

Review: Earl Mindell and Gene Bruno, *What's in Your Blood & Why You Should Care: How to Cleanse and Detoxify Your Blood For Optimum Health*, Square One Publishers, Garden City Park, NY, 2019

Pages:: 198

Life of the Flesh

Rather than a dry haematological textbook, this is a wide-ranging and dense book on all aspects of health and nutrition.

The first part is a very informative theory of blood and blood tests, the second looks at nutrients and blood chemistry, and the third natural and cutting-edge detoxification options.

Overall a well-rounded and helpful book which should be read by anyone, including those who takes care about the fuel and oil quality used in their cars, but are yet to give a thought about the liquid of life running through their veins.

“For the life of the flesh *is* in the blood: and I have given it to you upon the altar to make an atonement for your souls: for it *is* the blood *that* maketh an atonement for the soul.”

Leviticus 17.11, Authorized Version

Introduction (pp. 1-2)

Six nutrients dominate the body's health: carbohydrates, fat, protein, vitamins, minerals, and water.

The blood, God's life-sustaining liquid of the body, is truly a wonder. It's circulatory system is often compared to the canals of Venice, with some capillaries only a single blood cell wide.

Red cells are disc-shaped and concave for smooth travel, they take seven days to produce from the bone and live on average for 120 days.

White cells give their lives to protect from viruses, fungi, bacteria, allergies, and asthma.

At the centre is the heart, beating 108,000 times each day, or 39 million times per year.

I) All About Your Blood (pp. 3-24)

The circulatory systems is akin to the canals of Venice.

55% of the blood is plasma, of which 92% is water[†], and the remaining 8% consist of proteins, glucose, clotting factors, electrolytes, hormones, and CO₂.

Water allows free plasma movement, moistens tissues and joints, dissolves minerals, regulates temperature, and flushes waste products from the kidney and liver.

A *peptide* is a partial protein. A *dipeptide* has two amino acids and a *tripeptide* three.

Of the plasma proteins, albumin makes up 55%, globulin 38%, and fibrinogen 7%.

Antibodies (*gamma globulin*) are large Y-shaped proteins of which the two prongs are designed to fit a certain antigen, like a lock and key.

RBCs are disc-shaped cells concave on both sides. They take seven days to produce from the bone marrow and circulate on average for 120 days before dying.

Haemoglobin returns carbon dioxide to the lungs and helps maintain the disc/concave shape.

RBCs are covered with mysterious sugar or protein antigens which are ignored by the immune system. This discovery led to *blood type*, and is the reason why plasma will attack incompatible blood transfusions.

Those with both 'A' and 'B' surface antigens are type AB, those with neither type O (blank surfaces), etc. A further antigen, *Rh factor*, may exist or not, adding a '+' or '-' to each combination.

Type O people are universal donors, ABs can only donate to ABs but can receive any blood type.

There are five WBC types (neutrophils, eosinophils, basophils, lymphocytes, and monocytes), each averaging thirteen to twenty days' lifespan.

Neutrophils are 62% of WBCs and are 'first-responders' upon inflammation, attacking bacteria and fungi.

Eosinophils are 2.3% of WBCs and control allergies and asthma.

Basophils are 0.4% and produce histamine and serotonin which inflame tissue and prevent blood clotting.

Lymphocytes are 30% of WBCs and are either B 'killer' cells, or 'T' cells. T cells may be subdivided into helper, cytotoxic, gamma delta, and regulatory.

Monocytes are 5.3% and are the largest.

Platelets, also thrombocytes, are a fifth the size of an RBC.

Blood pH is balanced via carbonic acid, bicarbonate, and carbon dioxide reactions. Low pH promotes bone mineral loss.

Copper, folic acid, iron, vitamin B₁₂, and vitamin C are essential dietary vitamins. B₁₂ shortage leads to pernicious anemia, and C microcytic anemia.

Exercise lowers blood pressure and LDL cholesterol, and improves maximal oxygen consumption by enhancing the vessels' dilation capacity.

Hemochromatosis is an excess of Fe, causing liver cirrhosis, cardiomyopathy, bone pain, and skin bronzing.

Haemophilia is a bleeding disorder caused by a lack of blood clotting factor.

Porphyria affects the way heme is made and causes abdominal pain, vomiting, and confusion.

Sickle cell anemia causes pain attacks, bacterial infections, and stroke from lack of oxygen supply.

Thalassemia leads to low RBC count.

Leukaemia are cancers affecting the bone marrow causing faulty leukocyte (WBC) production which suppresses normal RBC production.

Arteries take blood away from the heart and have an inner-muscular *intima* layer which helps move it via small contractions.

Veins carry deoxygenated blood back to the heart. They are thinner and equipped with valves to prevent backflow.

Capillaries are the smallest blood vessels, some so small they only allow a single RBC to pass through at a time. Capillary walls are 'leaky' which allow O₂ and nutrients to pass into tissue and conversely toxins and waste products into them.

Babies in the womb do not use their own lungs, receiving O₂ via the mother's placenta.

The cardiovascular system has two circuits, the pulmonary and systemic.

Pulmonary moves deoxygenated blood from the right heart ventricle into the lungs via the pulmonary artery, leaving behind CO₂. Oxygenated blood returns to the heart via pulmonary veins.

The hepatic portal vein carries blood and nutrients to the liver before returning to the heart.

The liver filters larger fat-soluble waste products and deposits them into bile for disposal.

Blood also flows to kidneys, where it is filtered to produce urine with small water-soluble waste particles.

The heart beats 108,000 times each day, or 39 million times per year.

†Meaning that 50.6% of plasma is water.

II) What Your Blood Test Reveals (pp. 25-45)

The traditional blood panels are lipid, metabolic, complete blood count (CBC), hepatic, hormonal, and other (e.g. homocysteine and C-reactive protein).

Hypertriglyceridemia is a major heart disease, diabetes, and insulin resistance risk factor. This is because they can combine with LDL to form very low LDL (VLDL).

Sugar and refined carbohydrates are major triglyceride sources.

Cholesterol is required for cell membranes and hormone production.

Lipoprotein contains cholesterol, triglycerides, and proteins.

Oxidised LDL causes atherosclerosis.

HDL cleans out LDL.

Metabolic tests measure blood sugar, electrolyte and fluid balance, and kidney function. This includes glucose, K, Na, Cl, CO₂, blood urea N₂ (BUN), and creatinine.

Hyperglycemia develops into diabetes.

Hypoglycemia triggers agitation, dizziness, and weakness.

Ca is the most abundant body material, and is essential for nerve impulse transmission, enzyme function, clotting, and energy production. It is therefore called an electrolyte. Levels are regulated by C, parathyroid hormone (PTH), and calcitonin.

K is for nerve impulse transmission and muscle contraction.

Na is for BP regulation, to which it is positively correlated.

Excess Cl is excreted in the urine.

CO₂ is turned into H₂CO₃ by RBCs, and then HCO₃, which acts as an alkaline buffer.

BUN is a protein breakdown byproduct getting rid of NH₃.

Creatinine is made in the liver and is energy for brain and muscle. Men have higher levels.

The BUN-to-creatinine ratio is used to assess kidney function.

Glomerulafiltration rate is the amount of blood the kidneys can filter each minute.

Total protein adds albumin and globulin.

Edema is fluid buildup causing ankle swelling due to fluid buildup.

Albumin keeps blood fluid contained within vessels. Elevated albumin signifies dehydration.

Globulin is mainly antibodies and consists of three groups: alpha, beta, and gamma.

The albumin-to-globulin ratio can indicate a compromised immune system.

Alanine aminotransferase (ALAT) is a liver enzyme and when found in the blood can indicate liver disease.

Alkaline phosphatase is in the liver and bones and high levels may indicate cancer.

Aspartate aminotransferase (ASAT) is a liver enzyme and high levels may indicate liver disease.

Gamma-glutamyl transferase when high may indicate liver disease.

RBCs may be raised at higher altitudes.

Hematocrit is the blood volume proportion made of RBCs.

Mean corpuscular volume (MCV) measurement can lead to macro or micro cytosis diagnosis.

Mean corpuscular hemoglobin (MCH) measures the average haemoglobin RBC content.

Mean corpuscular hemoglobin concentration (MCHC) measures the average haemoglobin RBC *density* in a given unit.

Platelets can plug tissue holes up to a certain size.

WBC elevation may be caused by strenuous exercise, excess carbohydrates and sugars, allergies, and severe stress.

Dehydroepiandrosterone (DHEA) is a cortisol building block, and supports the immune system, increases insulin sensitivity and is an antioxidant. It exists as a sulfate (DHEAS). Elevated DHEA may indicate adrenal tumours.

Estrogen exists as estrone (found in menopause), estradiol (the most potent found in pregnant women), or estrinol.

Progesterone helps in conception and is made in the ovaries, adrenal glands, and placentas. It supports bone density and brain nerve fibers. The synthetic progestins are used in birth control pills and HRT.

Testosterone is either bound or free. Low levels indicate erectile dysfunction, mood changes, fatigue, sleep disturbances, and poor concentration.

Prostate-specific antigen is a protein created to arrest prostate cell growth.

Thyroid-stimulating hormone (TSH) is made in the pituitary gland to make triiodothyronine (T₃) and the inactive thyroxine (T₄).

Cortisol helps fat metabolism, but elevated levels can damage brain memory in the hippocampus area.

Homocysteine is a protein production byproduct.

III) How Your Body Cleanses Your Blood (pp.47-59)

Pb, Hg, Cd, As, Ni, and Al are all bioaccumulative heavy metals, especially in the brain, kidneys, and immune system.

Copper-pipe solder and cigarette smoke, and environmental sources of exposure.

Microbial endo- and exotoxins can be absorbed into the bloodstream causing liver disease, Crohn's, ulcerative colitis, thyroid disease, psoriasis, lupus erythematosus, allergies, and asthma as the body forms antibodies against them.

Elevated NH_3 levels from poor protein processing function leads to dizziness, confusion, and delirium.

Skin can excrete DDT, Hg, and Pb via sweating as these are water-soluble toxins.

Liver fat-soluble detoxification occurs as Phase I (using cytochrome P450 which generated free radicals) and then Phase II (which creates a conjugate water-soluble compound from Phase I outputs by using glucuronic acid, sulfate, and glutathione).

Phase II has six sub-pathways:

1. Acetylation (removes sulfa drugs).
2. Amino Acid Conjugation (using glycine, taurine, and glutamine).
3. Glucuronidation (using this acid as found in apples and grapefruits to detoxify opiate derivatives and aspirin).
4. Glutathione Conjugation (eliminate Hg and Pb).
5. Methylation (from natural compounds in B_{12} , folate [B_9] in fish, meat, and eggs to detoxify Hg and As).
6. Sulfation (of which garlic, MSM can removed food additives, and intestinal bacterial toxins).

The small intestine is the first exposure point for toxins and has a 'Phase III' antiporter process where P-glycoprotein reroutes toxins from wall absorption back into the tube for excretion. This compound is found in the BBB. Phase II is inhibited by refined carbohydrate and vegetable oil consumption.

IV) Understanding Nutrients (pp. 63-85)

Nutrients move into the small intestine and enter the bloodstream via *villi* on its inner walls.

Macronutrients include:

Carbohydrates: the most rapidly utilized fuel source. They are broken down into monosaccharides of glucose, fructose, and galactose. Glucose is the most efficient source and used immediately. The others are metabolised further in the liver to create glycogen, or stored glucose, a process which takes time meaning these monosaccharides (e.g. fruits) are a preferred energy source (e.g. than refined sugar).

The brain relies on glucose causing the body to maintain a steady blood concentration. Glycogen in muscles can be consumed to create glucose when amounts are low, or excess glucose turned to fat.

More carbohydrate consumption leads to higher blood glucose and a signal for the pancreas to release more insulin. In time, this state can lead to insulin non-response by cells or Type 2 diabetes.

Dietary fibre is that which the body cannot directly digest, however, some probiotics (protective against heart disease, cancer, and arthritis), can do so via fermentation.

Soluble fibre binds to bile acids causing an increase in demand for which the liver needs to consume cholesterol, thereby lowering it. These also ferment in the large intestine producing fatty acids. Sources include oatmeal, fruit, vegetables, nuts, beans, and flax seed.

Diverticulitis is an inflammation of small pouches in the digestive tract and is caused by a low-fibre diet.

Whole wheat flour, grains, beans, fruit skin, onions, and lettuce are insoluble fibre sources.

A high-protein diet can cause ketoacidosis where excess Ca is released from the bones into the urine. Symptoms include acetone-smelling breath and urine.

Fat has double the energy of carbohydrates and is broken down into fatty acids and the glucose precursor glycerol. Fatty acids generate ketone bodies which increase blood acidity.

The ketone acetone can be converted into glucose.

Fat carries A, D, E, and K.

Linoleic acid fights inflammation and is found in fish, olive oil, and seeds.

Saturated fats include coconut oil.

Unsaturated fats are either mono or polyunsaturated, including olive oil, canola, and nuts.

Omega-3 sources include sardines, salmon, walnuts, and flax seed, reducing BP and boosting HDL.

Omega-6 fatty acids are found in safflower oil, soybeans, and salmon. These promote healthy skin, hair, and bone health.

A 4:1 Omega 6 to Omega 3 ratio is desirable.

Triglycerides provide between-meal energy but accumulate when unused.

Excessive fat intake slows digestion and absorption causing indigestion.

Protein increases blood glucagon to control body fat and inhibit insulin release.

Lysine is an essential amino acid, arginine is conditionally essential.

Proteins are broken down into amino acids which circulate in the blood as a reservoir.

Foods with all essential amino acids are “complete protein” foods.

Micronutrients include Mg (for sleep troubles), and K for high BP.

Water-soluble vitamins only circulate for a few hours.

A aids vision, epithelial cell integrity, embryonic development, stops DNA mutation, and immune system function.

There are eight B vitamins: 1, 2, 3, 5, 6,7, 9, and 12. These are converted into coenzymes. Twelve makes haemoglobin.

C makes collagen for vessel walls, forming scar tissue, and bone matrix growth. It is also a powerful antioxidant.

D helps Ca and phosphorous absorption.

E is for heart health and blood thinning.

K is for clotting.

Minerals are 4-5% of body weight, major ones being Ca, K, Na, and Mg. Trace are Cu, I, Fe, Mn, Se, and Zn. Ca and phosphorous create an electrical current.

Choline carries cholesterol from the liver.

Cr removes blood sugar which helps with Type II diabetes.

Cu is needed for RBCs and nerve fibers. It is also an anti-inflammatory.

Mg maintains heart rhythm and is needed for Ca and C metabolism.

Se is for immune function.

Zn has over a hundred enzyme interactions, helps with wound healing and activates T WBCs

V) Choosing Your Food (pp. 87-)

Bad food choices lead to heart disease, stroke, cancer, and Type II diabetes (60% of total deaths each year).

Atherogenic diets elevate LDL.

The SAD causes high blood sugar and fat spikes, oxidative stress, 'sludgy' blood, inflammation, and nervous system hyperactivity.

Allium protects against stomach and colorectal cancers.

Stroke and heart disease have the same causes.

A high-GI diet and Type II diabetes are positively correlated.

The grain kernel consists of the bran (for fiber, Fe, Mg and other minerals), germ (folate and protein) and endosperm (carbohydrates). Refined wheat strips off the bran and germ reducing protein by 19% and dietary fibre 80%.

New phytochemicals are still being identified in fruit.

B₁₂ is only found in animal products.

Legumes are edible seeds with no cholesterol, low fat and Na.

Lactose is processed by lactase, produced in SI cell linings. Lactase nonpersistence can be solved by adding lactase to cow's milk.

Twenty percent of daily water intake comes from food.

Cinnamon lowers BS and ginger is a blood thinner.

Turmeric prevents blood clots.

Rosemary prevents heterocyclic amine (HCA) formation when meat reaches high temperature. HCA is tumorogenic.

Coriander (or cilantro) is high in beta-carotene and eliminates Hg.

Cooked tomatoes have higher lycopene content.

Cooking raises the GI as it breaks down the food. Adding fat, fibre, or acid lowers GI.

Smoking meats creates dangerous polycyclic aromatic hydrocarbons (PAHs).

Chicken or beef liver is a super food.

Animals contract bovine spongiform encephalopathy (BSE) by eating ground-up animal byproducts in their feed.

The Mediterranean diet is based on sixteen countries' experience.

Raw vegan diet reduces mortality by half.

VI) Oxygen and Your Blood (pp. 109-124)

O₂ converts food to energy via oxidation, producing CO₂ as a byproduct.

O₂ makes up 61% of body weight.

Reactive oxygen species (ROS) and reactive nitrogen species (RNS) are stressors.

Hypoxemia and hypoxia are both dangerous.

Hypoxemic hypoxia is a respiratory ailment where O₂ cannot get into the lungs.

At 5,000f blood O₂ levels drop to 95%, and 10,000f 90% causing mild hypoxemia. Moderate hypoxemia occurs at 75-89% and severe under 75%.

Smoking, alcohol, and coffee consumption each equate to living at 2,000f.

Anaemic hypoxia can be caused by low Fe.

CO has hundreds of times more affinity to bind to O₂ in the blood causing CO poisoning.

Methemoglobinemia is when the blood cannot release O₂ properly.

Stagnant hypoxia is poor oxygenated blood flow.

Histotoxic hypoxia is when cells cannot uptake O₂, as with As poisoning and drug abuse. Cyanide is also a cause as it blocks the cell's oxygen usage reaction.

Exercise burns more O₂ therefore also generating more CO₂. It also helps the lymphatic system which relies on gravity and movement for circulation.

O₂ therapy speeds rehabilitation and wound healing.

Slouching and shallow breathing reduce O₂ intake.

VII) Foods and Fasts for Blood Cleansing (pp. 127-142)

Citrus and grapefruit juices are contraindicated with pharmaceuticals as they inhibit cytochrome P450 causing drugs to build up in the BS.

Cabbage, cauliflower, broccoli, garlic, onions, turmeric, and milk thistle all support detoxification.

Cruciferous vegetables contain sulfurophane and indole-3-carbinol

Methionine and cysteine create metallothionein, proteins that bind to HMs.

Cysteine is a glutathione building block and is in garlic, red peppers, and onions.

Antioxidant Response Element (ARE).

Xenobiotic Response Element (XRE).

Long-term or acute fasting can hinder detoxification pathways.

VIII) Dietary Supplements That Support Detoxification (pp. 143-164)

As skin ages, permeability, lipid and sweat production, and immune function reduce.

Collagen and elastin can glycolate causing wrinkles, but glucosamin hydrochloride and counter this.

Cherry blossom extract (sakura flowers) are also anti-glycation.

Lemon balm is rosmarinic acid that also breaks down glycolated proteins.

N-acetyl-cystine (NAC) promotes Hg, Pb, and As secretion. 600mg daily is a dosage.

Caffeine contains sulfotransferases (SULTs), which A also promote.

Ca-D-glucarate protects the glucuronidation pathway.

Silymarin prevents toxin recirculation and regenerates the liver.

The body converts arginine to NO.

LGS causes fatigue, unknown fevers, abdominal pain, bloating, and concentration problems.

Many probiotic strains are destroyed by stomach acid before reaching the SI, however, spore-forming probiotics can survive the trip. These include *Bacillus subtilis*, *coagulans*, *licheniformis*, and *clausii*.

Acacia gum is a potent prebiotic.

Modified citrus pectin is from citrus peel and pulp.

Alpha-lipoic acid (ALA) increases glutathione.

Garlic can protect against methylmercury.

IX) Complementary Therapies (pp. 165-171)

A fifteen-minute sauna reduces BP, enhances blood flow and cardiac function.

Intravenous chelation therapy (ICT) usually involves EDTA.

Conclusion (pp. 173-174)