Factors Effecting Optimal Brain Function Compiled by Elizabeth Yates, MEd.

What factors effect learning?

Environmental Toxins

Developmental Disabilities can have origins in pre and post natal exposure to environmental toxins. Of the 85 thousand synthetic compounds man has made since WW II, 45 thousand of them are harmful to neurological development.
(See: "In Harm's Way: Toxic Threats to Child Development", by Greater Boston Physicians for Social Responsibility) One author is Dr. Ted Schettler.

- 0-9 mos. – fetal neurological development is highly vulnerable to thalidomide, smoke, alcohol, and the mother's nutrition
    - There is a connection between intelligence and behavior as the fetus is exposed to contaminants in the womb
    - Synthetic compounds can derail neurological development

- B-2 yrs – children play close to the ground, where there is carpet, soil, environments that often have synthetic compounds, pesticides, or dust.
    - pound for pound children are more exposed to food, water, air, dust, soil, and carpets that are treated with pesticides, synthetic compounds, flame retardant, or contain bacteria and germs.
    - Being an activist may help to reduce toxins, as the lead poisoning in paint.

- Fire retardants – a contaminant that binds with a protein inhibitor and minimizes the thyroid hormone (T-4). Thyroid hormone play a role in fetal brain dev. And is very vulnerable. The result of contamination is
    - impaired coordination
    - impaired speech
    - memory problems
    - mental retardation
    - learning disabilities

- Organophosphates – developed during WWII from nerve gas, they are used in agricultural pesticides sprays, r in such products as Raid. These have contaminated our air, water, soil, and food. Results of exposure to these contaminants are:
    - brain abnormalities
    - poor coordination
    - memory deficits
    - hyperactivity

- Phthalates – These are industrial chemicals used to soften plastics. They are also found in cosmetics and toys. The toxic cosmetics, as with lipsticks, that are ingested by the mother, have been found very suspicious in effecting the fetal development

- Undernourishment of the mother, has long-term threat to the developing fetus. (See: "Time" magazine, article by Dr. David Barker, Director of Environmental Epidemiology, U. of Southampton)

Essentials for Brain Efficiency

Hydration, Oxygen, Food (Nutrition), and Rest

- **Hydration and Oxygen**

"The brain requires about 200 gallons of blood each day to supply its high demand for both water and oxygen." - Eric Jensen, "Teaching with the Brain in Mind". People should drink 8 ounces of water per every 25 pounds of body weight per day, to allow for the optimal amount of water and oxygen to reach the brain.

- **Nutrition** – in "Feeding the Brain" Connors describes the effect that iron has on the electrical activity in the brain.

Lack of iron absorption causes anemia, which results in

- reduced cognitive functioning
- maladaptive behaviors
- poor motor development

Foods that inhibit iron absorption are: cereal, tannin in tea, bran, and soybean
Foods that contribute to iron absorption are: orange juice, broccoli, bell pepper
Consider what your child is eating every morning? Is there a variety?

Glucose, blood sugar from carbohydrates/ starches, found in foods such as fruits, vegetables, legumes (beans), grains, and dairy, will boost:

- active working memory
- attention
- motor functioning

Hypoglycemia (low levels of blood sugar) has a profoundly negative effect on learning and memory. "Children need nutrition-rich complex carbohydrates found in such foods as cereal, pasta, and rice to prevent hypoglycemia." (Eric Jensen)

Protein is critical to brain function. Tyracene enhances thinking. *Proteins are synthesized into neurotransmitters, such as dopamine and norepinephrine, both essential for:

- quick reactions
- thinking
- working memory*

Protein has shown a correlation to improved math competency, attention span, conscious awareness, and alertness.

*Unsaturated fats and other nutrients contribute to optimal brain function. Minerals and trace elements, including iron, zinc, iodine, selenium, ensure proper mood regulation, reduce fatigue, and improve concentration. Vitamins A, B, C, and E are essential for:

- brain maintenance
- protective effects,
- vision strength
- memory

Essential fatty acids (EFAs) play a role in cell membrane function and the development of the brain and eyes.*

- **Rest** – 8 to 9 hours of sleep per day allows the body to go through 5 REM cycles, essential for the brain to store information into long-term memory. Sleep deprivation impairs:
    - memory
    - energy
    - emotional well-being

High school students who go to bed late and rise early, typically miss out on the last 2 REM cycles. Doing this consistently, results in "Delayed Sleep Phase Disorder", *where the brain doesn't get ample opportunity to organize and store new learning. Teens will be seen in class as sleepy, drowsy, and academically underperforming.*

"Sleep deprivation impairs the ability to store information, increases irritability, and leads to chronic fatigue." – David Sousa, 1997

"Neural plasticity refers to the brain's ability to change and reorganize in response to some change in input from internal or external sources." – Merzenich, Taub, and Greenough, 1997

" The existence of plasticity demonstrates that the development of the brain is not dictated solely by genes." – Greenough and Black, 1997

Summary:

- **Eat a variety of nutritional foods, get plenty of rest, drink 6-8 glasses of water daily for optimal brain function.**
- **Toxins and the lack of the nutrition, water, and rest can have a profound effect on brain development.**
- **Learning disabilities are not just inherited. The brain's neural plasticity, the ability for adjustment and change in the neurons, can react to positive or negative change from the environment.**
- **Along with the aforementioned environmental influences, educational therapy, retraining the areas of deficit, can lead to restructuring of the brain.**

"NILD Educational Therapy should have an impact on chemically induced disorders. Success will depend upon how severely the neurological systems have been impaired. More research is needed." Dr. Kathleen Hopkins, DVD from NILD Conference, 2002, Portsmouth, VA

*Eric Jensen's "Teaching with the Brain in Mind"