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# *Autism and Oxidative Stress*

***Safe and Gentle therapies  
to protect your child***

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# ABSTRACT

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**Studies suggest that increased oxidative stress may contribute to the development and severity of the symptoms of Autism Spectrum disorders.**

**This seminar explores the sources, implications, and testing for oxidative stress as well as safe, gentle strategies to decrease oxidative stress burden.**

# What is *Oxidative Stress* ?

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- Not a disease but a condition *that can lead to* or accelerate a disease
- Occurs when the supply of *antioxidants is insufficient* to neutralize *free radicals*
- The end *result is* cellular damage

# Free Radicals – what are they ?

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- Highly unstable molecules
- Have unpaired electrons in their molecular structure
- Interact aggressively with other molecules

# Free Radicals are a part of *Life*

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## ■ Free Radicals

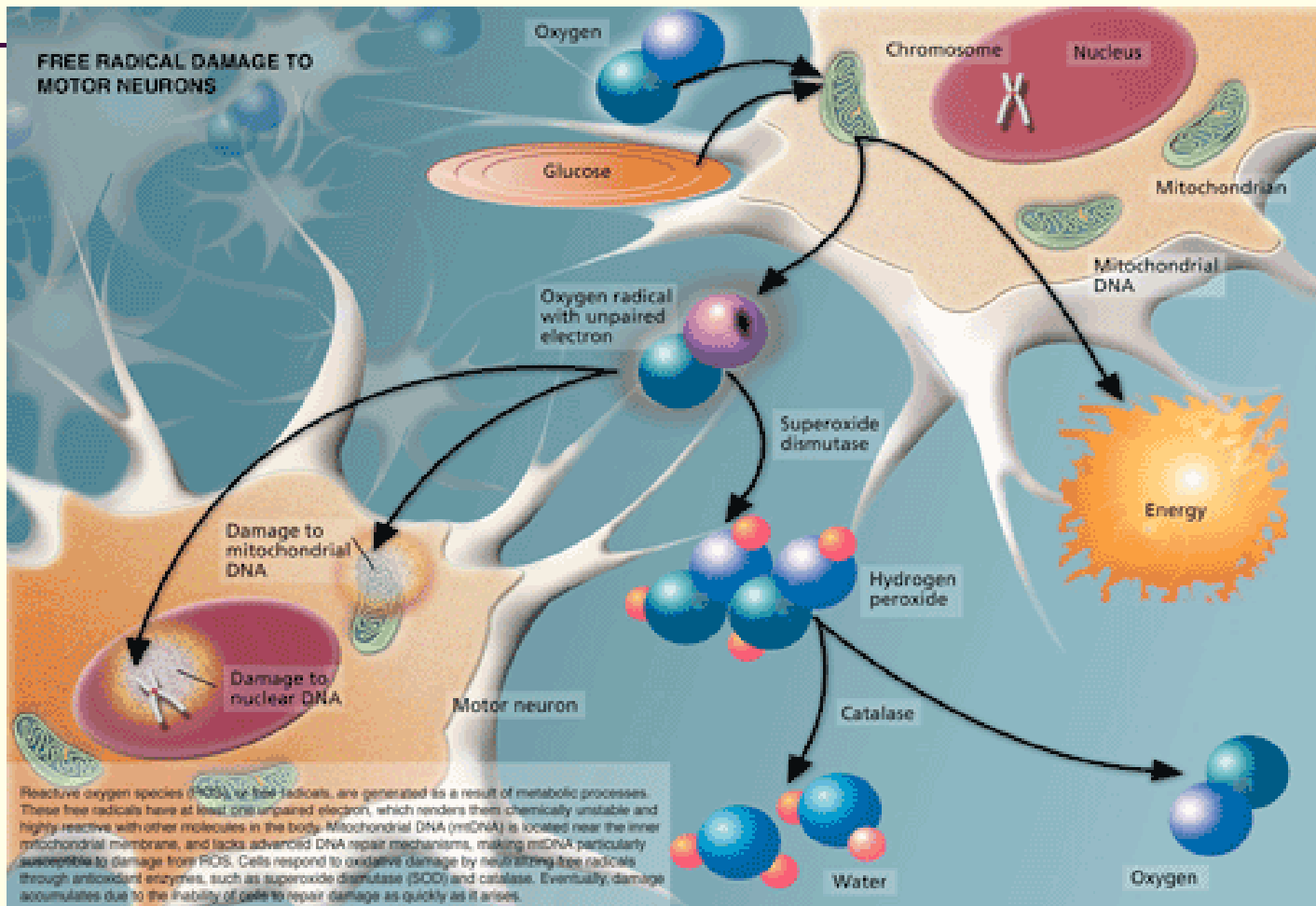
- Involved in many healthy cellular functions
- Normal part of life
- Useful *under controlled conditions*
- Left unchecked, harm cells.

# Cost of Free Radicals

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- **Excess free radicals damage**
  - Cellular membranes
  - Enzymes
  - DNA
- **Cell damage results in**
  - Tissue breakdown
  - Immune compromise
  - Cellular mutations
- **Neuronal tissue**
  - Most susceptible to oxidative damage by free radicals

# Cost of Free Radicals





# Free Radicals = Reactive Oxygen Species

<b>ROS</b>	<b>Endogenous Antioxidant</b>	<b>Exogenous Antioxidant</b>
Hydroxyl radical	Glutathione peroxidase (cofactor selenium)	Vitamin C, Alpha-Lipoid acid
Lipid Peroxide	Glutathione Peroxidase (cofactor selenium)	Vitamin E, Beta-carotene
Hydrogen Peroxide	Catalase (cofactor Iron)	Vitamin C, beta-carotene, alpha-lipoid acid
Superoxide Radical	Superoxide dismutase (cofactor Cu/Zn/ Mn)	Vitamin C

# What is *Oxidative Stress*?

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# *Diseases* linked to Oxidative Stress

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- Diabetes
- Alzheimer's
- ALS
- Parkinson's disease
- Huntington's disease
- Autism?

# *Autism* as an Oxidative Process

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- **“Autism is not a brain disorder but a disorder that affects the brain.”**
  - Martha Herbert, MD
- **The brain is downstream of the body**
- **If the body suffers an oxidative burden, the brain is deeply affected.**

# Autism as an Oxidative Process

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- Kern JK. Jones AM. **Evidence of toxicity, oxidative stress, and neuronal insult in autism.** Journal of Toxicology & Environmental Health Part B: Critical Reviews. 9(6):485-99, 2006 Nov-Dec
- **The oxidative burden of children on the spectrum far exceeds the oxidative burden of neurotypical children**

# Sources of Oxidative Stress

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- **Toxicants such as heavy metals**  
Mercury, Lead, Arsenic, Tin, Cadmium, pesticides, etc.
- **Viral infections**  
Herpes simplex virus, Measles, Cytomegalovirus, Epstein Barr Virus, Varicella, etc.
- **Natural activity**  
Immune reactions, Detox reactions, Cellular Energy Production
- **Diet**  
Chemically-altered fats from commercial vegetable oils and all oils heated to very high temperatures
- **Genetic susceptibility.....**

# Sources of Oxidative Stress

## *Genetic Susceptibility or Vulnerability*

- No one autism gene, but a series of genes
- Single Nucleotide Polymorphisms (SNPs) cause impaired activity
- SNPs make children more vulnerable to Oxidative stress

James SJ. Melnyk S. Jernigan S. Cleves MA. Halsted CH. Wong DH. Cutler P. Bock K. Boris M. Bradstreet JJ. Baker SM. Gaylor DW. **Metabolic endophenotype and related genotypes are associated with oxidative stress in children with autism.** American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: the Official Publication of the International Society of Psychiatric Genetics. 141(8):947-56, 2006 Dec

# Sources of Oxidative Stress

## *Genetic Susceptibility*

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- **MTHFR - Methylene tetrahydrofolate reductase**
  - folate metabolism
  - elevated homocysteine levels
  - defective methylation capacity
  
- **MS - Methionine Synthase**
  - B12 dependent methylation of homocysteine
  
- **CBS - Cystathionine Beta- Synthase**
  - joins the methyl and sulfur pathways in the body
  
- **PON-1: Paraoxonase**
  - regulates the breakdown of organophosphates (pesticides)



# Sources of Oxidative Stress

## *Genetic Susceptibility*

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### ■ **Glutathione-S-transferase**

- **Glutathione activity**
- **Regulates detoxification**

**Risk of autistic disorder in affected offspring of mothers with a glutathione S-transferase P1 haplotype.** Williams TA. Mars AE. Buyske SG. Stenroos ES. Wang R. Factura-Santiago MF. Lambert GH. Johnson WG. Archives of Pediatrics & Adolescent Medicine. 161(4):356-61, 2007 Apr

### ■ **Superoxide dismutase 2 - A16V**

- **Potent Antioxidant activity in cell cytosol**

# Testing for Oxidative Stress

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## ■ Organic Acid Markers

- **8 Hydroxy-2'-deoxyguanosine**  
DNA Oxidation end product
- **P-hydroxyphenyllacetate**  
Pro-oxidant and carcinogen

■ **The Great Plains Laboratory**  
913-341-8949

■ **Metametrix Clinical Laboratory**  
800-221-4640

# Testing for Oxidative Stress

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- **Oxidative Stress Panel (Blood and Urine)**
  - **Genova Diagnostics**  
**1-800-522-4762**
  - **Glutathione**
  - **Lipid peroxides**
  - **Superoxide Dismutase**

# Oxidative Stress (Blood/Urine)



63 Zillicoa Street  
Asheville, NC 28801  
© Genova Diagnostics

Patient: **SAMPLE PATIENT**

Order Number:

Completed:

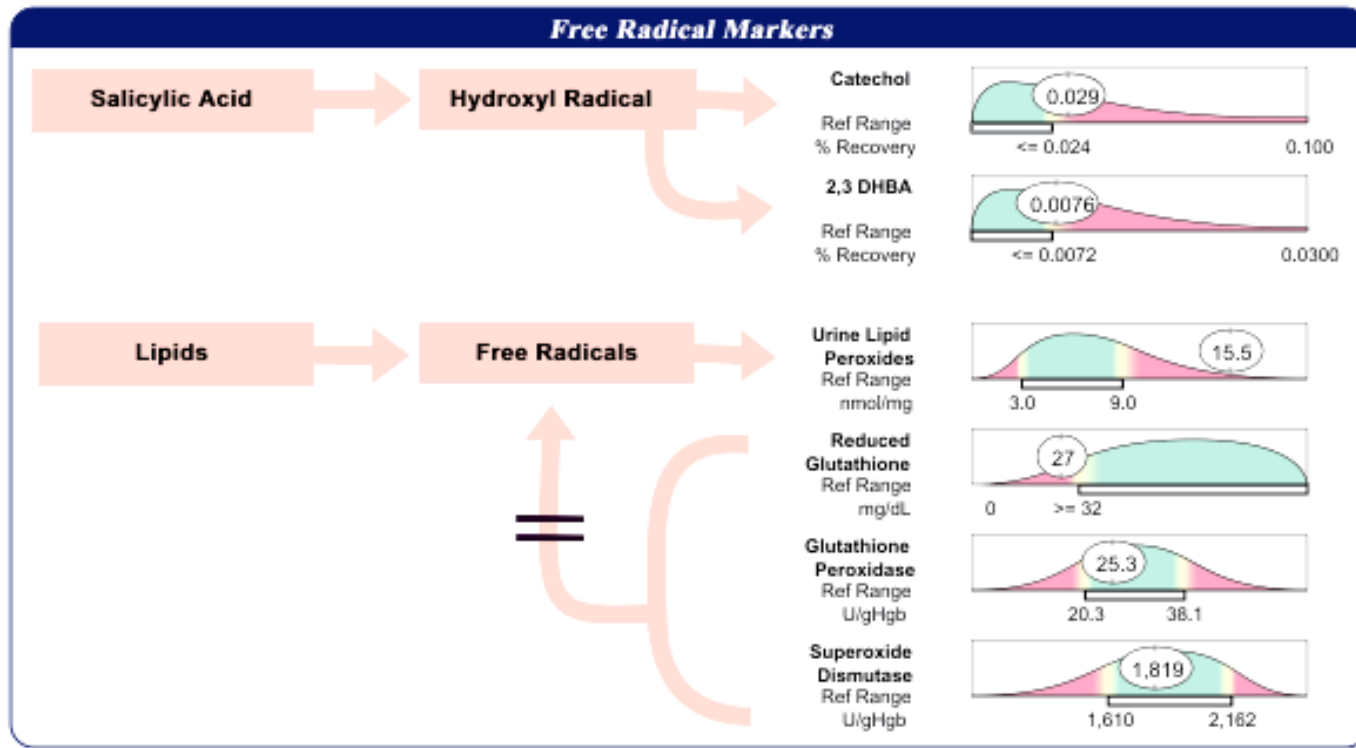
Age: 39

Received:

Sex: F

Collected:

MRN:



# Testing for Oxidative Stress

## *Intracellular Antioxidants*

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### **Functional Intracellular Analysis**

- **Spectracell Labs**  
**800-227-5227**
- **Tests Lymphocytes for nutritional history**
- **Comprehensive panel includes individual antioxidant nutrient levels**  
**(Vitamin A, Vitamin E, Glutathione and COQ10)**
- **SPECTROX Marker**  
**Antioxidant function within the cell**

# Testing for Oxidative Stress

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- **Nitrotyrosine levels**

- **Marker of nitric oxide–derived oxidation**
- **Vitamin Diagnostics Lab (732)583- 7773**

- **8-hydroxyguanosine (8-OHG)**

- **Ubiquitous marker of RNA damage and oxidative stress**
- **Laboratoire Phillpe Auguste in France**  
**Email: [contact@labbio.net](mailto:contact@labbio.net) or 0033143675700**
- **[www.labbio.net](http://www.labbio.net)**

# Testing for Oxidative Stress

## *Identify the Cause*

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### ■ Heavy Metal Testing

- Provocative challenge with EDTA, DMPS or DMSA
- Hair Analysis

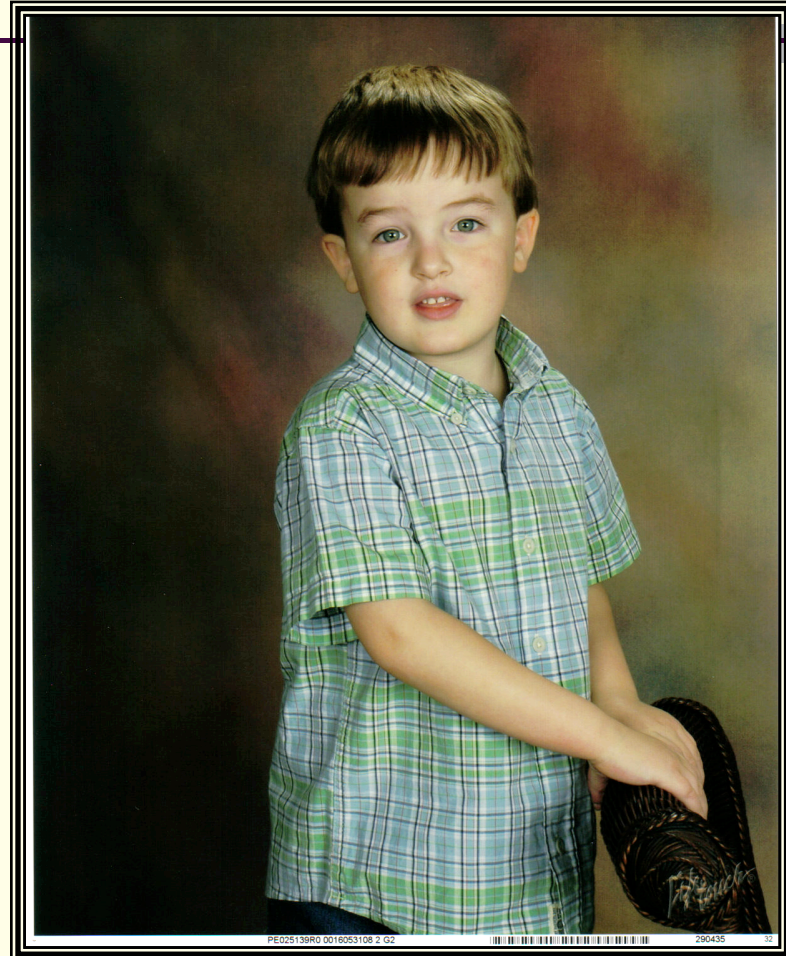
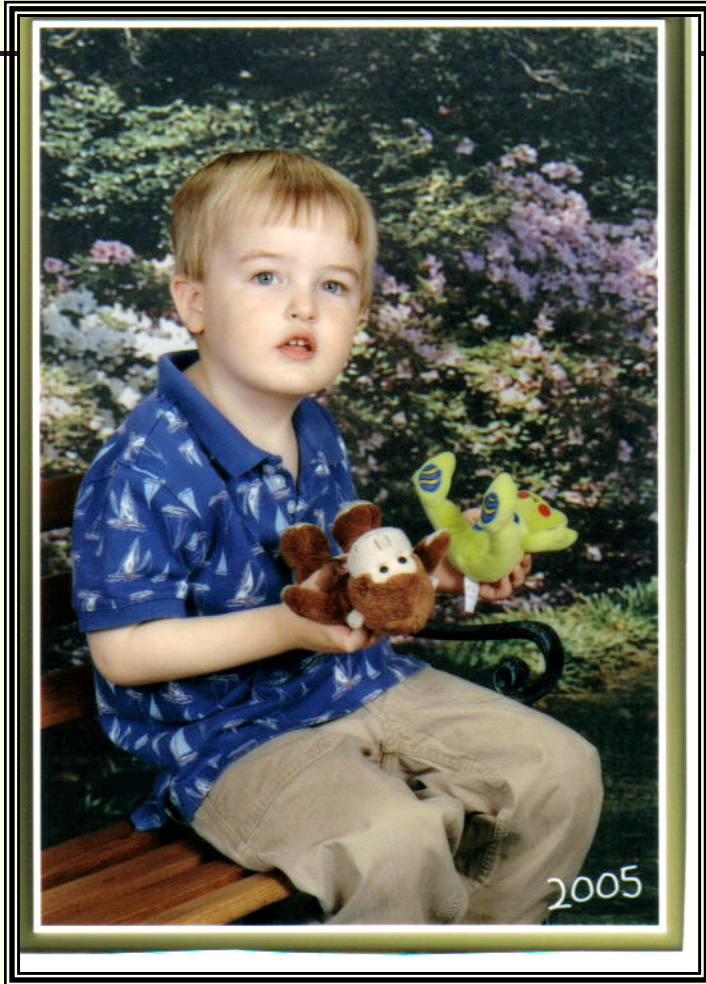
### ■ Food Allergy Testing

- IgG and IgE Antibodies to foods

### ■ Immune Testing

- Antibody titers to viruses such as HSV-6, CMV, EBV, MMR.
- Antibody titers to bacteria such as Antistreptolysin O (ASO)

# Why are we here?





# Treating Oxidative Stress

## *Dietary Choices*

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### ■ Vegetables

- Beans
- Tomatoes
- Brightly colored greens and yellows

### ■ Fruits

- Cranberries
- Blueberries
- Blackberries
- Pomegranates



**“Let your food be your medicine and your medicine be your food”**

**Hippocrates 460 – 359 BC**

# Treating Oxidative Stress

## *Dietary Choices*

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### ■ Spices

- Cinnamon
- Cloves
- Oregano



### ■ Nuts

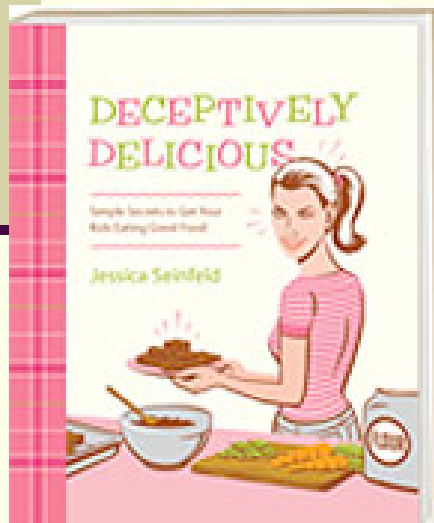
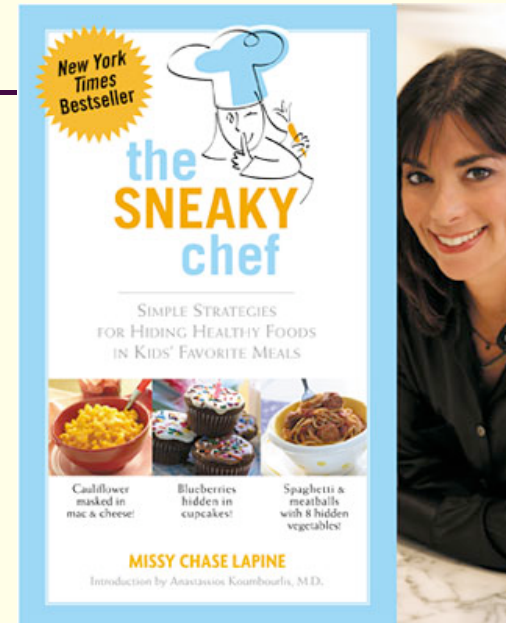
- Pecans
- Walnuts
- Hazelnuts



# Treating Oxidative Stress

## *Dietary Choices*

**The Sneaky Chef Cookbook**  
**by: Missy Chase Lapine**  
[www.thesneakychef.com](http://www.thesneakychef.com)



**Deceptively Delicious**  
**By: Jessica Seinfeld**  
[www.deceptivelydelicious.com](http://www.deceptivelydelicious.com)

# Treating Oxidative Stress

## *Glutathione Replacement*

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### ■ **Reduced L-glutathione**

- **Also known as Glutathione or GSH**
- **Most powerful naturally occurring antioxidant in human cells**
- **Any source of oxidative stress depletes GSH**
- **Intravenous (IV) GSH is 100% absorbed**
- **E-GSH - Oral Glutathione replacement**
  - **Wellness Pharmacy 1-800-227-2627**
    - **1/4 tsp for every 30 lbs of child 2x per day**

# Treating Oxidative Stress

## *Antioxidant Supplementation*

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- **Vitamin A: 5000 IU/ day**
  - Cod Liver Oil
- **Vitamin C: 1-3 grams/ day**
  - Citrus and spinach
- **Vitamin E: 30 IU/ day- 400iu/ day**
  - Nuts and vegetable oils
- **Zinc: 20 mg/day**
  - Meats and nuts

# Treating Oxidative Stress

## *Antioxidant Supplementation*

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### ■ **Melatonin**

- **Perfect antioxidant**
- **Encourages sleep**
- **Stimulates immune system**
- **Regulates circadian rhythm**
- **1-3 mg one hour before bedtime**

# Treating Oxidative Stress

## Treating the Cause - Detoxification

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### ■ **Get Bowels Moving**

#### ■ **Probiotics**

10 -20 billion units per day

#### ■ **Water**

Half body weight in ounces per day-minimum  
Ideally 24-32 oz

■ If your child's constipation persists with probiotics and water...consult a doctor

### ■ **Investigate the cause:**

food allergy, yeast, motility issues, etc, etc.

# Remove the Source

## *Gentle Strategies for Detoxification*

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### ■ **Far Infrared Sauna Therapy**

- **Greater detox potential than conventional sauna**

- **Elimination of water and fat soluble toxins**

- **High Tech Health            1-800-794-5355**

- **Sunlight Saunas            1-877-292-0020**



# Remove the Source

## *Gentle Strategies for Detoxification*

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### ■ Epsom Salt Baths

- Magnesium sulfate
- Detoxifying
- Mild Sedative
- Add 1-4 cups of Epsom salts to bathwater
- Safe for the whole family

# Treating Oxidative Stress

## Protecting the Family

- **The Relationship Between Autism and Parenting Stress**

Laura A. Schieve, PhDa, Stephen J. Blumberg, PhDb, Catherine Rice, PhDa, Susanna N. Visser, MSa and Coleen Boyle, Ph

PEDIATRICS Vol. 119 Supplement February 2007, pp. S114-S12

- **Parents of children**

- With autism were more likely to score in the high aggravation range **(55%)**
- Than parents of children with developmental problems other than autism **(44%)**
- Than parents of children with special health care needs without developmental problems **(12%)**
- and parents of children without special health care needs **(11%)**

# Treating Oxidative Stress

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## Protecting the Care giver

**Red wine consumption increases antioxidant status and decreases oxidative stress in the circulation humans.**

Micallef,M , Lexis,L and Lewandowsk,P. *Nutrition Journal* 2007, 6:27doi:10.1186/1475-2891-6-27

### **Dose:**

400mL/ day for two weeks decreases oxidative burden

# *Other Therapies*

## With Antioxidant Potential

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- Methyl B12 injections
- Heavy metal chelation
- HBOT
- Antiviral therapies
- CoQ10
- Intravenous therapies
- Phosphatidylcholine
- NAC/ ALA
- Selenium