

Impact of Health on Brain Development

Eastern Regional CHM Convention

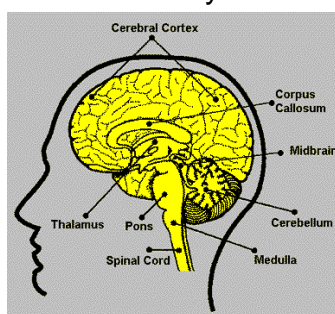
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I. Introduction –

“Since the mind and the soul find expression through the body, both mental and spiritual vigor are in great degree dependent upon physical strength and activity; whatever promotes physical health, promotes the development of a strong mind and a well-balanced character. Without health no one can as distinctly understand or as completely fulfill his obligations to himself, to his fellow beings, or to his Creator. Therefore the health should be as faithfully guarded as the character.” (White, Education, p195)

A. Basic Anatomy



1. Part of CNS – controls many body functions -- voluntary (walking, speaking) and involuntary (breathing/blinking)
2. Hemispheres (2) -> 4 lobes
Cerebral cortex – brain work: thinking, planning, remembering
different areas responsible for memory/learning; and stress/emotions
3. Neurons: basic building blocks
4. Most metabolically active organ
5. Blood volume to brain = 17% of cardiac output, 20% of body oxygen consumption;
6. Brain weighs 12% of total body weight at birth, Year 1 – 2X weight; 5-6 yrs - 3X

B. Development

1. Gestation – at 4 weeks neurons forming @ 250,000/min
 - a) organized, precisely in place
 - b) Weeks 15-20 rapid growth of neurons

2. Birth – 100 billion brain cells (neurons) formed,
 - a) most not connected except for basic connections – heartbeat, breathing, reflexes, function to survive
 - b) New synapses, pruning-> increase efficiency->8 mo=1,000 trillion synapses (dendrites branch, receive signals)
3. At 8 months –
 - a) Has ability to master 3,000 languages;
 - b) child initiates many of explorations
 - c) 20% body weight (2%) -> 2 yr =80% of adult weight of
4. 8 mo – 2 years: developing foundation for education: language, curiosity, intelligence, and sociability
5. By Year 3 – more connections than will need - 75% brain growth;
6. Peak growth of brain ages year 3, 7, 12, 15

C. Vision -- least developed of the senses

1. Newborn – least; vague patterns, 40x less accurate than adults
2. 3-4 months – wiring for sight

D. Brain tries to identify patterns – 18 seconds – pruning, wiring, rewiring

E. Talk, read, interact with child help stimulate brain to make more connections

II. Ways Health (Physical) can Affect Brain Development

A. Timing

1. Prenatal – Profound Impact, especially after 20 week;
 - a) Development
 - (1) Week 7 – Brain waves detected, surface still smooth;
 - (2) Week 8 -- Embryo now a fetus; brain signals muscles;

- b) Infections,
- c) Drugs –prescription, illegal (cocaine), Alcohol, Cigarettes
 - (1) Fetal Alcohol Syndrome
- d) What eat – amount, type

2. After Birth

- a) Nutrition
- b) Harmful Chemical Exposure
- c) Enrichment baby's life – less stress;
 - (1) cortisol released, slows brain growth (causes brain cells to do, \ connections between cells in certain areas of brain);
 - (2) Strong, + relationships -> lower levels cortisol.
- d) Critical periods
 - (1) 2-4 months – vision
 - (2) Infant—individual attention, responsive sensitive care giving critical for later language and intellection development; early stimulation, loving interactions -> stimulate brain to grow, synapses
 - (3) develop connections after birth
 - (4) Language before puberty or first 10 yrs.

B. Folic Acid – prevent 50-75% of NTD (anacephaly, spina bifida, myelomeningocele) –

1. Malaysia – 17.5% of fetal/neonatal deaths; Incidence 5.3x >UK
2. Take 3 months before and 3 mo after conception (400 mcg)
3. Over half threw away – “doctor pills” give bigger babies
4. Fortify flour, cereal (rice?), vitamins

C. Cognitive Function

1. Theoretically high metabolic & rapid development require energy & protein
 - a) Studies malnutrition/under-nutrition –supplement before 24 mo best, along with environmental stimulation;
 - b) Higher energy supplement->walked earlier (Indonesia)
 - c) Maternal diet influences likelihood of preterm birth and possibly cognitive/behavioral development
2. Premature Infants – early nutrition enriched with protein, vitamins & Min, more advanced (Isaacs, London)
3. Dehydration—children greater risk higher surface: mass ratio
 - a) Fluids necessary for circulation to brain, deliver nutrients, take away waste
 - b) TBW=75% @ birth -> 60% boys/50% girls by puberty

III. Ways to Support Brain Development

A. Diet – building blocks & Fuel – protein & carbohydrates (calories)

1. Hi Vitamin B - Folic Acid (teens, pre-pregnant, and pregnant, child)
 - a) Alleviate stress, depression, anxiety; prevent neural tube defects
 - b) Eat whole grains, nuts, bananas, brown rice, eggs, leafy greens, peas, poultry, wheat germ, organic raisins, molasses
 - c) Supplements when teens, community involvement, flour, etc.

2. Underdeveloped areas – encourage use of high caloric/protein/vitamin supplements
3. Breastfeeding – high fatty acids, close interactive stimulation,
 - a) 68% found / IQ
 - b) Premature: tube fed breast milk, more advanced @ 18 mo.
4. Fatty Acids – brain organ richest in lipids (40-60% fat); Good fats: fish oils, flax oil, canola oil (hemp oil?), tree nuts, avocados;
 - a) calm brain
 - b) Decreases s/s depression and anxiety
 - c) Growing brain cells -- stimulate development of myelin sheath
5. Blood sugar levels – even supply; Eat every 3-4 hrs; high quality protein and fiber; Cut back on processed sugar, white flour products, hydrogenated fats, and trans fats.
 - a) Adequate calories, low glycemic index – timing and composition of meals & snacks
 - b) Studies show child eats sugary breakfast, memory becomes like 70 yr old by 11 am

GI Values of Selected Foods

Western Foods	GI	Oriental Foods	GI
Boiled potato	100	Jianxi rice vermicelli, boiled	56
White bread	70	Mung beans	31
Banana	88	Mung bean noodles	39
Orange Juice	75	Rice noodles, Fresh	40
Apple	55	Rice noodles, Dried	61
Skimmed milk	46	Basmati rice	55
Whole meal flour	67	Broken Rice	86
All bran	38	Glutinous Rice	94
Muesli	81	Jasmine Rice	109
Maize meal porridge	55	Sushi	67
Lentils	35	Rice cracker	111
Apricots	61	Udon (Japanese wheat noodles)	58
Orange	42	Soba (buckwheat noodles)	56
Mango	51	Chinese noodles	47
Papaya	58	Garden milk bar bun	73
Pear	37	Linola seed bread	90
Butter beans	30	Doll fried noodles, boiled	88
Croissant	67	Taiwan vermicelli, boiled	68

http://www.afic.org/dietaryguide.php?news_id=1119&start=0&category_id=26&parent_id=26&arcyear=&arcmonth=

6. Fluids – necessary for circulation; decrease blood volume, shunt to vital organs, not as efficient
7. Safety source – avoid pesticides
8. Summary: Colorful fruits and vegetables, nuts, whole grains and quality proteins; Avoid sugar and artificial sugars and chemicals;

B. Play – Exercise

1. Explore environment – held, baby explore-> nerve connections; Older trip to museum, library, zoo, park – build baby's/child's brain
2. Movement – large motor->fine motor (jerky, Moro reflex->hand-eye coordination): cuddling, reading, rocking, reaching, grabbing, sitting, walking, running, jumping;
 - a) 6 mo+ begin fine motor;
 - b) 5 yr – musical fingering
 - c) Activities foster – objects within reach, readiness for drawing, playing violin, piano
3. Safety measures – safe, responsive, predictable play environment; avoid hi stress levels, bike helmet
4. Exercise -> / circulation, including brain
 - a) -> / endorphins & help prevent obesity
 - b) -> nutrients to brain & other systems to remove waste-> / growth and levels of brain chemicals
 - c) Minimize TV, video/computer games (/ ADD the intro ch. TV)

C. Music –

1. Synchrony to voices of caretaker, (Melody in mother's voice)
2. motor coordination, decreasing stress, develop certain areas of brain

D. Reading/Thinking- Language

1. 6 mo recognize vowel sounds for building speech;
2. Birth to 6-7 yr – sharpest recognition of speech;
3. 2 yr - adulthood vocabulary
4. Activities: talk baby, higher pitch singsong speech; read, variety of experiences

E. Emotions - Loving interactions

1. Relaxed, stress;
2. Birth-3y – stress response develops;
3. 2-10 empathy and envy
4. Neglect – not form nerve pathways patterns,

F. Sleep & Rest

1. Improves memory, mood, and brain function
2. Lack sleep -> / stress hormone, cortisol -> \ concentration and brain cell production;

IV. Brain Damaging Habits?

V. Using what we've learned –

References:

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Secret Life of the Brain

<http://www.pbs.org/wnet/brain/index.html>

<http://growingchild.com/brain2.html>

<http://nccic.acf.hhs.gov/poptopics/brain.html>

Children's Brain Health

<http://www.childhealthbook.com/childrensbrainhealth.html>

[Prenatal Development - baby, stages, average, Definition, Description, Common problems](#)

<http://www.healthofchildren.com/P/Prenatal-Development.html#ixzz0jubHBVh6>

Asian Food Information

<http://www.afic.org/>

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White Estate Books – Education-Index

<http://www.whiteestate.org/books/ed/ed.asp#23>