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The "Father" of Environmental Medicine.

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## Overview of what we'll cover

- SENSITIVITY to chemicals.
  - What has been proven.
  - What has not been proven.
- Cases of several "typical" patients
- Warning signs
  
- TOXICITY to Chemicals
  - How your liver does its damndest to get rid of foreign chemicals, like pesticides.

## Sensitization

- Can be due to toxins like pesticides, or other kinds of chemicals
  - But also to "innocuous materials"
  - Ex: Dust, dog dander, pollens
- Once it occurs and progresses, may be extreme sensitivity to tiny exposures.
- Spreading sensitivity to "other" chemicals

## Attitudes about Chem Sensitivity

- Most MDs would say: "Unproven."
- Why?
  - Our scientific method depends on measuring
  - Examples: fatigue, headache
- Most patient symptoms not measurable
- Most affected people do not work in factories where many people are exposed to same chemical.

## Proven medical conditions

- Occupational Asthma
  - Many people with same exposure
  - Able to control exposure and measure
    - Reaction comes soon after exposure
- Brain function Impairment
  - Very expensive
  - May be much delayed after exposure, so harder to establish cause and effect relationship.
- Sick Building Syndrome
  - Partially established

## How Occup Asthma is Proven

- Suspicion: Several factory workers with asthma, exposed to a particular chemical, EX: Toluene Di-isocyanate (TDI)
- Pulmonary Function Tests (PFTs)
- Inhale small dose of TDI, check PFTs.
- Increase dose of TDI, check PFTs.
- If a low dose causes 20% drop in PFTs, Diagnosis of TDI sensitization asthma.

## Occupational Asthma – I Known chemical causes

- Ethyl cyanoacrylate
- Methyl 2 cyanoacrylate
- Ethyl Methacrylate
- Methyl Methacrylate
- Ethoxy BPA diacrylate
- Formaldehyde
- Glutaraldehyde
- Aluminum
- Chromium comp'ds
- Cobalt
- Nickel compounds
- Palladium
- Platinum
- Tungsten Carbide
- Zinc Chloride fumes

## Occupational Asthma II Known chemical causes:

- Ethylene diamine
- Hexamethylene tetramine
- N,N-Dimethyl-1,propanediamine
- Triethylene tetramine
- EPO 60
- 4-Methylmorpholine
- P-Phenylene Diamine
- Trimethylhexanediamine + Isophoronon-diamine
- Piperazine dihydrochloride
- Ethanolamine
- N,N-dimethylethanolamine
- Triethanolamine

## Occupational Asthma III Known chemical causes:

- Chlorendic anhydride
- Hexahydrophthalic anhydride
- Himic anhydride
- Maleic anhydride
- Methyltetrahydrophthalic anhydride
- Phthalic anhydride
- Trimellitic anhydride
- Pyromellitic anhydride
- Benzalkonium Cl
- Chloramine T
- Toluene Diisocyanate
- Captofol
- PLUS
  - 71 occupations
  - 48 more chemicals
  - 4 large categories.

## Occupational Asthma IV

- QUESTIONS:
- If a chemical is not on the list, it can't cause asthma. Correct?
- If a patient believes that a chemical known to cause asthma, like TDI, causes her some other kind of problem, like abdominal pain, it is likely to be "all in her head." Correct?

## Sensitization I: Major exposure

- Case: 53 year old woman from Cheyenne.
- Single blast from neighbor spraying shrubs
- Wiped off the moisture, went back to work
- That night, very bad case of "flu"
- 6 years later, still felt like she had the "flu"
  - Sick most of the time, unable to work
  - Very sensitive to a wide array of chemical exposures
- What would you have advised her to do?

## "Classic" TDI Sensitization

- 45 year old male factory worker w/ asthma
- Work at factory for 13 years, no symptoms
- Then frequent "colds" and "viruses." Then chest tightness much of the time.
  - At first better on weekends.
  - Then better only after days on vacation
- Eventually not able to walk by outside of the factory without getting asthma

## “Classic” TDI Factory worker II

- Points:
- Most workers in same factory do not develop symptoms. Why did this man?
- Many sensitized patients have problems with DeTox mechanism. Did he?
- \*\*Staying on the job and in the exposure makes vulnerability to symptoms worse.

## Some Sx of Chem Sensitivity

- “Can’t think straight”
- Irritability
- Anxiety
- Depression
- Headache
- Fatigue
- Low Stamina
- Tight chest (not asthma)
- Stomach ache
- Nausea
- Diarrhea
- Constipation
- Insomnia
- Sleepiness
- Rashes
- Anger

## Life for the Chemically Sensitive

- Life is a lot more constricted
- Get sick if you go to the mall or drop off your car for maintenance
- Get sick if you go to church – perfumes are made from a rich mix of chemicals
- Have to ask friends not to wear aftershave or perfumes
- May not be able to keep appointments
- Many or most people cannot work

## Perspectives from seeing patients

- Pesticides sensitization not different
- A person sensitive to one chemical likely to become sensitive to other types.
- Once reactions begin, continued exposures lead to greater sensitivity.
- BUT Pesticides are more toxic than many other chemicals.
- Lower deTox ability seems associated with increased risk of Sensitization.

## Do you influence your DeTox?

- Exercise
- Smoking
- Alcohol
- Tylenol (and others)
- Char-broiled foods
- Food choices
- Fiber in diet
- Nutritional deficiencies

## Detoxification processes

- Basic problem: Fat soluble chemicals can’t be carried in blood
- Liver excretes some in bile, but “can” be re-absorbed
- Basic DeTox mechanism
  - Modify the molecule to make it water soluble
- Genetic DeTox variability known– small changes = less glutathione than usual.

## DeTox Basics I

- IF chemical can't be excreted in bile (need fiber in the diet to attach to):
- In Phase I, liver cells attach an oxygen to the chemical, readying it for Phase II
- In Phase II, another molecule (like glutathione) attached, so chemical is now water soluble.
- Problem: often after phase I, the chemical is MORE toxic than before.

## DeTox Basics II

- Phase I can run slowly, but less often than Phase II running slowly.
- SO: if phase I is running fast, and phase II is running slowly, may get a "Pile-up" of more toxic molecules, and damage cells and tissues.
- Therefore: Want Phase II running well, and then Phase I to keep up.

## -DeTox Basics III – Why a slow Phase II?

- Not enough signals to run fast
- Needed Molecules used up - heavy load
- Not enough raw materials in diet
- Lack of nutrients needed for cell enzymes
- Lack of energy to support enzyme function
- Genetic defects in making attachment molecules, like glutathione

## DeTox IV – What speeds up Phase II? You want these:

- Broccoli, Brussels Sprouts, Cabbage
- Orange and Tangerine (whole fruit)
- Turmeric (Curry), Dill Seed, Caraway seed
- Adequate levels of protein, plus
  - Vitamin C,
  - Vitamin B complex.
  - Minerals, particularly Magnesium, Zinc, Copper and Selenium.
- Exercise (helps mitochondria produce energy)

## DeTox V What slows up Phase II? Want to avoid these.

- Alcohol (in excess)"uses up" glutathione
- Tobacco (particularly smoke)
  - Have to deTox nicotine
  - Have to deTox toxic chemicals created.
- Tylenol (Acetamenophen or APAP)
  - (more than 1-2 a day regularly)
  - Requires a glutathione molecule for every Tylenol molecule.

## DeTox VI What slows up Phase I? Don't want this if Phase II working:

- Antihistamines
- Librium, Valium
- Grapefruit (30% slower)
- Aging (can't avoid, so have to be sure to meet nutrient needs)

## DeTox VII – What speeds up Phase I?

- |                     |                        |
|---------------------|------------------------|
| Vitamin C           | • Char-broiled meats   |
| Vitamin B1, B3      | • Alcohol              |
| High Protein Diet.  | • Nicotine             |
| Broccoli, Cabbage   | • Exhaust gases        |
| Brussels Sprouts    | • Paint Fumes          |
| Oranges, Tangerines | • Dioxin               |
| Caraway, Dill seeds | • Carbon Tetrachloride |
|                     | • Pesticides           |

## DeTox VIII – Summary: what you want

- Fiber in Diet: bran, psyllium seed husks, fruits and vegetables. Absorb toxins in bile.
- Exercise: keep the energy generation up
- Vitamin C 500 to 1000 twice a day
- Multi-Vitamin/Mineral, with 300% or more of B complex, plus Zinc 15-20 mg, Copper 1-2 mg, Selenium 200 mcg, Magnesium citrate 400-800 mg in two doses.
- +/- Milk thistle (silymarin) 200 mg twice a day, helps liver function.

## DeTox IX – What to avoid:

- Larger amounts of Alcohol
- Regular use of tobacco
- Regular heavy daily use of Tylenol (acetaminophen)
- Foods with little beside calories
  - (white flour products like pasta or bread)
  - white rice or white potatoes, refined sugar
- “Unnecessary” chemicals at home (stored paints, fuels, pesticides)

## How would you know you're at particular risk?

- Parent or sibling with sensitivities.
- Personal reactions to “other” chemicals like perfumes, fresh paint, road tar
- (possibly) Unexplained symptoms that come and go
- Known recent carbon monoxide exposure
- Recurrent symptoms at work, particularly if better on weekends, or on vacation

## Vulnerability increase I

- Case: 29 year old Chinese woman, graduate student in chemistry.
- 18 months work at lab at CSU
- Steady worsening of symptoms at work.
- Lived in a (cheap?) basement apartment
  - Furnace in closet off bedroom.
- Carbon Monoxide ties up part of the DeTox mechanism.
- Phase I DeTox molecule very similar to hemoglobin.

## Big exposure? What to do:

- Wash off immediately, and change out of any clothes which were affected.
  - Minimizing exposure more important than modesty.
- IV Vitamin C 20-30 grams.
  - If not possible, Vitamin C by mouth 4000 every 3 hours for 3-5 days.
- Medical oxygen at 4 L/minute for 3-4 hrs.
- If possible, IV Glutathione

## Treating chemical sensitivities I

- Decrease "Total Load."
- Remove unnecessary chemicals at home
  - Non-chemical cleaning agents, etc.
  - Store paint outside the house
  - Don't sleep in bedroom above the garage
- Minimize avoidable chemical exposures at work and activities
- Avoid/limit household mold exposure

## Treating Chemical Sensitivities II

- "Medical" measures:
- No Drugs available.
- Medical Oxygen
- IM/IV/special forms of Glutathione.
- High concentration SL Hydroxocobalamin
- Intra-nasal Selenium, Strontium
- Special allergy treatment (LDA)

## Re-Cap

- Most chemical sensitivity not recognized by medical profession. Not measurable, so minimally researched.
- Impaired ability to DeTox often associated with risk of sensitization
  - Vulnerability may be partly genetic
- You can significantly influence your DeTox capabilities

## Recap II

- Sensitization: No typical symptom pattern.
  - Avoidance and intentional challenge best way to establish correlation.
- Avoidance best way to avoid sensitization
- Avoidance of all exposures best treatment.
- Medical interventions only partially help

## If you suspect you are sensitized or have a defect in your DeTox ability

- Small number of physicians in the country
  - American Academy of Environmental Medicine. [www.aaemonline.org](http://www.aaemonline.org)
- Over the phone no charge 10 min consult:
- Dr. Ken Gerdes 719-597-6075