

# News

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## Book review: *Transformer: The deep chemistry of life and death*

By Dr Nick Lane. W.W. Norton and Company, 2022. ISBN: 978-0-393-65148-5. Hardcover, 400 pages.

When you were a medical student, you were told to sit down, shut up, raise your hand when you wanted to go to the bathroom, and memorize a whole bunch of strange names of carboxylic acids that make up the Krebs cycle. I thought this was a gigantic waste of time and had nothing to do with the practice of medicine.

Dr Nick Lane, a renowned biochemist and one of the best science writers on the planet, has written a book titled *Transformer: The Deep Chemistry of Life and Death*, about the Krebs cycle, which completely changed my mind about the above paragraph. Few publishers

would give the go-ahead to a nonfiction book on such a subject, but this writer has the credibility pull it off.

After reading this book, one will understand how this cycle of matter (eponymously named in the 1930s after Sir Hans Adolf Krebs) is a sound explanation for the origin of life, lifespan, and the end of life. You will learn how the whole beautiful process can be understood in terms of physical chemistry, which is a unique sweet spot in the massive space of possible scientific explanations. It is a remarkable story.

The writing is remarkable also. Dr Lane uses interesting recurring analogies, such as comparing a cell to a city from a structural point of view or a Shakespearean sonnet to DNA from an informational point of view, to get his point across. You will learn that this dance between biological structures and biological functions has an underlying chemical explanation as ancient as the Earth itself. The newly named science of metabolomics is outlined in the most illustrative way, which doctors will find useful in talking about disease to patients. It turns out that the Krebs cycle is the primordial controller of DNA, healing, and essentially everything we call life.

Energy from the sun is captured by plants (photosynthesis) and bottled up in molecules (otherwise known as food that is made of carbon, hydrogen, and oxygen, chemically speaking) which we humans then eat. The human Krebs cycle (electron transport chain) then strips out the energy (electrons) from this food and passes it on for cellular respiration. Think of it as taking a food molecule, ripping out the carbon and oxygen to make CO<sub>2</sub> waste, and then ripping out the hydrogen to make H<sub>2</sub>O. This is basically taking hydrogen and burning it in oxygen to give us energy to crawl, walk, or run. Dr Lane describes it as “feeding hydrogen to the ravaging beast called oxygen.” One can

think of the entirety of medicine as tending to faulty human cellular respiration. Dr Lane coherently shows how this small sliver of reality is embedded in a much more general evolutionary history, starting with alkaline vents at the bottom of the ocean and ending up at human consciousness. In between, the author plainly tells the tale of the development of DNA, the fluke of photosynthesis, oxygen in the atmosphere, the one-in-a-gabillion appearance of the eukaryotic cell, multicellular organisms, and animal predation, all grounded in survival of the fittest and death/extinction of the weakest.

The author further explains that life is able to take two gases and turn them into solid matter. Carbon dioxide and hydrogen are quite happy existing as they are, not reacting with anything; however, life lowers the thermodynamic barriers to transforming them and the Krebs cycle is integral to this.

The current thinking is that this started billions of years ago in the alkaline thermal vents at the bottom of the oceans, bubbling out hydrogen gas from a battery (Earth) when the Krebs cycle ran in reverse. When running in reverse, it makes stuff like cell membranes and doesn't burn (oxidize) stuff for energy. This same “making extra unwanted stuff” is pathognomonic of cancer at the end of a patient's life, when the Krebs cycle also runs in reverse. During the life of a patient there is a complicated meshing of the Krebs cycle, sometimes running forward to burn stuff and sometimes backward to make stuff.

After reading this really good book, one will appreciate the famous Harold Morowitz line that “matter cycles and energy flows.” I regret not having had this book during medical school. *Transformer* is well worth the read.

—Mark Elliott, MD, FRCPC

## Life insurance: Time for a beneficiary designation checkup

When was the last time you reviewed your beneficiary designations? You've no doubt made careful plans to ensure that your loved ones will be taken care of. However, your life circumstances may have changed, and it's important to ensure that your beneficiary designations reflect your current wishes. Here are some considerations to help you with your beneficiary checkup.

### Beneficiary basics

A beneficiary is someone you designate to be the recipient of insurance policy proceeds upon your death.

If you name a beneficiary, the proceeds will be paid outside your estate, directly to the beneficiary. Payment will be relatively prompt, minimal paperwork will be required, and the funds will not be subject to probate fees. You may also designate a trust as the beneficiary, but be sure to seek legal and tax advice before pursuing this option.

If you do not name a beneficiary, the proceeds will be paid to your estate. Your estate's executor must apply to validate your will in court and the funds will be subject to probate fees. BC's Probate Fee Act sets out the probate fee structure, which currently approaches approximately 1.4% of the value of an average policy.

Beneficiaries aren't for life insurance alone. Review all insurance policies, accounts, and investment vehicles for which you have designated beneficiaries. Your beneficiary designation

is separate for each and supersedes any general directive set out in your will, unless your will specifically identifies the policy in question.

### Types of beneficiary designations

#### Contingent beneficiary

You may wish to designate a primary beneficiary and a contingent beneficiary. The contingent beneficiary would be the recipient of your policy proceeds if the primary beneficiary is deceased. In the tragic case of you and your primary beneficiary dying at the same time, such as in an accident, insurance law deems that your beneficiary is deceased before you and proceeds will be paid directly to your contingent beneficiary. If no contingent beneficiary is named, payment will be made to your estate.

#### Minor children as beneficiaries

If a child under 18 is designated as your beneficiary, make sure you designate a trustee to receive the funds on the child's behalf. If no trustee is designated, the funds will be paid into the courts and the Public Guardian and Trustee of BC will be involved.

#### Corporations named as beneficiary

This is a popular strategy since there is a mechanism for corporations to pay life insurance policy proceeds as tax-free capital dividends to shareholders. In addition, corporations are subject to a lower income tax rate so tax efficiencies

are gained by paying corporately. Payors must align—the corporation named as beneficiary should also be paying the premiums for the life insurance policy. Speak with your accountant about whether this strategy makes sense for you.

#### Charity beneficiaries

You may name one or more charities as your beneficiary. Professional tax advice can determine if your charity designation renders your premiums tax-deductible.

#### Assignments

It is also important to review your life insurance policy to determine if there are any old assignments. In an assignment, the policy proceeds are assigned to a lender as collateral for a loan (often a business or clinic loan). The lender receives the funds to repay the loan before the residual is paid to your beneficiaries. If you change lenders or pay off the loan, it can be easy to forget to remove the original assignment, which can cause delays at death.

To make an appointment for a free insurance consultation with a licensed, noncommissioned Doctors of BC insurance advisor, contact us at [insurance@doctorsofbc.ca](mailto:insurance@doctorsofbc.ca) or by phone at 604 638-7914.

—Erin Connors

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