

Scientific Support for Chapter 10

Our Secret for Natural Beauty

Dermatologists take note: The first experiments with EFAs concerned their wonderful effects to the skin:¹

- “The effect of linoleic acid [**Parent omega-6**] on skin inflammation was perhaps the first “**medical**” effect of **the EFAs to be noted**. A technician working in the Burr’s laboratory where the EFAs were discovered noted that his hand dermatitis improved when linoleic acid [Parent omega-6] intake was increased.
- “At the same time Hansen, a pediatrician friend of the Burrs, noted that the **dermatitis in EFA-deficient animals resembled atopic eczema in his patients**. Atopic eczema is the type of eczema which runs in families and usually manifests itself in the first year of life. Using crude techniques Hansen went on to show that the levels of unsaturated fatty acids in the blood [**in particular, Parent omega-6**] were *low* in patients with atopic **eczema**.”

1 Horrobin, D.F., “Nutritional and medical importance of gamma-linoleic acid,” *Prog. Lipid Res.*, Vol. 31, No. 2, pages 163-194, 1992.

“Detrimental Effect of an ω -3 Fatty–Acid Enriched Diet on Wound Healing:”²

“The hypothesis that a diet enriched with ω -3 fatty acids could be detrimental to wound healing was tested in male rats fed complete diets **differing only in their fat composition** (17% menhaden oil [fish oil] + 3% corn oil *vs.* 20% com oil by weight) for 21 days before wounding and for 10 or 30 days after wounding.

“At 30 days, however, *wounds harvested from rats fed the menhaden [fish] oil diet were significantly weaker than those from corn oil-fed [parent omega-6] animals.* This difference in tensile strength was not explained by differential collagen accumulation, inasmuch as the collagen content of the sponges at 30 days was the same in both groups, Dietary consumption of a diet rich in ω -3 fatty acids [fish oil] may **conspire against the quality of wounds** by altering the fibroplastic or maturational phases of the healing response.

“Current results show that **substituting ω -3 fatty acid [fish oil] for ω -6 fatty acids in the diet is deleterious to the mechanical properties of wounds** at 30 days.”

2 Albina, JE, et al., *Journal of Parenteral and Enteral Nutrition*, Vol. 17, No. 6, 1993, pages 519-521.

“Just for Fun”: Cellular Voltage / Current as a function of Membrane PEO Composition

A succinct theoretical analysis is presented first. Then a more applied application with its implications that all health professionals—especially physicians—will appreciate.

Nobel Prize-winner Otto Warburg, MD, PhD stated:

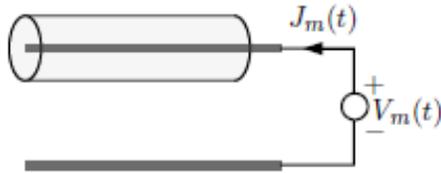
“The most important and *completely unexpected result* of the present investigation is the **proof that the plasma-membrane as such, and not because substances pass in or out through it, plays an important role in the oxidative metabolism of the cell. In section II this was **proved unquestionably.**”¹**

Therefore, the composition of the *CELL MEMBRANE ITSELF* is key. For example, if a membrane were made of plastic, little or any biological material could transfer into it. Insulin activity would be blunted, etc. You have already discovered, because of the disassociation curves, the oxygen in Parent omega-6 can be released for increased cellular oxygenation. We can look how an electrical analysis is consistent with the above and how the PEO / Athlete Advantage is explained with highly increased eye-hand co-ordination, etc.

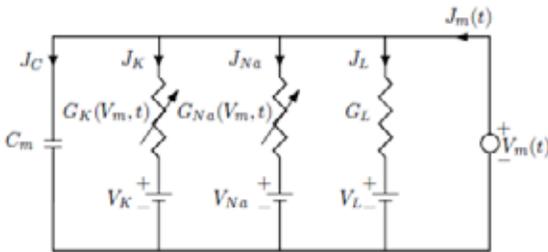
1 Otto Warburg, “The Metabolism of Tumours: Investigations from the Kaiser Wilhelm Institute for Biology,” translated by Frank Dickens, Constable & Co Ltd., 1930, page 56 (out of print). Ref: Hoppe-Seylers Zeitschr. f. physiol Chem., 66, 305, 1910.

PEO Solution

The cell's axon action potential of nerve excitation can be modeled as a voltage source and associated current entering a circuit:

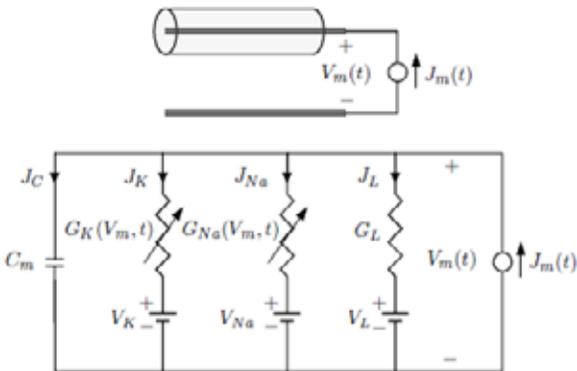


The voltage configuration would be:



Note: This ASSUMES a fixed capacitance. **In actuality, the capacitance is VARIABLE because of the composition of the bi-lipid membrane.**

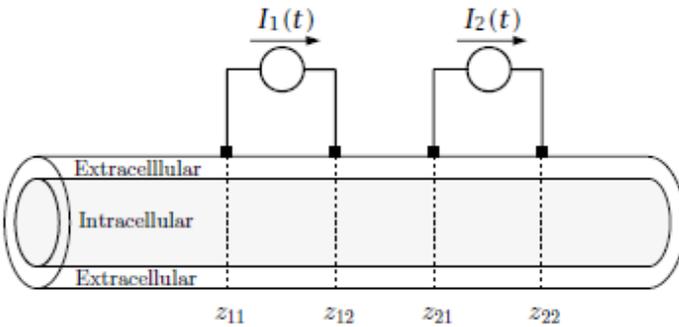
The corresponding current configuration is:



C is the CAPACITANCE – the ability to store electrical charge.

The membrane current density consists of the capacitance current density and the ionic current density mainly from sodium and potassium. Calcium does make a difference in rate constants, proportionately. Physicians may recall from physiology class the potassium / sodium connection in nerve impulse propagation.

A fiber representation:



The core conduction is:

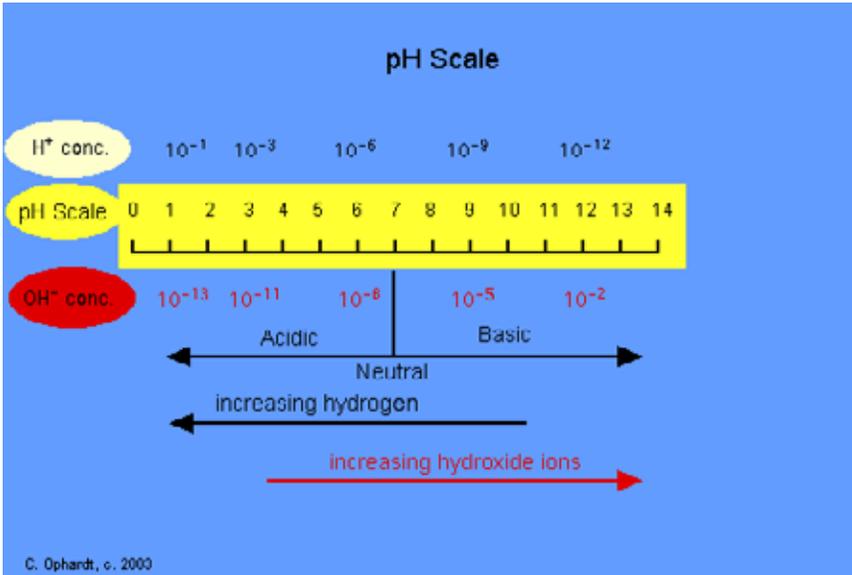
$$\frac{1}{2\pi a(r_o + r_i)} \frac{\partial^2 V_m(z, t)}{\partial z^2} = C_m \frac{\partial V_m(z, t)}{\partial t} + J(z, t)$$

You will notice the **importance of C_m** , the capacitance per unit area of membrane.

Jerry Tennant, MD has written an insightful book, *Healing is Voltage*.² In the medical field, pH is used relating electron and proton charge (hydrogen / hydroxide ions) in a solution. It is a logarithm used to make a power of 10 smaller with each change in pH of 1 meaning a factor of 10-fold increase or decrease. A pH change of 3 is a 1,000-fold change in ion concentration:

² Jerry Tennant, MD, *Healing is Voltage*, 2010.

$$\text{pH} = -\log_{10}[\text{H}^+]$$



pH is obviously directly related to voltage (the Nerst equation). At 25 degrees C:

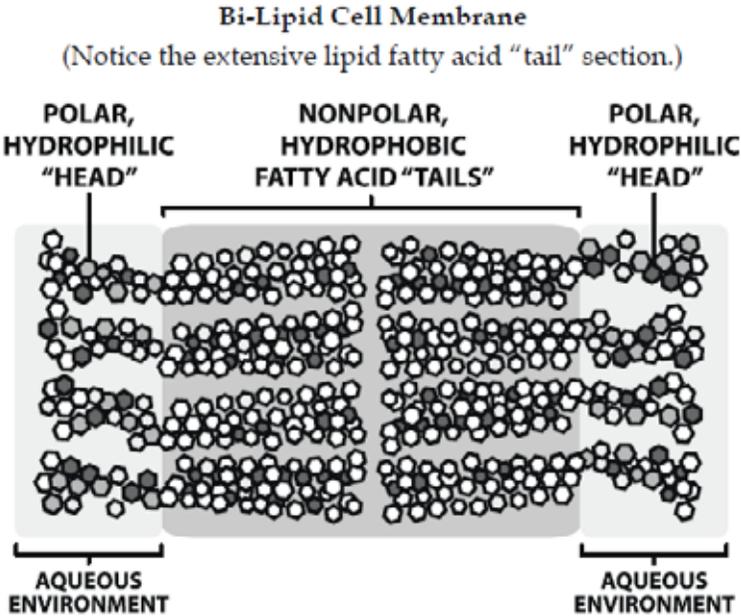
$$\text{Voltage}_{\text{cell}} = -0.0592 \log_{10}[\text{H}^+]$$

A voltage of 400mv is pH=0. Cellular and blood physiologic pH of 7.35 and 7.45 translates to voltages of -20mv and -25 mv. There is an excess of electrons—i.e., electron donors.

Dr. Tennant tells us that to heal and produce new cells requires a minimum voltage of -50mv and that pain occurs when the cellular voltage

is too low (relative to negativity)! He also tells us that the lower the voltage from normal, the LOWER THE OXYGEN CONTENT. We know this from Nobel-Prize-winner Warburg's monumental work in the cancer field The more acidosis (lower pH), the more virulent the cancer.

There are 2 concepts: First the charge on the bi-lipid membrane material with PEOs in the phospholipids forming the capacitive network itself, and then a possible *dielectric* factor which increases the effective capacitance. A dielectric is an insulator. Regarding the cell bi-lipid membrane, the heads are polar and the tails are non-polar "insulators" – we have capacitors!



A capacitor also acts as a battery. Therefore, we can see how cell membranes ALSO ACT as batteries.

The cytoplasm can be viewed as a resistor. We are starting to see how electrical circuits are physiologically utilized. Furthermore, it is now understood that **the real “brain of the cell” is NOT the nucleus, but the cell membrane!**

On page 67 of *Healing is Voltage*, Dr. Tennant makes clear about the criticality of cellular fat (PEOs):

“...the fat is critical to the cell being able to do its work at -20mv and to repair itself at -50mv.

“You must also remember that cells replace themselves frequently. If you don’t give the new cell **new building materials** including **adequate amounts of good fat**, the cells will have to make new cells with materials from the worn-out cell it is replacing. “

Dr. Tennant also comments how transfats are essentially a “plastic membrane” analogous to wrapping the cell in cellophane. Therefore, regardless of the insulin produced it can’t adequately get through, i.e., Type II diabetes...He also applies this line of thought to stem cell initiation, but that is beyond the scope of this discussion.

I wanted to present this information as *many physicians are often under the mistaken impression that the cell membrane structure is irrelevant* to oxygen transfer, etc. because oxygen isn’t polar. *This is*

categorically incorrect. One of the tenants of engineering is looking at limits, i.e., what would happen if the membrane is 100% “plastic” or 100% ideal. Then the actual answer must lie within the 2 areas. Anything impacting 100% functionality of the cells’ membrane impacts functionality, and fully functional PEOs are at the core of membrane functionality.

Confirmation of the capacitance feature of cells can be found in *Mathematical Physiology* (second edition), published in 2009 by James Keener & James Sneyd, Springer Publishers, pages 177-180, and pages 196-198.

It is beyond question that the fully functional, unadulterated Parent omega-6 & Parent omega-3 are the key to every cell membrane’s functionality, including natural beauty from the “inside-out.”