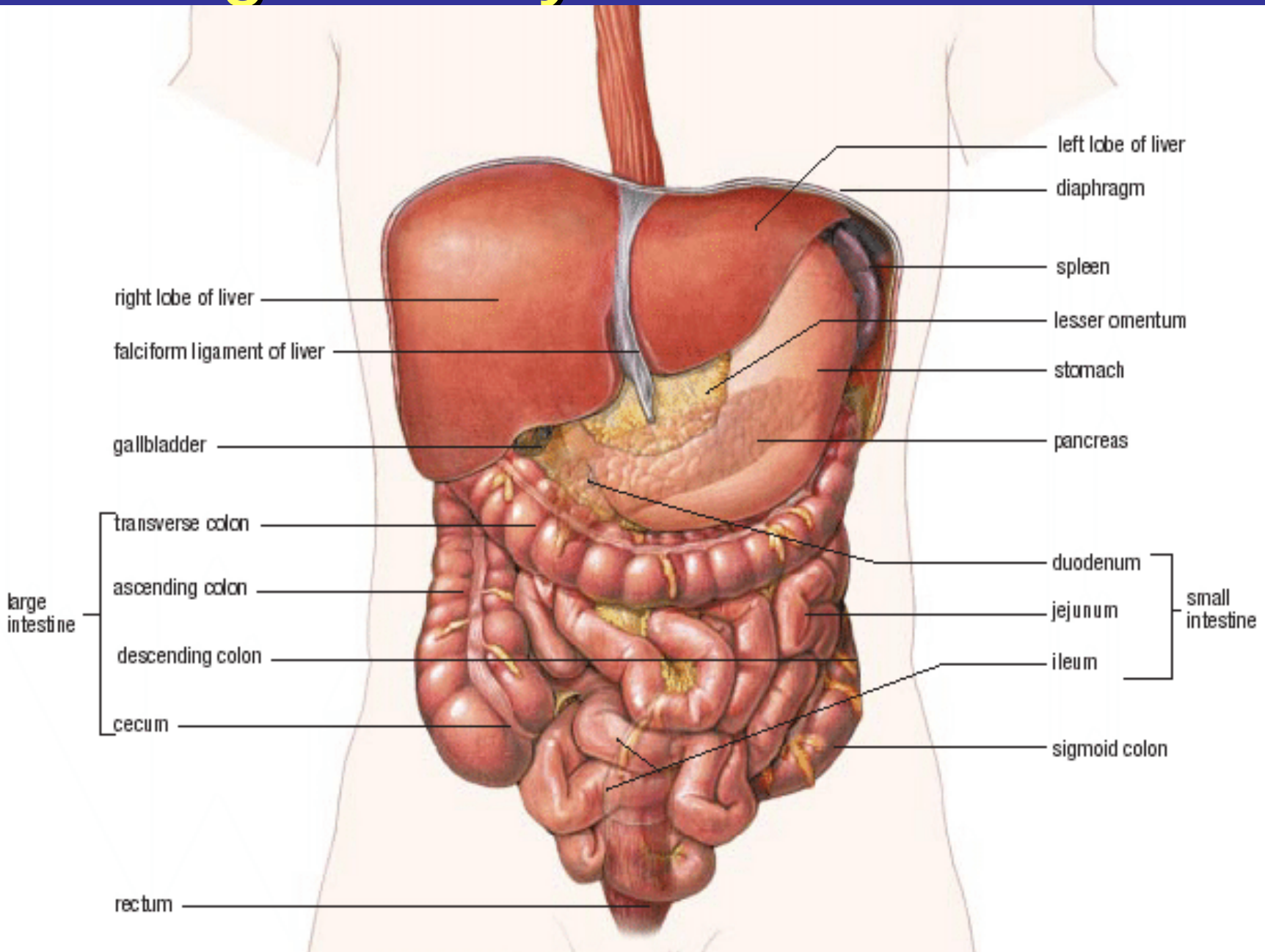
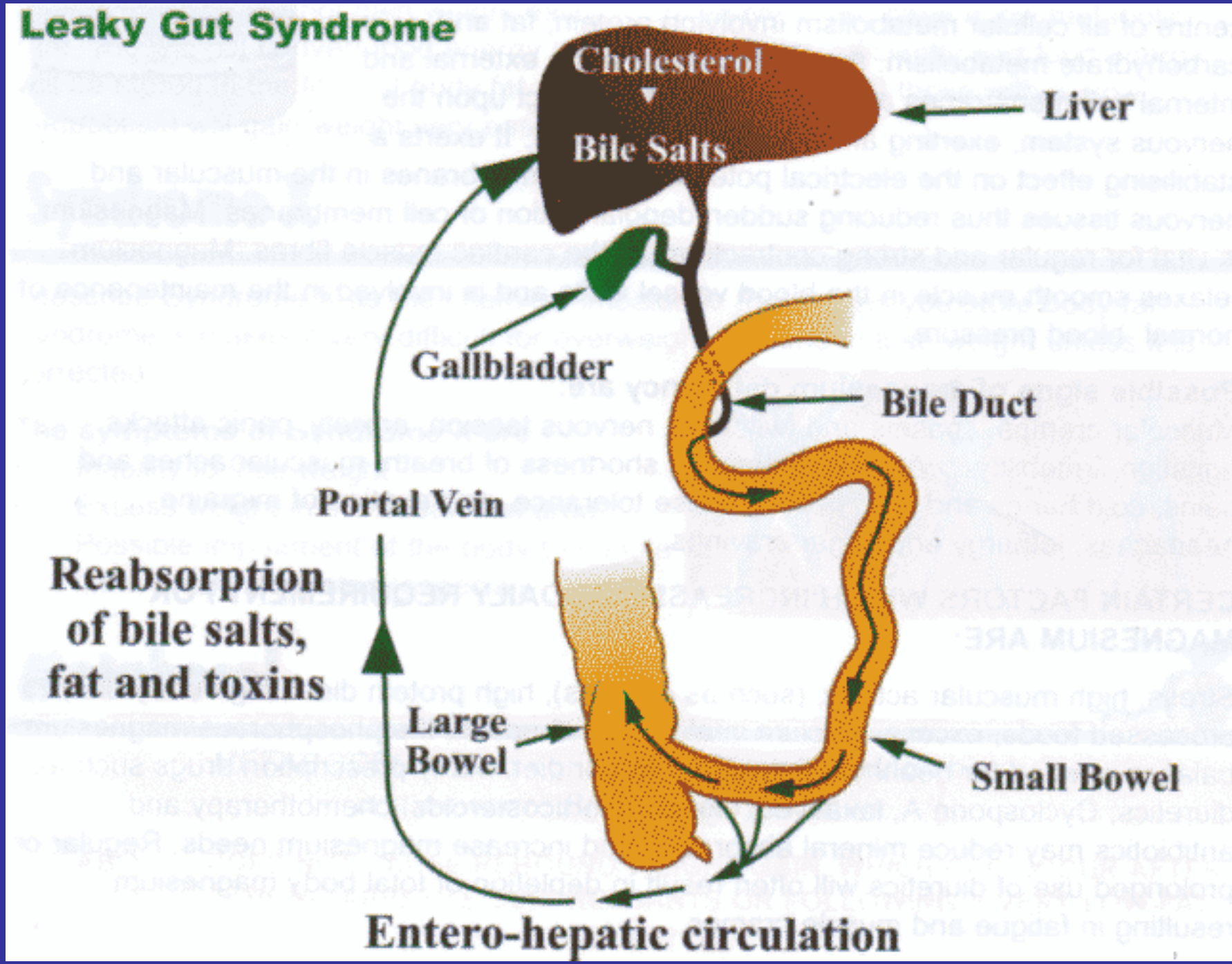
The digestive system……



What is Leaky Gut Syndrome?.....

- Leaky gut or LGS is a poorly recognised but extremely common problem. It is rarely tested for. Essentially, it represents a hyperpermeable intestinal lining.
- Large spaces develop between the cells of the gut wall, and bacteria, toxins and food leak in to where they shouldn't.
- If the gut is not healthy, neither is the rest of the body. It is the point of fuel and nutrient entry.

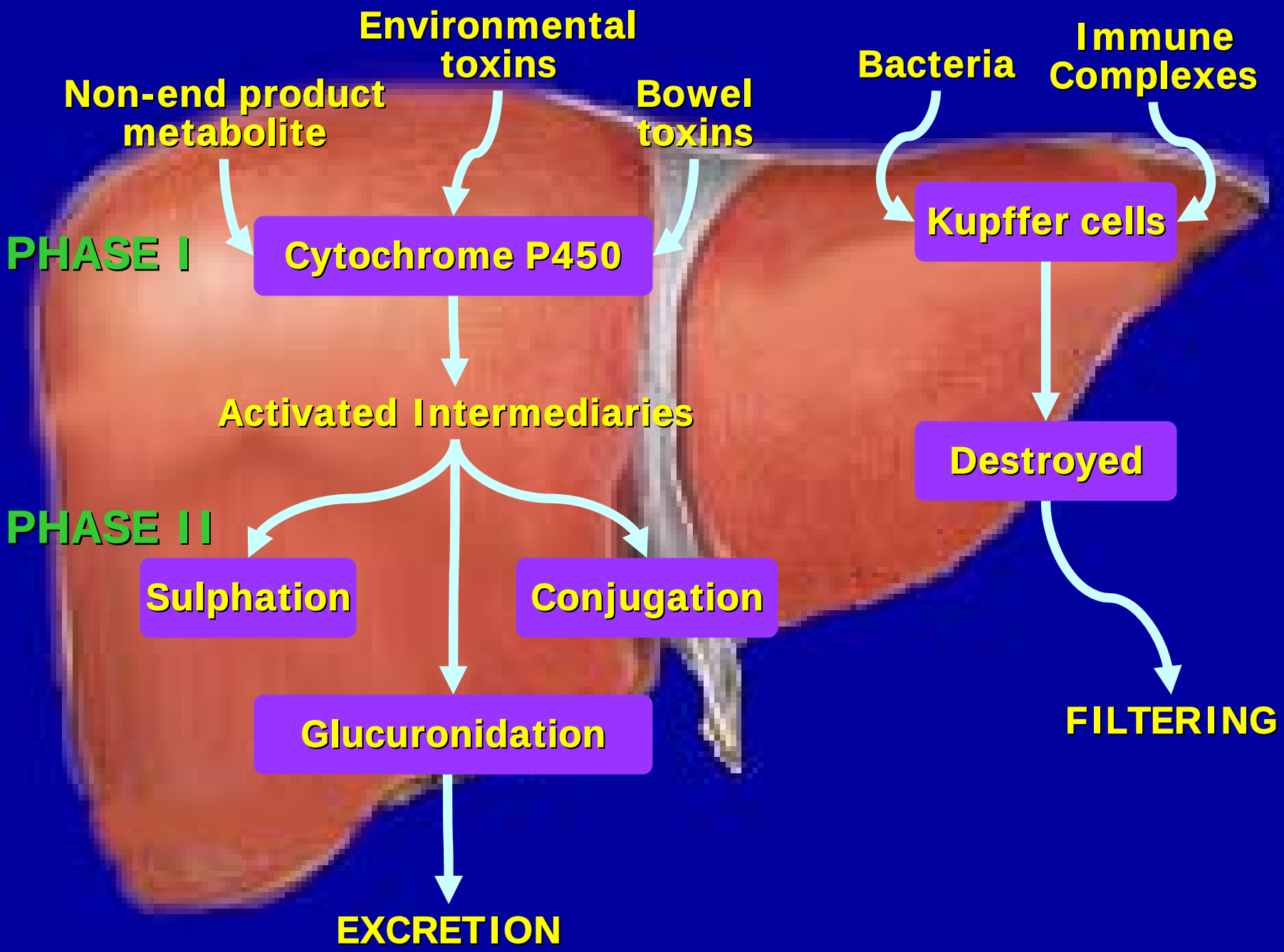
Leaky Gut Syndrome



Detoxification Weakness

- **Glutathione Conjugation low in 14 of 17 (mean 0.55 vs 1.4-2.9)**
- **Metallothionine suppression**
- **Peroxisomal Malfunction** *(P Kane, J of Orthomolec Med 1997; 12-4: 207-218 and 1999; 14-2: 103-109; Anne Moser)*
- **Phase II Depression** *(S. Edelson, DAN Conference Sept, 1997, and Toxicology and Industrial Health 14 (4): 553-563 1998)*

Detoxification pathways of the liver…….



Detoxification continued……..

- **Sulphation Deficit in 15 of 17 (mean 5 vs. nl 10-18)** *(Biol Psych 1; 46(3): 420-4, 1999; Waring, 2000)*
- **Glucuronidation low in 17 of 17 (mean 9.6 vs. 26.0-46.0)**
- **Glycine Conjugation low in 12 of 17 (15.4 vs. 30.0-53.0)**
- **Increased Heavy Metal Burden**
- **Sulphydrate affinity for heavy metals**

Permeability and Gastrointestinal Support….

The 4R™ approach to gut rehabilitation

- **Remove** - pathogens, xenobiotics, allergens
- **Replace** - digestive enzymes, Factors, HCl
- **Reinoculate** - Pre & probiotics, FOS, inulin
- **Repair** - low irritant diet, nutrients to support growth & repair

Immunological Factors.....

- **Recurrent Infections** *(Euro Child/Adolesc Psych, 1993:2(2):79-90 J Autism Dev Disord 1987; 17(4): 585-94)*

- **T-cell Deficiency** (J Autism Child Schizo 7:49-55 1977) **- There is a shift from TH1 to TH2 cells in autism which impairs cell mediated immunity.** *(Gupta University of CA, MOA 2002)*

- **Reduced NK Cell Activity** *(J Ann Acad Chil Psyc 26: 333-35 '87)*

- **Low or absent IgA** *(Autism Develop Dis 16: 189-197 1986)*

Immunological Factors continued……

- **Low C4B levels** *(Clin Exp Immunol 83: 438-440 1991)*
- **There is a lack of inflammation - i.e. cell death without the normal immune response**
  (Gupta University of CA, MOA 2002)
- **There are antibodies to neurological tissue proteins**
  (Gupta University of CA, MOA 2002)

Prevention is better than cure. Nutrition is the cornerstone of health and wellbeing.....

- Research indicates that a deficiency in any or many essential nutrients on the part of parents can contribute to L.D. and P.D.D.s
- Many foods today are subject to genetic modification, pesticide sprays and industrial processing, --- what are the potentials to health?

Nutritional Factors.....

- **Lower serum Magnesium than controls**
  (Mary Coleman, The Biology of Autistic Syndromes 197-205, 1976)
  Lower RBC Magnesium than controls
  (J. Hayek, Brain Dysfunction, 1991)
- **Low activated B6 (P5P) in 42%.**
- **B6 and Magnesium therapeutic efficacy --multiple positive studies** *(Am J Psych 1978;135: 472-5)*
- **B12 deficiency suggested by elevated urinary methylmalonic acid** *(Lancet 1998; 351: 637-41)*
- **Low Methionine levels not uncommon**
  (Observation by J. Pangborn)

- **Dietary analysis revealed below-RDA intakes in Zinc (12 of 12 subjects), Calcium (8 of 12), Vitamin D (9 of 12), Vitamin E (6 of 12) and Vitamin A (6 of 12)** *(G. Kotsanis, DAN Conf., Sept, 1996)*
- **Higher in serum copper.** *(Nutr. and Beh 2:9-17, 1984)* **Higher Copper/Zinc ratios in autistic children.** *(J. Applied Nutrition 48: 110-118, 1997)*
- **Low Derivative Omega-6 RBC Membrane Levels 50 of 50 autistics assayed through Kennedy Krieger had GLA and DGLA below mean. Low Omega-3 less common (may even be elevated)** *(J Orthomolecular Medicine Vol 12, No. 4, 1997)*

- **Lowered glutamine (14 of 14), high glutamate (8 of 14)** *(Invest Clin 1996 June; 37(2): 112-28)*

- **Reduced sulphate conjugation & lower plasma sulphate.** *(Dev. Brain Dysfunct 1997; 10:40-43)*

- **Hypocalcinurics Improve with Calcium Supplementation - Lower Hair Calcium in Autistics Reported** *(Dev Brain Dysfunct 1994; 7: 63-70)*

Nutritional Assessment & Protocol.....

Nutritional/Biochemical work-up

- **Full blood count**
- **Metabolic Biochemical Analysis (MBA)**
  - **Full iron studies**
  - **Thyroid function**
  - **Urine analysis**
  - **Stool Analysis**
  - **Lipid and Peroxisomal Studies** *(Kennedy Kreiger, Kane)*
  - **Mineral levels (Zinc/Copper, ceuroplasma)**
  - **Vitamin levels (especially B6 function)**

Nutritional Protocol…..

- Start with gluten and casein elimination.
- Eliminate processed foods and soft drinks with additives, preservatives, sugar, aspartame, pesticides, hormones & potential allergens
- Eat as much organic food as possible - Biodynamic is even better. Build up proteins, vegetables, fruit
- Clean filtered water
- Big Breakfast - Low Glycemic Index Foods - High Protein, Frequent Meals

Nutritional Protocol continued……

- **Gut Care**
  Digestive enzymes (Betaine Hydrochloride - TMG & DMG), amylase, lipase, peptidases, supplements and complementary remedies - milk thistle protects the liver, cranberry, grapefruit seed, papain & bromelain.

- **Address EFAs**
  First Omega 6 (Evening Primrose for GLA) then Omega 3
  Cod Liver Oil (Provides Vit A and D plus EPA/DHA)
  Fish Oil for additional Omega 3
  Other: B12, Biotin, Taurine, MSM, Folate, DMG, Amino Acids, Mb

- **Address bacterial overgrowths**
  Pre & Probiotics- Lactobacillus GG, bifidobacteria etc.

Nutritional Protocol continued……

- **Enhance detoxification pathways including**
  Epsom salts bath - sulphates better absorbed via skin than food.
- **Start with the following incrementally, and monitor**
  Zinc with Manganese
  B6 (and/or P-5-P) with Magnesium
  Calcium
  Vitamins C and E
- **Continue monitoring and modifying as necessary to the individual's metabolic changes.**

ARI parent survey for therapeutic responses by autistic children:

- 50% improved with Zinc (6% worsened)
- 49% improved with Vitamin C
- 46% improved with Magnesium and B6 (5% worsened)
- 58% improved with Calcium (Later survey 42%)
- Further research is needed

Immediate environmental factors.....

- **EMF:** Our environment is now filled with man-made electro magnetic radiation that did not exist 100 years ago.
  - Many research studies indicate that amongst other things, our immune system is depleted by continued EMF exposure.
- **Sick Building Syndrome:** Increased use of plastics, awareness of drinking water content, toluene, cleaning fluids, carpets, paints, toiletries, ‘air conditioning’ etc.
- In light of the concerns raised, it makes sense to try to limit exposure to EMF's and other household pollutants as much as possible while still enjoying all that technology has to offer.

Structural and Somatic Work.....

The value and benefit of human touch is beyond question, but in autism, it may require a considerable period of desensitisation before such therapies may be of value. The issues of comfort zone and development of trust can be major obstacles initially.

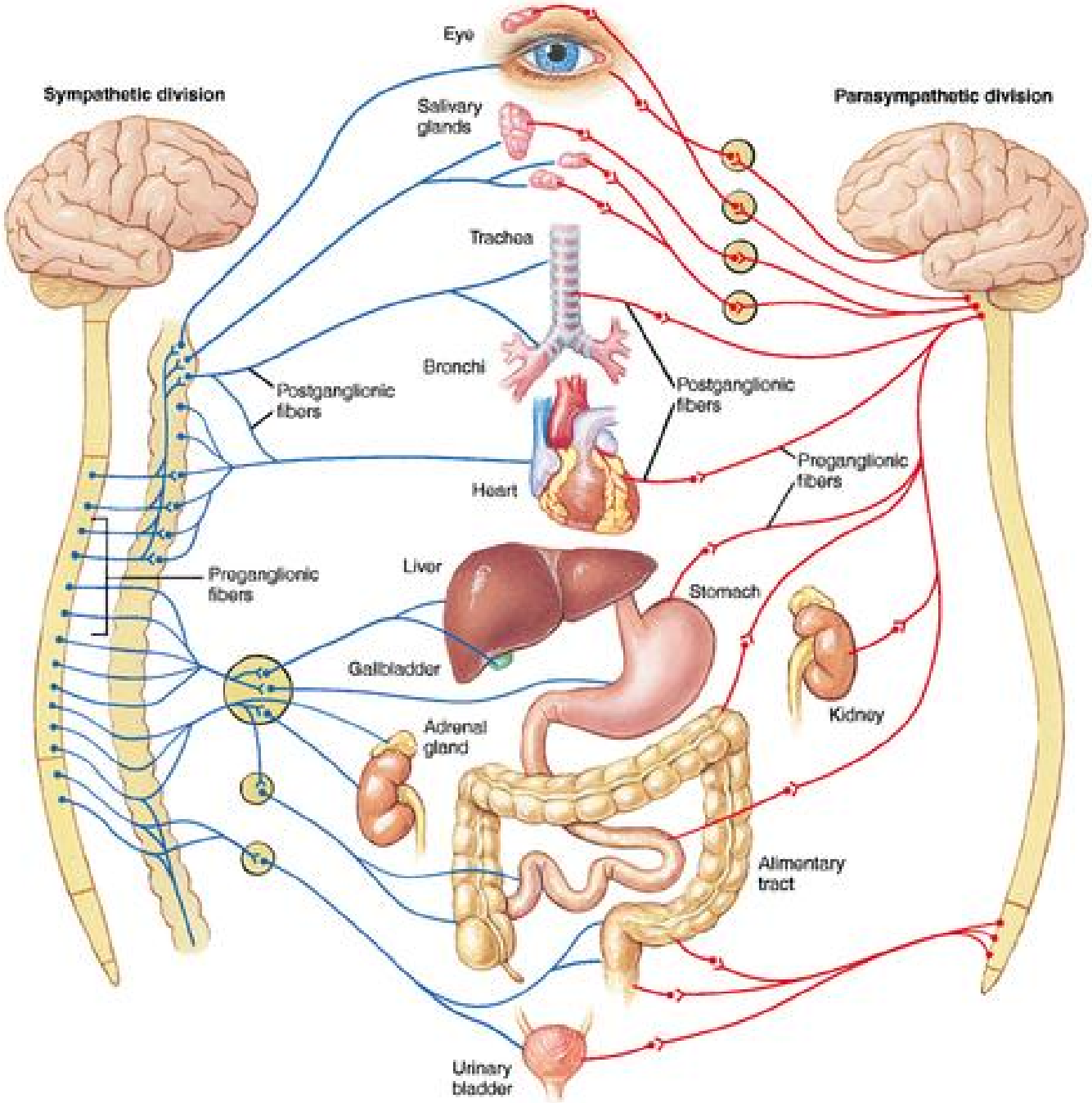
While traditional chiropractic and osteopathic moves may be of benefit in cases requiring such adjustment and manipulation, in autism, subtle and gentle therapies such as the following have been used with some success.

- **Aromatherapy Massage**
- **Craniosacral Therapy**
- **Bowen Therapy**

Aromatherapy Massage.....

- Teaching parents basic massage techniques in combination with gentle blends of oil - calming or stimulatory depending upon need - can help develop bonding and attachment where previously there was little or none.
- Many children respond well to this technique, and will voluntarily initiate contact where previously, no recognition was present.

The Autonomic Nervous System……



Craniosacral Therapy.....

John Upledger in conjunction with the Autism Research Institute, developed craniosacral techniques which can be used successfully with a number of autistic children.

Restrictions in the dural tube of the spinal cord and brain can impede the flow of CSF which nourishes the brain and nervous system. Children with classical autism were found to have similar restrictions in the craniosacral motion.

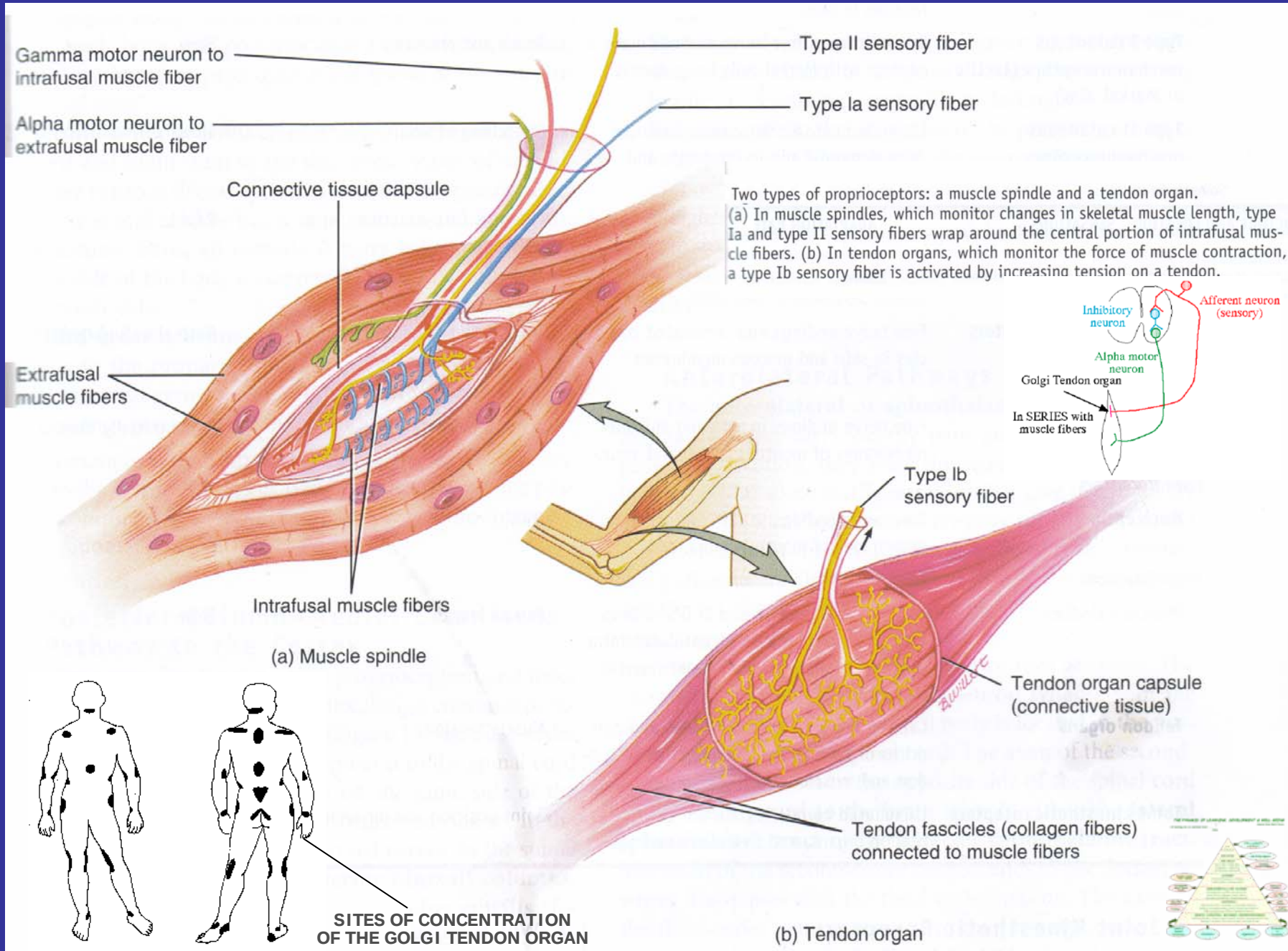
In the hands of skilled and experienced practitioners this gentle and subtle, hands-on technique applied with just a slight amount of pressure (about 5 grams) encourages body systems (particularly musculoskeletal and the ANS) toward homeostasis.

- Upledger Institute
- Milne Institute

Bowen Therapy.....

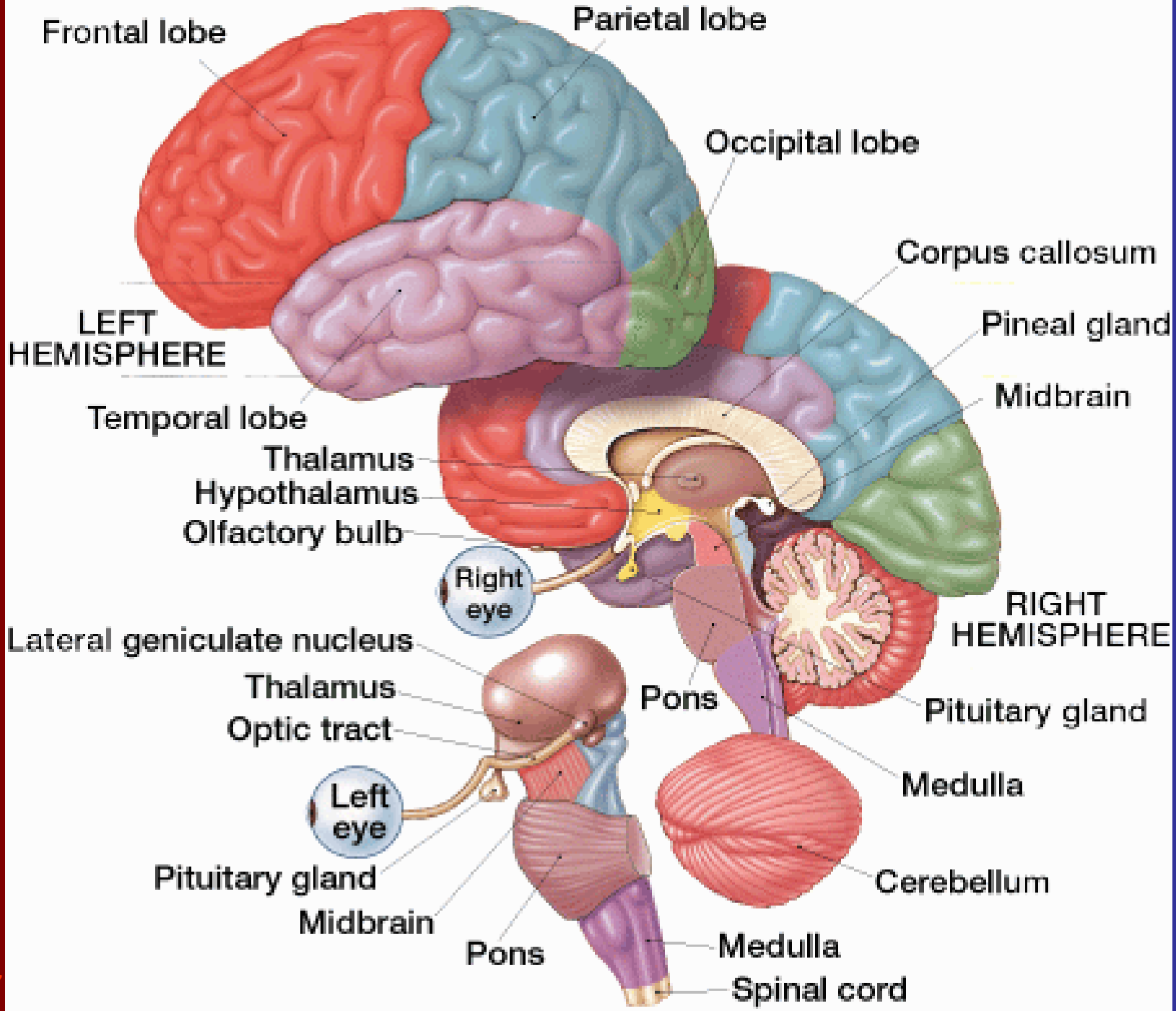
- Bowen was developed in Geelong, Australia by the late Tom Bowen in the 1950's and is now in use worldwide.
- Bowen Therapy is a gentle muscle and connective tissue technique which addresses the whole body response by utilising precise moves across particular sites of the body in which the golgi tendon organ and neurovascular bundles are concentrated.
- With an experienced practitioner addressing such sites, an impulse is sent to the central nervous system, (think of the reset button on your computer) allowing balance in the autonomic nervous system (homeostasis).
- The moves are light and can be done through light clothing.

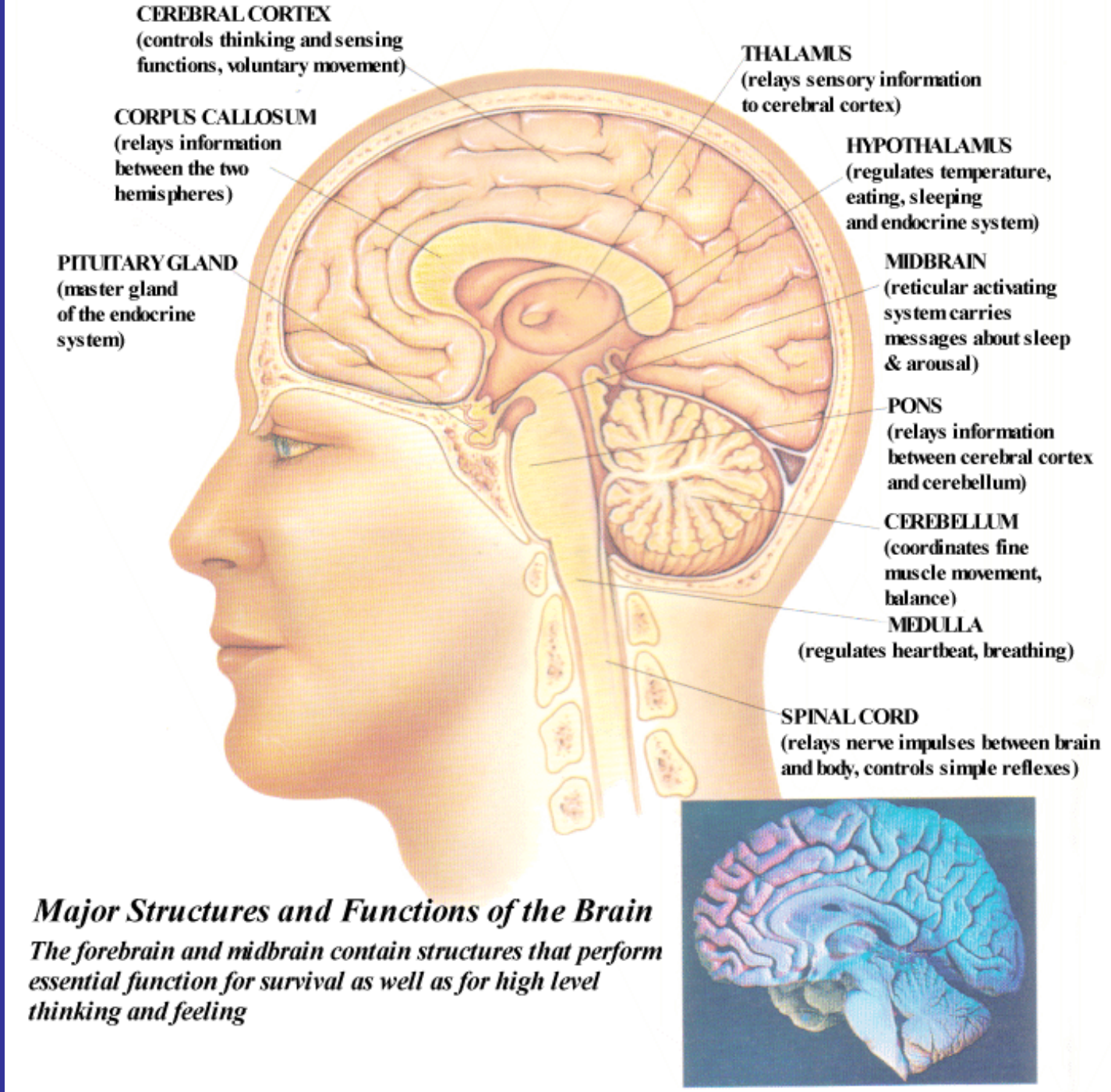
Golgi continued..... *(From Tortora & Grabowski - 2000)*



Counselling & Family Support.....

- **Explanation of the difficulties and the criteria for diagnosis affords family members a better understanding of the child's disorder.**
- **Be specific about strengths and weaknesses.**
- **Outline medical and complementary strategies available, including nutritional advice and the likely prognosis.**
- **Explanation of the value of genetic testing.**
- **Support groups**
- **Practitioner network and continuing education of all educational/health care personnel who work with children, esp. neonates.**


Frontal lobe
Parietal lobe
Occipital lobe
Corpus callosum
Pineal gland
Midbrain
LEFT HEMISPHERE
Temporal lobe
Thalamus
Hypothalamus
Olfactory bulb
Right eye
RIGHT HEMISPHERE
Lateral geniculate nucleus
Thalamus
Optic tract
Pons
Pituitary gland
Medulla
Left eye
Pituitary gland
Midbrain
Cerebellum
Pons
Medulla
Spinal cord

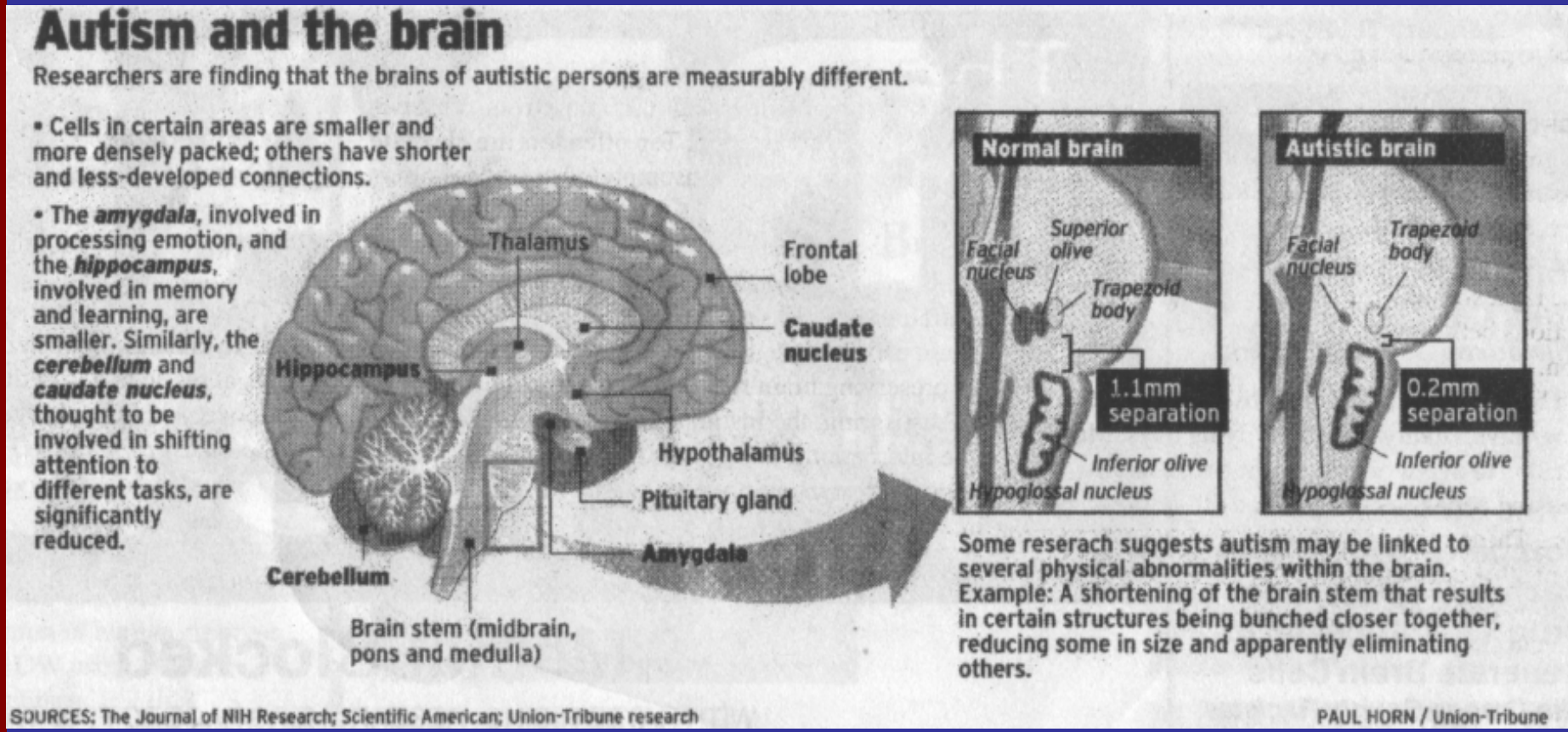


Major Structures and Functions of the Brain

The forebrain and midbrain contain structures that perform essential function for survival as well as for high level thinking and feeling

Neurological factors.....

- **Decreased cerebral blood flow**
- **EEG abnormalities (frontal, temporal, parietal lobes and insular cortices; auditory ERPs at P50, P300)**
- **Altered neurotransmitters (serotonin, dopamine)**
- **Poor communication between cortical areas (angular gyrus, inferior frontal extrastiate occipital)**



From "The Brain In The News", The Dana Foundation, 2002

- **Seizures are found in approximately 35-45% of all cases - 70% temporal lobe.** *(Olsson, Steffenberg & Gillberg, 1988)*

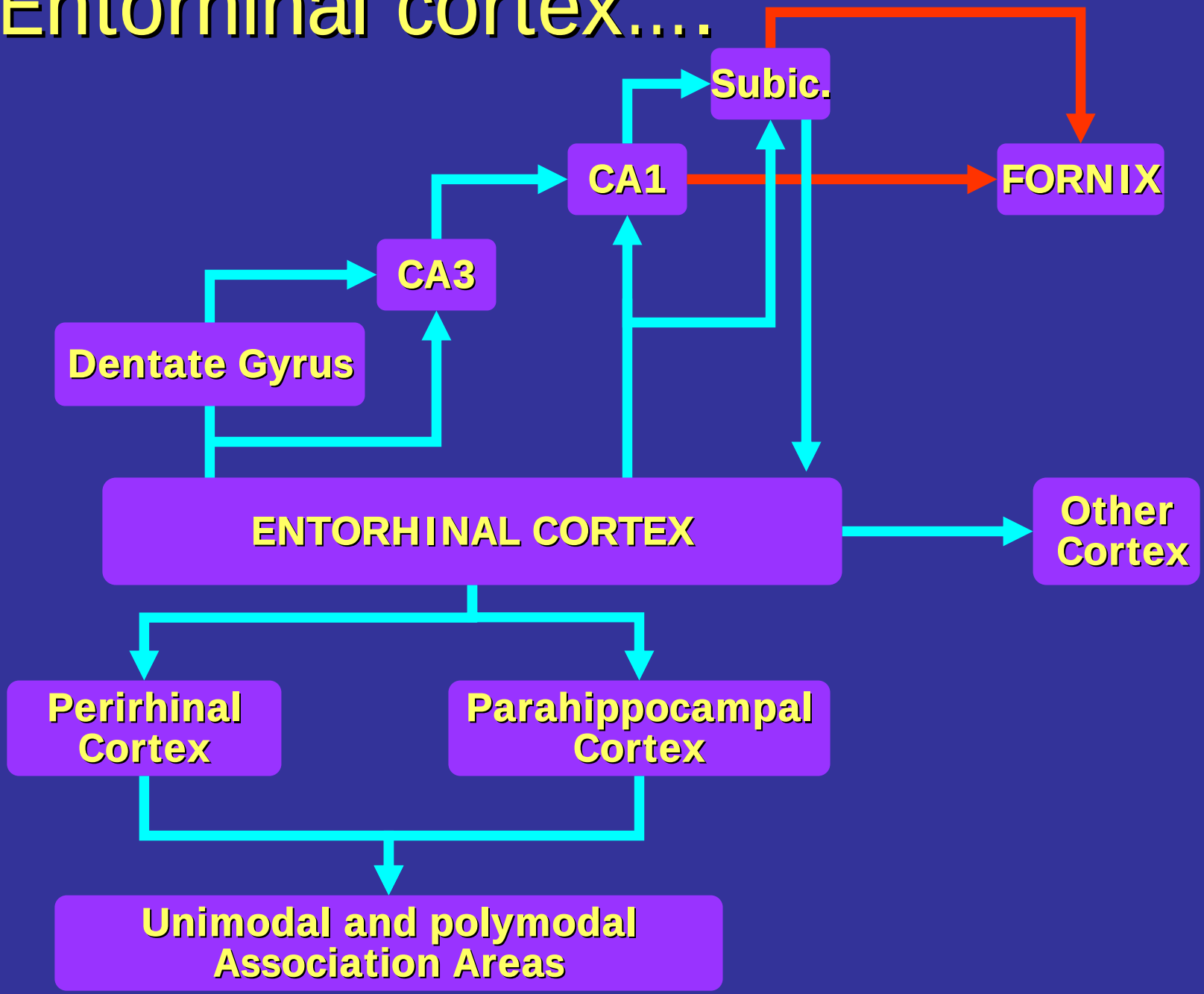
- **Structural imaging studies reveal:**
  - Cerebral atrophy *(Courchesene et.al. 1988)*
  - Ventricular Dilation *(Gaffney & Tsai, 1987)*
  - Abnormal ventral temporal cortical activity during face discrimination among individuals with autism and Asperger's Syndrome *(Shultz et.al. Arch Gen Psychiatry. 2000;57:331-340)*

- **- Various abnormalities of cellular migration** *(Piven et.al. 1990)*

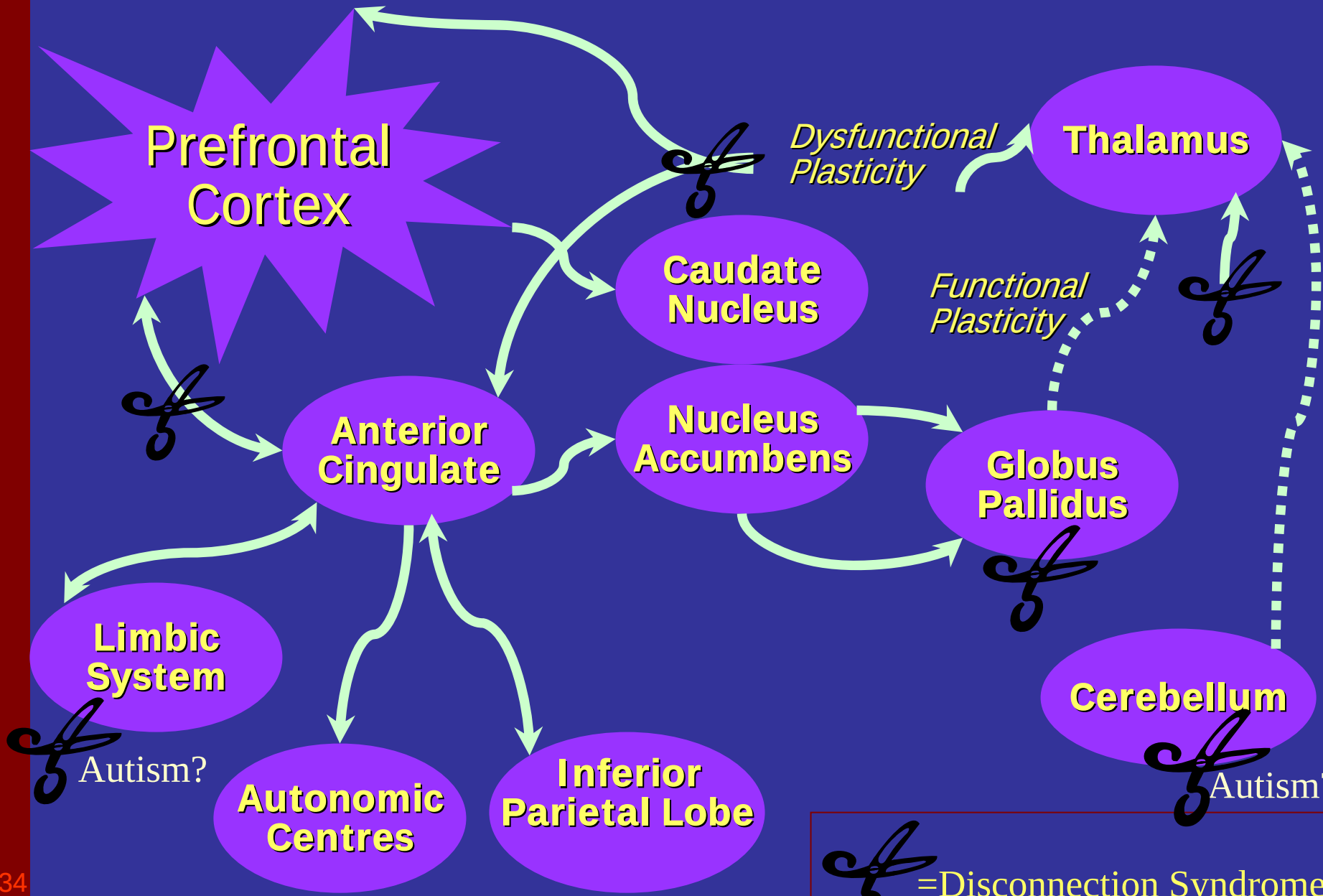
- **Anterior and medial temporal lobe abnormalities** *(Bauman& Kemper, 1985; Bolton & Griffiths, 1997; Chugani et.al. 1996; Maurer & Damasio, 1982; Bachevalier 1994)*

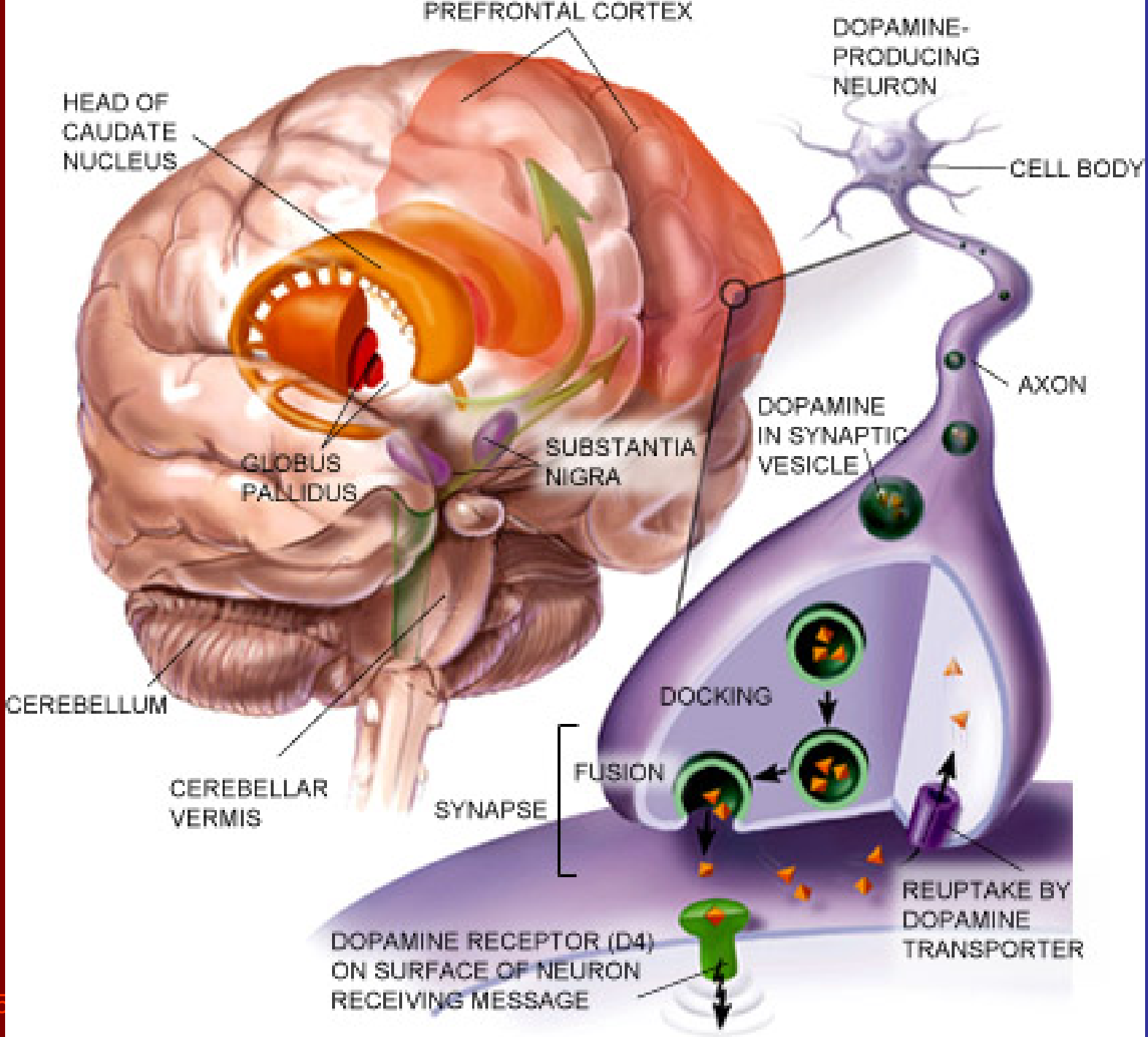
- **Decreased neuronal size and increased cell packing density has been observed in the hippocampus, entorhinal cortex and amygdala suggesting cells are fixed at an earlier stage of brain maturation.** *(Miller et.al. 1999)*

Entorhinal cortex....



Neural networks in autism..... *(Zimmerman & Gordon 2001)*




PREFRONTAL CORTEX
DOPAMINE-PRODUCING NEURON
HEAD OF CAUDATE NUCLEUS
CELL BODY
AXON
DOPAMINE IN SYNAPTIC VESICLE
SUBSTANTIA NIGRA
GLOBUS PALLIDUS
CEREBELLUM
DOCKING
FUSION
CEREBELLAR VERMIS
SYNAPSE
REUPTAKE BY DOPAMINE TRANSPORTER
DOPAMINE RECEPTOR (D4) ON SURFACE OF NEURON RECEIVING MESSAGE