enzyme with as little as 1 micromM PLP decreased PST activity by 50%. Excess 2-naphthol protected PST from inactivation by PLP, whereas 2-naphthyl sulfate and PAPS were

not protective. Although PLP inhibition was apparently competitive with 2-naphthol, a steady-state kinetic  $K_i$  value could not be measured due to non-linear Line weaver-Burk plots in the presence of the inhibitor. Kinetic progress curves revealed that this was due to progressive loss of activity during catalysis. The kinetics of inactivation of PST by PLP was pseudo-first-order and exhibited saturation. The derived  $K_I$  value for the binding of PLP to PST in the initial reversible step was 23  $\mu\text{M}$ , with a maximal rate of inactivation of  $0.077 \text{ min}^{-1}$ . Absorbance spectra of the PST/PLP complex indicated the formation of a Schiff base conjugate, and this is consistent with decreased electrophoretic mobility of the protein-PLP adduct in the presence of dodecyl sulfate only after reduction with borohydride. These results point to the possible regulation of an important detoxification enzyme by a ubiquitous cofactor.

### **Other than food removal, ideas to help with phenol sensitivity**

Houston Nutraceuticals sells enzyme products which are effective for many children in removing phenol sensitivity. The HN-Zyme Prime helps many children with many phenol foods, although not all. The new No-Fenol product helps specifically for phenol issues.

Some parents have found supplementing with molybdenum has helped with phenols.

Many parents report that giving Epsom salt baths is beneficial to help their child's body process the phenols. Some give these baths every night; others say only when their child is having difficulty processing the phenols. The recommended "dose" is two cups of Epsom salts in a bath of very warm water [not too hot], then let your child soak for at least 20 minutes. Just do not let your child drink the water, it can cause diarrhea. Some parents find that foot soaks are sufficient. Some use creams, one you can purchase from Kirkman Labs, or you can make it yourself, here are two recipes.

Epsom Salt Ointment [by Mary Kaye]:

I am sure that a handy person can come up with a cream/ ointment in the same way I did but here is the formula I have been using for about a year now. We use it after a bath before bed and as a hand and foot lotion during PT and to soothe. It absorbs fine and leaves only a little powder type residue.

1 cup Epsom salts  
2 t non-aluminum baking soda  
1/2 cup boiling distilled water  
2 T glycerin  
1/4 cup almond, olive, or sunflower oil or coconut oil  
1/2 cup favorite natural lotion or cream from HFS OR 1/2 cup coconut butter

optional:

a few drops lavender or other essential oils  
a T flaxseed oil  
a T evening primrose oil  
a T of MSM powder to boost sulfate levels

This is like making real mayonnaise, you need to blend at high speed and add ingredients a little at a time. Boil water and add to Epsom salts and baking soda in blender, pulse till dissolved and not grainy (must be boiling). Add glycerin, then slowly add oils while blending to emulsify. Still blending add lotion, cream, or coconut butter a little at a time. Pour into a clean container, preferably ceramic or glass (I use a wide mouth mason jar that I can sterilize). If this separates into layers when cool, rewarm and add 2T guar gum dissolved into a bit of hot water, reblend and cool.

For the cream [by Karen D.]:

Dissolve the salts with a little water, usually heating the water and salts in the microwave helps it dissolve better and then just mix into any cream you like. Mixed a little water with 3 tablespoons of Epsom salts and dissolved it by heating in the microwave (about 1 minute). Then just mixed the salt water in with the cream. You can add more

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or less salts, but more than this and it leaves the white film and gets a little too itchy for me. Adding a little oil or coconut oil may help this if you like. I have also mixed the salts in leftover suntan lotion, primrose oil cream, and some aloe vera cream. Pretty much any lotion your child can tolerate. You can buy large bottles of hand lotion or skin cream. The salts will last a long time this way.

For the oil [by Karen D.]:

Just mixing the salts with water would leave a salty film on the skin which my two boys and I did not like (itchy). Lately, I have been mixing some coconut oil in with the salts and water. Actually it is more oil than water. 3 tablespoons water + 4 tablespoons salts + 12 tablespoon coconut oil. The coconut oil is good for the skin anyway and it seems to counter the drying effect of the salts. I found that just mixing the salts and oil did not dissolve the salts, so I needed to add just some water. I apply this liberally on the skin and it soaks in plus leaves the skin smooth and soft. I pretty much use just the cream now.