Acid Base Balance in Health – From Past to Present

Abstract
Much has been made of the mismatch between our modern diet and our stone age genes. However, recurrent attempts to recreate the Paleo Diet in a time and food context which bears little resemblance to that era appear fraught with problems and potential unintended outcomes. Perhaps there is an argument instead to consume a diet that attempts to align as closely as possible with the actual nutritional composition and subsequent physiological norms characteristic of Paleolithic diets generally. One of the most consistent scientific findings in this regard is the alkaline nature of most pre-agricultural diets compared with the acid-producing modern diet. Personally I don’t subscribe to the currently popularised notion of the Paleo Diet. The Paleo Diet purports to emulate a diet eaten by our ancestors, in spite of

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Many people have articulated this argument eloquently: From an evolutionary nutritional perspective, contemporary humans are Stone Agers habitually ingesting a diet discordant with their genetically determined metabolic machinery and integrated organ physiology. One tangible example takes the perspective of the kidneys, whose function is thought to be adapted and well suited to our traditional diet, which was characterised by intermittent high potassium intake along with other anions (bicarbonate, magnesium, calcium), thanks to the consumption of fruits and berries with negligible intake of sodium and chloride. As a result, our kidneys are single-mindedly geared towards renal conservation of sodium and elimination of potassium. So what happens when our diet has changed so radically but our kidneys remain the same? This has been coined the ‘diet/kidney mismatch’ by some.

The physiological norms of pre-agricultural Homo Sapiens have been determined by detailed analyses of hundreds of documented Paleolithic diets and have produced a surprising level of consensus among researchers. In particular the majority agree that the net endogenous acid production (NEAP), also referred to as the net acid dietary load, of most pre-agricultural diets (85%) was alkaline with an average NEAP of 82mEq/d. While the degree of alkalinity varied significantly across the various Paleolithic diets, this still contrasts starkly with the standard American diet (SAD), which has been consistently shown to be net acid-producing.
In simple terms this is thought to be the result of 1) reduced biocarbonate consumption due to lower fruit and vegetable intake, 2) the reversed ratio of sodium to potassium intake that has seen our average daily sodium exposure increase by a factor of ten and our potassium intake reduced by 75%, 3) along with 5) the enormous increase in chloride intake, and finally 4) the large dietary contribution from ‘energy-dense, nutrient-poor foods’ (e.g., separated fats, refined sugars, and vegetable oils), which have no capacity to buffer the net acid producing foods of the modern diet, such as meat, dairy and grains.

Interestingly, one study found that those few pre-agricultural diets that were net acid-producing were consumed by populations living at higher latitudes (e.g., > 40°). Ethnographic data tells us that while the contribution of hunted animal foods remains relatively constant across latitudes, plant food intake notably declines and fished animal food typically replaces hunted animal food with increasing latitude. Effectively, these diets had a higher animal to plant food ratio.

Some advocates of the current Paleo Diet acknowledge the need to be mindful of acid-base balance in theory, yet the example diets and actual execution of the Paleo Diet principles appear to do little to ensure that a net alkaline diet is achieved (http://thepaleo diet.com/what-to-eat-on-the-paleo-diet/). Even modern popularised ‘alkaline diets’ can unfortunately lead us astray, with consumers exposed to conflicting and inaccurate messages about how to ‘alkalise’, from simply drinking alkaline NEAP is central to this. How to ‘alkalise’, from simply drinking water to full-blown alkaline orthodoxy. As such, there is real danger that many people are consuming diets that are net acid-producing, which is highly concerning as it would fail to address the issue.

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What do we risk if we don’t solve this modern diet malady of acidity? At a population and public health level, there is increasing evidence of a broad multi-system burden secondary to the ‘chronic mild metabolic acidosis’ produced from a net acid-producing diet, negatively affecting the renal, immune, adrenal and musculoskeletal systems. Consequently, there is significant speculation about the potential causative role chronic mild metabolic acidosis and an acid-producing diet may play in a range of chronic diseases that dominate the modern medical landscape, such as diabetes type 2, renal impairment and osteoporosis. However, more research is needed to establish causality and clarify the full magnitude of its contribution.

Closer to home, working in integrative nutrition for over 20 years, I know that most patient outcomes typically are the result of identifying and addressing the underlying determinants of health and disease and, in particular, of individuals’ nutritional imbalances. In human nutrition we can draw parallels with agriculture: the more we attend to the overall health of the soil, the fewer direct interventions (fertilisers, added nutrients, pesticides) the plant will need. Similarly, in nutritional practice, if we fail to address the ‘soil’ of our clients, then our prescriptions risk being superficial and so tend to become longer and longer lists of supplements and interventions, in response to which the patient manages to keep their head above water, but not to swim unaided. A relatively simple analogy I use with my clients is this: when we consume an acid-producing diet long-term, it’s like having a leaking tap in your house, not just creating a constant drain on your wallet but also creating an enormous increase in chloride intake3; and ultimately, it’s like having a leaky tap in your house, not just creating a constant drain on your wallet but also creating an enormous increase in chloride intake3; and finally 4) the large dietary contribution from ‘energy-dense, nutrient-poor foods’ (e.g., separated fats, refined sugars, and vegetable oils), which have no capacity to buffer the net acid producing foods of the modern diet, such as meat, dairy and grains.

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