



THE WELLNESS MEDICAL INSTITUTE

~ Endothelial Biomedicine ~

Science always evolves. Dr William Aird has founded the field of Endothelial Biomedicine in a new textbook*, in which, he, too, identifies the endothelium as a vital organ teeming with life. He states that the endothelium is too vast for the human mind to grasp without metaphors--for example, *the endothelium is like the weather--it's everywhere in the body, affects everything, and is always changing*. This inspired me to call the endothelium our "*Life Organ*" or "*Wellness Organ*," or to simply call it the ENDO--like a proper noun such as Truth, Love, Good or Spirit.

Dr. Aird declares the goal of supporting the ENDO is not to reset its switch, but rather to fine-tune and recalibrate it--nudging it back towards its ideal state. This ignited my appreciation of *resilience* and led me to identify new avenues of nutritional supplementation to promote ENDO resilience--especially omega-3 fatty acids, antioxidants and plant-based polyphenols, i.e., green tea, grape seed extract, pomegranate, etc.

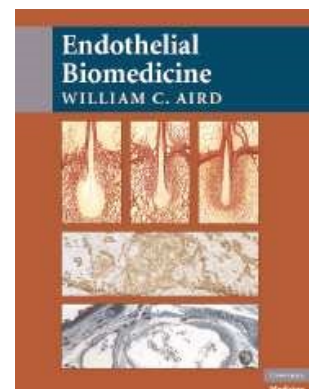
I've focused on Endothelial Biomedicine ever since reading a landmark article in The Journal of the American Medical Association (2012), which concluded that today's most common health problem is the coexistence of multiple chronic conditions in a patient--especially baby boomers who are entering their years of declining health. The authors point out that the modern epidemic of multiple chronic degenerative diseases is skyrocketing, and the present medical approach that treats single diseases rather than the entire patient with multiple diseases is chaotic and harmful.

Indeed, almost 3 out of 4 Americans will have multiple diseases by the time they reach 65 years old--and the common tipping point in both men and women is around the age of 35-40, which coincides with the natural winding down of the ENDO's production of Nitric Oxide molecules. This clarifies the therapeutic basis of my Wellness Vaccination: it is an inoculation that builds ENDO resilience by fine tuning and recalibrating it so that it can wind down naturally in ways that allow us to age healthfully and gracefully.

The TO-LIFE ENDO HEALTH Nutritional Supplement System, currently under development, represents my updated formula guidelines to support ENDO resilience--when used along with the lifestyle guidelines in The Wellness Solution book. This is my Wellness Vaccination!

Edward A. Taub, M.D.

October, 15, 2015



Book Review

Endothelial Biomedicine

William C. Aird, MD, ed

1856 pages. New York, NY: Cambridge University Press; 2007. \$285.00. ISBN 0-521-85376-7

It is a diaphanous film of tissue, only 1 cell layer in thickness, that lines the lumen of our vessels. Despite its apparent fragility, the endothelium exerts powerful influence over the tone, structure, and interaction of the vessel with circulating blood elements. Furthermore, the endothelium is a semipermeable membrane that regulates the passage of water, minerals, and nutrients to the surrounding tissue. In response to hemodynamic forces, the endothelium releases factors that normalize shear stress and cyclic strain by inducing vasoconstriction or vasodilation of the underlying smooth muscle. In response to tissue injury or invasion by pathogens, the endothelium expresses adhesion molecules and chemokines that recruit inflammatory cells for self-defense and repair. Because it has a major role in vascular homeostasis, tissue viability, and immunity, the endothelium when dysfunctional can cause or contribute to disease. Over the last few decades, an acceleration of research insights about the endothelium has illuminated a new therapeutic vista: endothelial biomedicine.

Dr William Aird reveals to us the landscape of this new field in his masterpiece *Endothelial Biomedicine*. This comprehensive and authoritative tome is the work of many contributors, but the hand of the editor is seen in every chapter. Furthermore, in the choice of authors and topics and in the organization of the material, there is reflected a creative talent with great intellectual depth and breadth. In addition to thoughtful contributions from well-established vascular biologists, Dr Aird has recruited chapters from superb scientists outside of the field, whose perspectives provide fresh insights. Indeed, by inducing other scientists to think about the endothelium, this project has generated new knowledge and ideas.

Like a Gothic cathedral, this is a work of art that is the result of the intense labor of many artisans with meticulous attention to detail. The work is built on a strong foundation, with superbly written chapters on the cellular and molecular biology of the endothelium, as well as vascular development and angiogenesis, vascular physiology, signaling, and transcription. The work is buttressed by chapters on model systems, comparative vascular genomics, and relevant aspects of metabolism, coagulation, and inflammation. The overarching theme of endothelial dysregulation and its role in pathobiology is gloriously expanded (50 chapters) to a great and luminous space that can accommodate the interests of specialists from many fields including cardiology, endocrinology, immunology, nephrology, and vascular medicine. This scholarly work is illuminated by the hopeful rays emanating from a section on diagnosis and treatment of endothelial disorders. Five years ago, endothelial-targeted management was more light than substance. However, a transfiguration of the field is under way. The translation of vascular biology into vascular medicine is most recently and dramatically manifested by the antiangiogenic therapies that have become standard practice for cancer and age-related macular degeneration.

Some rococo embellishments to the work may seem extravagant and unrelated. Nevertheless, these are well-crafted and

amusing pieces. Not 1 but 3 chapters are included on the semantics of the endothelium, in particular how metaphors may inform or constrain. For example, the endothelium as Teflon lining, as cobblestone paving, or as a gatekeeper invokes images that may assist our visualization of its functions but may also distort our view of the tissue. Chapters on cardiovascular adaptations at the extremes of vascular biology may seem esoteric to the casual reader, but for the vascular specialist, these cases are of interest and provocative. For example, the ice fish has colorless blood because it lacks hemoglobin. This anomaly has coevolved with a number of cardiovascular adaptations including greater capillary density, which reduces oxygen diffusion distance. Such cardiovascular adaptations are precedents for new therapeutic approaches for critical limb ischemia, including angiogenic growth factors and molecular modulators of oxygen diffusion. With respect to venous disease, consideration of how the giraffe subverts the effect of gravity on its circulation is instructive. In addition to having an inelastic fascia in its lower limbs, the endothelial permeability of the leg vasculature is significantly reduced, protecting it from the edema that might otherwise be induced by the hydrostatic pressure of gravity (intravascular pressures can reach ≈ 300 to 400 mm Hg in the limb arteries and almost 200 mm Hg in the leg veins of the animal). Could we someday induce regional modifications in venous or lymphatic endothelium to reduce the symptoms of venous insufficiency or lymphedema?

In another fascinating example, the Cavalier King Charles Spaniel may provide clues to a vascular puzzle. Great heterogeneity exists in individual manifestations of atherosclerosis. Patients with identical cardiovascular risk factors often develop disease affecting different vascular beds or perhaps no disease at all. What are the genetic factors that may predispose the development of hemodynamically significant disease in one vascular bed rather than the other? The Cavalier King Charles Spaniel spontaneously develops femoral arterial disease, manifested by localized "intimal thickening with breaks in the internal elastic lamina . . . and organized thrombus." Are there genetic determinants for this predisposition to peripheral arterial disease in the Cavalier King Charles Spaniel? Could these genetic determinants be operative in humans? Thus, seemingly arcane observations in other species may have implications for human peripheral arterial and venous diseases.

I had difficulty putting this book down (and with >1800 pages, I had difficulty picking it up as well). This is an entertaining, thought-provoking, and exhaustive scholarly work. It must be read by those who aspire to become vascular biologists, and it is a useful reference for those in related fields. With this comprehensive, clever, and artfully written masterpiece, Dr Aird has defined himself as the Tolstoy of vascular biology and medicine.

Disclosures

None.

John P. Cooke, MD, PhD
Stanford University School of Medicine
Stanford, Calif

(*Circulation*. 2008;117:e148.)

© 2008 American Heart Association, Inc.

Circulation is available at <http://circ.ahajournals.org>

DOI: 10.1161/CIRCULATIONAHA.107.740308