EnvironMental & EleMental Toxins in Neurological Disease

• Metal Exposure in Children with physical and neurological disorders
ترحيبات
• .....a minimum of 40% of autism cases are likely to have an environmental cause.

• Environ Health Perspect. 2006 July; 114(7): 1119–1125.
• The CHARGE Study: An Epidemiologic Investigation of Genetic and Environmental Factors Contributing to Autism
The Environmental Contribution

„Children today are surrounded by thousands of synthetic chemicals. Two hundred of them are neurotoxic in adult humans

...fewer than 20% of high-volume chemicals have been tested for neurodevelopmental toxicity.“

Landrigan, Philip J MD, MSC, Dept of Pediatrics, Children’s Environmental Health Center, Mount Sinai School of Medicine, NY, NY. Current Opinion in Pediatrics 2010, 22:219-225
Brick Township, N.J. an industrial city in the USA, known for its toxic landfill, has 3x more Autistic Children than other industrial cities.

Mercury is one of the toxins deposited in that landfill.

Sampling showed elevated levels of cadmium and a low-level presence of volatile organic compounds (VOCs) in groundwater and wells in and around the site.

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Common toxicological reactions to metal overexposure

- Enzyme dysfunction
- Cell death
Autism: CHARGE STUDY 2006
contributing causes are

Genetic and Environmental factors

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The Detoxification Pathway
(also a form of enzyme dysfunction)
internally regulates
AND PROTECTS
from
TOXIC EXPOSURE

THE GENETIC CONNECTION

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## GSTM1 & GSTT1 deletion in Arab populations

<table>
<thead>
<tr>
<th>Gene</th>
<th>Bahraini</th>
<th>Lebanese</th>
<th>Tunisians</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSTM1</td>
<td>49.7%</td>
<td>52.5%</td>
<td>63.4%</td>
</tr>
<tr>
<td>GSTT1</td>
<td>28.7%</td>
<td>37.6%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

Combined analysis of both genes revealed:

- 14.4% of Bahrainis
- 16.3% of Lebanese
- 21.0% of Tunisians harbor deletion of both genes
Toxins affect fetal development in the prenatal phases

- Transplacental exposure to heavy metals may affect child growth and cause neuro-developmental delays.
- Efforts should be made to measure and quantify maternal exposure to heavy metals in placenta to estimate environmental prenatal exposure.
• A significant, positive correlation was established between the parity of the examined women and the umbilical cord blood contents of lead and mercury.

• The obtained results support the opinion that human placenta does not form an effective barrier to toxic metal intake by the fetus.

• **Ginekol Pol.** 1989 Mar;60(3):151-5.

• The intrapartum content of toxic metals in maternal blood and umbilical cord blood.

• **Sikorski R, Paszkowski T, Sławiński P, Szkoda J, Zmudzki J, Skawiński S.**
Mercury, Lead and Cadmium pass the placenta and damage placenta cells.

Prenatale exposure correlates with reduced birthweight and developmental problems.

The amount of exposure during the specific time of development determines the extent of the damage.
How toxines influence postnatal development

Brain development continues for an extended period postnatally. The brain increases in size by four-fold during the preschool period, reaching approximately 90% of adult volume by age 6 (Reiss et al. 1996; Iwasaki et al. 1997; Courchesne et al. 2000; Kennedy and Dehay 2001; Paus et al. 2001; Kennedy et al. 2002; Lenroot and Giedd 2006).

During the first year -and rapid brain development- is the best time for corrections.

This is the time when CNS-damaging metals (Aluminum, lead, mercury) should be avoided.
We have reanalyzed the data set originally reported by Ip et al. in 2004 and have found that the original $p$ value was in error and that a significant relation does exist between the blood levels of mercury and diagnosis of an autism spectrum disorder.

Moreover, the hair sample analysis results offers support that persons with autism may be less efficient and more variable at eliminating mercury from the blood.
Toxic metals in umbilical blood

“Total mercury and methylmercury, cadmium, and iron were higher in cord blood than in maternal blood”

- Tsuchiya H, Mitani K, Kodama K, Nakata T
- Placental transfer of heavy metals in normal pregnant Japanese women.
- Archives of Environmental Health[1984, 39(1):11-17]
OTHER DIAGNOSTIC TESTS

Hair Analysis reflects chronic exposure ( = past exposure, usually over longer time)

Urine metal concentration reflects metal exposure or intake within 72hrs (= immediate exposure)
Chronic Metal Exposure in Children of Rio de Janeiro, Brasil

- Data was collected from Brazilian, German and US population of various age groups during September 1997 to March 1998.
- Total number of hair samples = >10,000

Reason for study:
- increase in criminal juvenile behaviour
Lead (Pb) levels in hair of Brazilian children
43% of children younger than 6 years showed pathological results, compared with 24% of adults >31 yrs
### HAIR Metal Analysis of 149 Punjabi People

#### % Pathological Test Results

<table>
<thead>
<tr>
<th>N= number of testpersons</th>
<th>Cadmium</th>
<th>Manganese</th>
<th>Lead</th>
<th>Uranium</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients N=149</td>
<td>21</td>
<td>55</td>
<td>50</td>
<td>78</td>
</tr>
<tr>
<td>Adults age &gt;13 N=34</td>
<td>6</td>
<td>27</td>
<td>29</td>
<td>85</td>
</tr>
<tr>
<td>Children &lt;12yrs N=114</td>
<td>13</td>
<td>87</td>
<td>55</td>
<td>88</td>
</tr>
<tr>
<td>Children 6-12yrs N=54</td>
<td>4</td>
<td>83</td>
<td>28</td>
<td>87</td>
</tr>
<tr>
<td>Cerebral Palsy N=48</td>
<td>21</td>
<td>67</td>
<td>58</td>
<td>77</td>
</tr>
<tr>
<td>Down Syndrom N=8</td>
<td>13</td>
<td>25</td>
<td>50</td>
<td>63</td>
</tr>
<tr>
<td>Mild Retardation N=20</td>
<td>15</td>
<td>40</td>
<td>30</td>
<td>80</td>
</tr>
</tbody>
</table>

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Urine Metal Analysis

Punjabi children age 3-12yrs with healthy renal function

Of the 55 children, 47 showed elevated **baseline urine levels** of one or more toxin-

**reflection of an immediate exposure**

<table>
<thead>
<tr>
<th></th>
<th>Reference Range for Normal Urine mcg/L</th>
<th>Baseline Urine in mcg/g Crea Mean Value</th>
<th>Exceeding Reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>&lt;8.22</td>
<td>78</td>
<td>9.5x</td>
</tr>
<tr>
<td>Cadmium</td>
<td>&lt;0.2</td>
<td>0.92</td>
<td>4.6x</td>
</tr>
<tr>
<td>Manganese</td>
<td>&lt;4.5</td>
<td>17.5</td>
<td>3.9x</td>
</tr>
<tr>
<td>Lead</td>
<td>&lt;5</td>
<td>43</td>
<td>8.6x</td>
</tr>
<tr>
<td>Uranium</td>
<td>0.06</td>
<td>0.65</td>
<td>10.8x</td>
</tr>
</tbody>
</table>
Urine Metal Analysis before and after DMSA
Punjabi children age 3-12yrs with healthy renal function

Lead detoxification - yes!

<table>
<thead>
<tr>
<th></th>
<th>Reference Range for Normal Urine mcg/L</th>
<th>Baseline Urine in mcg/g Crea Mean Value</th>
<th>Reference Range for DMSA Urine</th>
<th>DMSA challenge Mean Value</th>
<th>Detox Effect after DMSA &gt; Baseline value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>&lt;8.22</td>
<td>78</td>
<td></td>
<td>37</td>
<td>no</td>
</tr>
<tr>
<td>Cadmium</td>
<td>&lt;0.2</td>
<td>0.92</td>
<td>&lt;0.8</td>
<td>0.42</td>
<td>no</td>
</tr>
<tr>
<td>Manganese</td>
<td>&lt;4.5</td>
<td>17.5</td>
<td></td>
<td>7.45</td>
<td>no</td>
</tr>
<tr>
<td>Lead</td>
<td>&lt;5</td>
<td>43</td>
<td>&lt;10</td>
<td>71</td>
<td>yes</td>
</tr>
<tr>
<td>Uranium</td>
<td>0.06</td>
<td>0.65</td>
<td></td>
<td>0.53</td>
<td>no</td>
</tr>
</tbody>
</table>

TMI Trace Minerals International Laboratory
Metal Exposure in the Children of Punjab, India

E. Blaurock-Busch, Albrecht Friedle, Michael Godfrey, Claus E.E. Schulte-Uebbing and Carin Smit

Research Director, Micro Trace Minerals Laboratory, Advisor, International Board of Clinical Metal Toxicology (IBCM) and German Medical Association of Metal Toxicology (Deutsche Arzteschaft für Metallothekologie); CEO, Labor Friedle, Regensburg, Germany. Director, International Board of Clinical Metal Toxicology, New Zealand. Age Breaking Center, Professor (E.U.), Munich, Germany. Neurotherapist, Synapse Neuro-Nutritional Clinic, Town Square, South Africa.

Corresponding author email: ebblbauo@pmx.de or ebbl@traceint.com

Abstract: Our test results documented that hair and urine mineral analysis results support each other. This is of interest, because hair analysis evaluates past exposure while urine analysis detects immediate exposure.

We evaluated barium, cadmium, manganese, lead and uranium in hair and urine. Our test results indicate that all of the children show evidence of past and immediate exposure to one or more metals.

Hair mineral test results for the 114 children aged 12 and younger showed some type of toxic metal exposure for each of the children. 8.8% exceeded the uranium reference range for hair. This indicates past and chronic exposure.

After our evaluation, 55 children aged 3–12 years who passed certain criteria were selected for urine baseline testing. Urine baseline concentrations are a direct reflection of immediate exposure. Of the 55 children, 47 showed elevated urine concentrations for one or more of the toxic levels above, indicating immediate exposure.

DMAS is recommended in an initial test for lead and other metals. We selected 55 children aged 3–12 for a DMAS (Dimercaptosuccinic acid) urine challenge test. Our results showed that 98% of this group showed lead concentrations above the baseline level, demonstrating lead binding and excretion. The DMAS challenge did not affect barium, cadmium, manganese and uranium, suggesting that these elements, DMA successfully the clearing agent for toxic.

In summary, hair and urine mineral testing demonstrated that chronic and immediate toxic exposure had affected our test group of Punjabi children. The DMAS challenge test was effective in destroying lead, but did not affect barium, cadmium, manganese or uranium.

Keywords: urine analysis, hair analysis, DMAS, barium, cadmium, manganese, lead, uranium, Punjab, India.
Hair Metal Concentration in KSA Children

<table>
<thead>
<tr>
<th>Metal</th>
<th>X-value in mg/kg</th>
<th>Reference Range mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>2.94</td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.62</td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>3.35</td>
<td>&lt; 0.3</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>4.56</td>
<td>&lt; 3.0</td>
</tr>
</tbody>
</table>

Metals in hair tissue reflect chronic exposure to multiple toxic metals.
### Urine Metal Concentration in KSA Children

<table>
<thead>
<tr>
<th></th>
<th>Autistic N=25 X-value in mcg/g creatinine +SD</th>
<th>Reference Range mcg/g creatinine</th>
<th>Test group N=25 X-value in mcg/g creatinine +SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>37.58 +/- 30.12</td>
<td>&lt; 15</td>
<td>32.06 +/- 45.26</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.41 +/- 0.26</td>
<td>&lt; 0.80</td>
<td>0.53 +/- 0.38</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td><strong>2.48 +/- 2.34</strong></td>
<td>&lt; 1.00</td>
<td>1.1 +/- 0.63</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td><strong>8.45 +/- 7.33</strong></td>
<td>&lt; 5.00</td>
<td>3.36 +/- 4.11</td>
</tr>
</tbody>
</table>

**Metals in urine reflect immediate exposure**

**The autistic show multiple exposure (Hg + Pb)**
### DMSA Detoxification of KSA Children

see [www.tracemin.com](http://www.tracemin.com)

<table>
<thead>
<tr>
<th></th>
<th>Autistic N=44 Baseline Urine Mean + STD mcg/g creatinine</th>
<th>Autistic N=44 DMSA challenge Mean + STD mcg/g creatinine</th>
<th>Reference Range mcg/g creatinine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>109 +/- 84</td>
<td>93 +/- 86</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.86 +/- 0.04</td>
<td>0.97 +/- 0.01</td>
<td>&lt; 0.8</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>3.35 +/- 3.81</td>
<td>16.12 +/- 36.6</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>31.48 +/- 11.5</td>
<td>41.48 +/- 11.5</td>
<td>&lt; 5.0</td>
</tr>
</tbody>
</table>
Lead (Pb) levels (mg/kg=mcg/g) in Hair of Children

TMI Trace Minerals International Laboratory
MULTIPLE EXPOSURE

Where does it come from?
Epidemiology:
July 2002 - Volume 13 - Issue 4 - pp 417-423

Perinatal Risk Factors for Infantile Autism
Hultman, Christina M.; Sparén, Pär; Cnattingius, Sven

Cases were 408 children (321 boys and 87 girls) discharged with a main diagnosis of infantile autism from any hospital in Sweden before 10 years of age in the period 1987-1994, plus 2,040 matched controls.

The risk of autism was associated with
• *daily smoking in early pregnancy*

Conclusion:
• Our findings suggest that intrauterine and neonatal factors related to deviant intrauterine growth or fetal distress are important in the pathogenesis of autism.
Al-Masry Al-Youm, a top-ranking official from the Cairo Water Authority stated:

• “When water leaves our treatment plants, it is 100 percent clean.”

• “The problem is not in the treatment plants but rather in old and low-quality pipes that don’t comply with Egyptian and international standards, alongside poorly-maintained water tanks that emit dangerous elements into the water.”

Egypt Independent, 07/03/2011
Air quality, Cairo

• The 2010 WHO data ranked Cairo as having the second-highest levels of particulates in the world after New Delhi.

• Another WHO report, issued a few years earlier, equated living in the city of 7.8 million to smoking a pack of cigarettes a day.

• Citizens are exposed to high levels of lead every day.

Fertilizers?!
The presence of heavy metals in fertilizers is well established.

- Analytical testing of a wide range of fertilizer products shows that some phosphate and micronutrient fertilizers, and liming materials contain elevated levels of arsenic, cadmium, and lead compared to other fertilizer types (e.g., nitrogen, potash, gypsum).

- German law requires DeCadmiumizing Phosphatfertilizer
Conclusion - autism + toxic metals

1. Hair analysis confirms long term multiple exposure in AUTISTIC children OF DIFFERENT NATIONALITIES

3. Urine analysis confirms multiple immediate toxic exposure in AUTISTIC children OF DIFFERENT NATIONALITIES

4. Exposure could be result of prenatal exposure. (Mothers should be checked)

5. Multiple Exposure could be result of postnatal exposure. Source: water, soil, food, air?
Conclusion - autism + toxic metals

Research indicates that detoxification ability is reduced in populations worldwide, including Arab populations.

Detoxification ability of the metal intoxicated autistic patients should be evaluated. With a limited detoxification potential, the body's detoxification ability must be supported through proper nutrition, chelation or other means.

EXPOSURE MUST BE AVOIDED!
AUTISMUS / ASPERGER SYNDROM/ ADHS

Autism & The Genetic Connection
• Booklet 1:
  Beat Autism Now- logically, effectively and inexpensively

Neurotoxic Metals Affecting Autism / Asperger / ADHD
• Booklet 2: Treat Autism logically, effectively and inexpensively
  &
Recommendation for research

• A more comprehensive and controlled study should follow, involving metal testing of healthy and sick children. (Cooperate with Dr. Omnia Raffat, Psych Dep Cairo University)

• We recommend testing of Detoxification Enzyme Systems of healthy vs autistic group

• We recommend comparing immediate metal exposure (urine or blood analysis) with detoxification ability of healthy vs autistic group

• To locate main source of exposure, we recommend comparing urine metal analysis of healthy vs ill children from regions with safe water and/or soil vs regions with contaminated water and/or soil. Results would indicate information about metal sources and metal absorption.
We have answers and solutions!

• Depending on study outcome, treatment modalities can be developed to counteract and treat chronic or acute intoxications.

• Depending on the metal source, detoxification treatments may involve
  – Provision of clean water
  – Nutritional correction
  – Phytotherapy (stimulation of natural detoxification processes)
  – Detoxification via DMSA chelation
Cooperation

• Detoxification treatments such as chelation therapy are well accepted in Germany and other countries.

• Organisations such as KMT (German Medical Association of Clinical Metal Toxicology) and IBCMT (International Board of Clinical Metal Toxicology) teach detoxification treatment to physicians.

• KMT and IBCMT would support Egyptian Efforts to organize similar organisations.

• in shaa Allah
THANK YOU!

E. Blaurock-Busch
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& Micro Trace Minerals

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