Getting natural

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The vast majority of the 20,000 or so chemicals to which we are exposed every day have only ever been evaluated for safety in isolation. In truth, we know very little about the effect of our total chemical exposure or how these mixtures of new-to-nature chemicals interact both with each other and with our bodies.

Some scientists have argued that we are well adapted to toxins – our bodies contain a wide range of detoxification systems such as mixed function oxidases and glutathione-S-tranferase that have been successfully detoxifying a wide range of natural toxins to which we are regularly exposed in our food. But it is increasingly being shown that although these detoxification mechanisms have been well adapted to a wide array of naturally-occurring chemicals over millennia,, they are poorly adapted to some of the new chemistries that we have only encountered within the last 50 or so years. Enter the world of drug side effects, MCS (multiple chemical sensitivities) and ME/CFS/PVFS (Myalgic Encephalopathy/Chronic Fatigue Syndrome/Post Viral Fatigue Syndrome)…which are all associated with exposure to new chemistries with which our body's have had little previous experience in evolutionary terms.

What is natural?

It is increasingly difficult to compartmentalise chemicals solely into 'natural' and 'synthetic' categories. Perhaps the easiest way of understanding these two poles of what is in effect a continuum, is by thinking of 'natural' products as those that are 100% naturally occurring and derived, and 'synthetic' ones as being 100% new-to-nature. From this perspective, it should be recognised that the vast majority of vitamins and minerals sold on the high street and even in health stores are not fully natural by this definition. This distinction is useful as it seems that there are specific benefits from naturally occurring vitamins, minerals and other phytonutrients found in fruit and vegetables that are not present in the synthetic analogues found in some supplements.

Many compounds or products sit somewhere along the continuum between 'natural' and 'synthetic' and include nature identical compounds (that are direct analogues of naturally occurring compounds, but are manufactured synthetically) and bio-synthetic products (synthetic compounds that are transformed through a biological process, normally involving microorganisms).

The three key principles

There are three crucial principles that must be understood in determining the risk posed by exposure to chemicals, whether natural or synthetic.

Principle 1:
Toxicity is a function of dosage. This is the principle first identified by Paracelsus around 500 years ago who reputedly said, "all things are poison and nothing is without poison, only the dose permits something not to be poisonous".

Principle 2:
Hazard (i.e. the actual risk to the exposed individual) is a function of both the toxicity and exposure. Therefore a short, one-off exposure of a quite toxic substance may pose less hazard than long term, repeat exposure to a less toxic substance.

Principle 3:
Total chemical load is a function of both cumulative individual toxicities of substances and interactions, which may be subtractive, additive or synergistic.

Petroleum foundations

The synthetic chemical industry is built largely on petrochemicals, which saw a massive boom in the post-WWII period. This period spawned a series of companies that have evolved to become among the largest and most powerful corporations on the planet today and include names such as Bayer, BASF, Monsanto and Merck. Their activities transect the agrochemical, biotechnology, GM and pharmaceutical fields. They are now associated with the colloquialisms Big Food, Big Chem and Big Pharma.

It is interesting that if you are to analyse objectively the progress made by the pharmaceutical industry, things look somewhat less rosy than we are often led to believe by well-funded PR machines. For example, the *British Medical Journal*'s satellite website *BMJ Clinical Evidence* has been carrying out an ongoing review of medical treatments. Of 2500 or so treatments analysed thus far, only 15% have been shown to be beneficial, while the largest proportion, 47% are of unknown effectiveness[1]. Other studies have revealed that Western medicine is likely to be the third or fourth leading cause of death in Western societies[2].

Nature's treasure trove

We need to appreciate that changes in agricultural production methods and food processing technologies have dramatically reduced the diversity and nature of natural substances that we ingest today as compared with those with which we have evolved. For example, of the approximately 10,000 known species of edible grass known to exist, most of us consume no more than 7 (i.e. wheat, rice, maize, barley,

[1] http://www.clinicalevidence.com/ceweb/about/knowledge.jsp

[2] Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. JAMA. 1998; 279(15): 1200-5.

sorghum, rye and oats). Of the 3000 species of tropical fruits, more than 80% of world trade is in just 4 fruits, namely banana, mango, pineapple and papaya. Of a staggering 18,000 known species of edible legume, the majority of trade is in just 6, namely peas, beans, soya, peanuts, alfalfa and clover, the latter two being used primarily for animal feed[3].

Over our recent history as a species, we have simplified dramatically our exposure to naturally occurring substances through the simplification of our diet and we have correspondingly increased our exposure a massive array of chemicals to which we have never been exposed before. Although the precise effect of this shift is unknown, many scientists are of the opinion that this increasing chemical load is a significant factor in the development of a range of disorders and diseases common today including multiple chemical sensitivities and cancer.

GM…or Frankenstein?

The EU's Community register of genetically modified food and feed lists the GM foods which are allowed within the EU.[4] Monsanto is the company behind the vast majority of entries, with a sprinkling of offerings from the likes of Bayer, Syngenta and a few others. Although we are always told by governments who approve use of GM crops that biotechnological modification of food plants will offer us the solution to the paradox of feeding an ever growing global population with reduced land area and labour devoted to agriculture, the whole process opens a can of worms. We have been modifying crops through plant breeding programmes over centuries, and it is true to say that modern food plants, such as wheat, maize and rice, have little resemblance, physically, chemically and genetically, to their ancestral lines.

But it GM's ability for such rapid change, its capacity to insert genes which manufacture components in our foods to which we have little knowledge about the long-term effects, and of course, probably most importantly, the real possibility of genetic pollution of nature's wild plant life, that brings with it such potentially huge and unknown risks. Coupled with this is the potential use of 'terminator technology' more properly referred to as Genetic Use Restriction Technologies (GURTs), which allow particular genes to be switched on or off during a plant's growth. If seed production is switched off, an option being seriously contemplated for common subsistence crops, the 4 billion people on earth who currently subsist by raising seed from their crops would become dependent on companies like Monsanto from which they would have to buy seed. This type of corporate take-over of nature must, in my view, be resisted at all costs given that it has absolutely no guarantee of enhancing food production or quality. It could ultimately give rise to an array of dire effects in health, social and environmental terms. It cannot be married with sustainability, a critically important concept over which more and more governments are paying at least lip service.

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[3] Vietmeyer, N. 1990. The New Crops Era. p. xviii-xxii. In: J.Janick and J.E. Simon (eds.), Advances in new crops. Timber Press, Portland, OR.

[4] http://ec.europa.eu/food/dyna/gm_register/index_en.cfm

Take home message

Keep it simple. Keep it natural. Understand what is really meant by natural. Think whole foods, not refined foods. Leave out the additives and preservatives. If we're to embrace a more sustainable world and a more sustainable healthcare system, getting more natural is a requirement for Base 1. Let's also not allow the term 'natural' to be hijacked by the largest corporations on the planet earth.