

EDUCATIONAL ARTICLE

GAPS Nutritional Protocol: How Healing the Gut Removes the Basis for All Chronic Diseases

Sophie Delaunay-Vagliasindi; Stephanie Seneff; Natasha Campbell-McBride

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ABSTRACT

A growing amount of research highlights the relationship between damaged gut microbiome and chronic illnesses - mental and physical. Healing the gut is becoming a priority in treating any chronic disease. The GAPS Nutritional Protocol has been designed for this purpose and has been used all over the world for twenty years. It has yielded successful results and is very distinct from other dietary interventions. Not only it focuses on healing the gut wall and repopulating the gut flora with beneficial microbes, but also provides the body with fundamental building blocks to heal and restore its anatomical structure. Through this article, we aim to remind our readers of the importance of gut health in a large array of disorders, describe the GAPS Nutritional Protocol, and encourage research on dietary interventions such as this one.

GUT MICROBIOME

The human body is populated by a myriad of microbes; it is an ecosystem. Nothing in the body is microbe-free, and all sorts of microbes are present in our inner microbial community: fungi, bacteria, viruses, protozoa, archaea, etc (Faintuch & Faintuch, 2019; Hallen-Adams & Suhr, 2017; Lurie-Weinberger & Gophna, 2015).

So far, the research has largely focussed on bacteria, estimating that our bodies contain as many bacterial cells as human cells, with 90% of them in our gut (Sender, Fuchs, & Milo, 2016). This part of our microbial community is called the gut flora or gut microbiome, and it plays a fundamental role in human health and disease (Hao & Lee, 2004) The gut with its microbial community is often referred to as 'our

second brain', but its structure and connections are so complex that some researchers name it 'the first brain' (Petra et al., 2015; Quigley, 2017).

Our digestive system with its microbiome is responsible for proper digestion and absorption of food, neutralisation of toxic substances, and production of vitamins, hormones, and neurotransmitters (Cénit et al., 2014; Clarke et al., 2014; Yoshii, Hosomi, Sawane, & Kunisawa, 2019). It is the headquarters of our immune system, ensuring its health, vitality, proper balance, and functions (Belkaid & Hand, 2014; Wu & Wu, 2012). All of these have far-reaching consequences for human health. In short, the gut holds the roots of our health. No matter how far removed from the gut an organ or tissue may be, its health and function are determined, to a large degree, by the state of the gut and its microbial community (Salem, Ramser, Isham, & Ghannoum, 2018).

In any microbial community, if there is balance between various species of microbes, then there is harmony and health. When this balance is damaged by antibiotics, chemicals in food and drink, and other influences, the gut flora becomes imbalanced – this is called gut dysbiosis.

In gut dysbiosis, pathogenic microbes impair food digestion and absorption, leading to multiple nutritional deficiencies. They damage the integrity of the gut wall, making it porous and 'leaky' (Fasano, 2011, 2012; Sapone et al., 2006; Sturgeon & Fasano, 2016). Undigested food absorbs through this damaged gut wall, triggering food allergies and intolerances (Camilleri, 2019). Pathogenic microbes in the gut produce toxic substances (Din & Alam, 2020; Kaji et al., 1976; Zioudrou, Streaty, & Klee, 1979), which absorb through the damaged gut wall, causing

disease (Borba, Lerner, Matthias, & Shoenfeld, 2020; Din & Alam, 2020; Sanctuary, Kain, Angkustsiri, & German, 2018; Sokolov et al., 2014; Woodford, 2021). In short, in a person with abnormal gut flora the digestive system becomes a major source of toxicity, instead of being a source of nutrition. The immune system reacts to the whole situation, launching systemic inflammation and autoimmunity. Our gut produces and regulates many hormones, neurotransmitters, and other powerful molecules, all of which get out of balance in gut dysbiosis, adding an avalanche of physical and mental symptoms to the whole picture.

Many health practitioners realise that it is impossible to treat such a complex situation without changing the person's diet. Gut dysbiosis is increasingly being found in cognitive, mental, and autoimmune diseases (Belkaid & Hand, 2014; Capuco et al., 2020; Cénit, Matzaraki, Tigchelaar, & Zhernakova, 2014; Dinan & Cryan, 2017; Foster & McVey Neufeld, 2013; Heintz-Buschart et al., 2018; Jaglin et al., 2018; Kaplan, Crawford, Field, & Simpson, 2007; Maniscalco & Rinaman, 2018; Perricone & Shoenfeld, 2019; Rogers et al., 2016; Sanctuary et al., 2018; Sokolov et al., 2014; Stevens et al., 2018; Woodford, 2021).

These findings have led to a concept called gut-brain axis (Clapp et al., 2017; Cryan et al., 2019). Research on the gut-brain axis is rapidly growing, and so are the studies looking at dietary interventions to treat these disorders (Lange et al., 2017; Rucklidge & Harrison, 2010; Schnorr & Bachner, 2016; Tillisch et al., 2013).

The GAPS Nutritional Protocol with its central piece – The GAPS Diet – is a global phenomenon, gaining international popularity over two decades. It has been scarcely studied (Babinska et al., 2020; Cekici & Sanlier, 2019; Nazarenkov et al., 2018), and the research has largely focussed on autism (Abele, Tzivian, Meija, & Folkmanis, 2019; Çikili, Deniz, & Çakal, 2019). Yet, this protocol is used by people all over the world to heal from a very long list of mental and physical diseases, including autoimmune, neurological problems, hormonal problems, chronic fatigue syndrome, fibromyalgia, allergies, asthma, eczema, psoriasis and the full list of learning disabilities and psychiatric maladies.

The purpose of the GAPS Nutritional Protocol is to re-balance the gut flora and the rest of the microbiome, heal and seal the 'leaky' gut wall, normalise digestion and absorption of food, re-balance the immune and endocrine systems, and provide quality building materials for healing and repair of all the tissues and organs in the human body (Campbell-McBride, 2010, 2020).

THE GAPS NUTRITIONAL PROTOCOL AND THE GAPS DIET

GAPS stands for Gut And Psychology Syndrome and Gut And Physiology Syndrome. Its core principles rely on the need for a healthy microbiome for our body to function correctly. The most important part of the protocol is the GAPS Diet (Campbell-McBride, 2020).

The GAPS Diet is based on traditional diets from all over the world and focusses on foods with high-density, easily-digestible nutrition. It eliminates all difficult-to-digest and damaging substances. All foods are cooked at home from fresh natural ingredients. Re-building connective tissues of the patient is a particular focus. Fermented foods are used extensively. Full implementation of the GAPS Diet, over time, eliminates the need for nutritional supplements, as the food provides all the necessary building materials for healing and maintenance of the human body.

The GAPS Diet has several variations (Campbell-McBride, 2020, pp 162-281), but the two main ones are The Full GAPS Diet and The GAPS Introduction Diet. The Full GAPS Diet is followed as a permanent lifestyle, and it is easier to implement. The GAPS Introduction Diet is designed for deeper healing: it is a stage-by-stage introduction of nourishing foods, starting from the easiest-to-digest to more difficult-to-digest foods (see Campbell-McBride, 2020). It can be followed at the beginning of the protocol or at any point when deeper healing is required. The more damaged is the gut of the person, the more it is necessary to go through the GAPS Introduction Diet. This diet is particularly effective in removing abnormal intestinal permeability (leaky gut). Once enough healing in the gut is achieved through The GAPS Introduction Diet, the person moves on to The Full GAPS Diet to continue healing the whole body.

The GAPS Diet removes all toxic and processed substances: processed foods, food additives, antibiotics, toxic metals, butter substitutes and vegetable oils, sugar, grains, starch, soy and industrial meat and dairy. When following the GAPS Diet one should source the cleanest natural foods, to avoid agricultural chemicals. Especially concerning is glyphosate, widely used herbicide which disrupts the gut microbiome, chelates minerals, damages organs and tissues, and impairs liver detoxification (Samsel & Seneff, 2013; Seneff, 2021).

Nutrient-dense animal foods (meat, fish and eggs) and meat/fish stocks are central to the GAPS Diet. The human body is largely made out of connective tissue, the gut wall in particular. Connective tissues of animals and birds,

cooked with water, release building materials for the connective tissues of the human being, into the stock (Campbell-McBride, 2020, pp 218-220). Organ meats (liver, hearts, lungs, kidneys, tripe, brain, etc.) are used extensively in cooking, providing a plethora of nutrients, which are missing in muscle meats. Homemade meat stocks, well-cooked connective tissues and organ meats provide proteins, amino acids, cholesterol, minerals, glucosamines, collagens, fat soluble vitamins and all other crucial elements necessary for healing a damaged gut wall and the rest of the body (Campbell-McBride, 2020, pp 248-252).

Animal fats and cholesterol-rich foods (raw butter, homemade ghee, lard, tallow, goose and duck fat), seafood, avocados, cold-pressed olive oil and coconut oil are central to the GAPS Nutritional Protocol.

Low-fat diets have been long promoted as the solution to heart disease (Keys, 1953). The research is mounting to show that this idea is false (Ravnskov, 2002, 2003), and that fat and cholesterol are essential to the proper functioning of our bodies. Every cell of every organ contains a significant amount of cholesterol in its structure (Enig, 2000; Hussain et al., 2019; Nelson, Lehninger, & Cox, 2008; Roberts, Alberts, Johnson, Walter, & Hunt, 2002). This is especially the case in cell membranes, where cholesterol molecules can make up to half of the plasma membrane and even more when the cells are part of protective barriers (Garrow, James, & Ralph, 2003; Nelson et al., 2008). The brain consumes 25% of the body's cholesterol (Dietschy & Turley, 2001), and cholesterol is involved in cell communication (Enig, 2000; Hussain et al., 2019; Nelson et al., 2008; Purves, Orians, Heller, & Sadava, 2004; Roberts et al., 2002), myelin production and composition (Dietschy & Turley, 2001; Enig, 2000; Hussain et al., 2019; O'Brien & Sampson, 1965), functions and structures of synapses (Dietschy & Turley, 2001; Hussain et al., 2019; Huttenlocher & Dabholkar, 1997), production of steroid hormones (Berg, Tymoczko, Gatto, & Stryer, 2015; Garrow, James, & Ralph, 2003; Seeley et al., 2008) and functions of the immune system (Bhakdi, Trantum-Jensen, Utermann, & Füssle, 1983; Claxton et al., 1998; Iribarren et al., 1997; Muldoon et al., 1997). A low-fat and low-cholesterol diet, together with cholesterol-lowering drugs, can lead to serious health problems and impact brain functioning (Cham, Koslik, & Golomb, 2016; Golomb, Stattin, & Mednick, 2000; Golomb, Kane, & Dimsdale, 2004; Hussain et al., 2019; Tomson-Johanson et al., 2020). Campbell-McBride (2018, 2020) states that animal fats and cholesterol are essential-to-life substances. This is why they are provided in abundance by the GAPS Diet.

Raw organic dairy from natural breeds of animals is used in the GAPS Diet. Patients ferment raw milk and cream at home for 24 hours, which makes dairy lactose-free and breaks down casein (Campbell-McBride, 2020). Homemade yogurt, sour cream, kefir, whey and cheese provide probiotic microbes, enzymes and high-quality nutrition. Only raw (unpasteurised) milk and cream from natural breeds of animals are used (Campbell-McBride, 2020) for maximum healing effect. Pasteurisation damages the structure of milk, making it harmful to health and allergenic (Campbell-McBride, 2020, pp 146-150). Raw milk contains a larger amount of psychotropic and mesophilic bacterial populations, healthier than those found in pasteurised milk. In addition, the bacteria contained in pasteurised milk have reached a nonculturable form (Quigley et al., 2013a,b). Consumption of fermented raw milk has yielded positive results on mood and health issues (Baars, Berge, Garssen, & Verster, 2019) and has been suggested as 'preventive strategies to reduce the incidence of allergic disease' (van Neerven, Knol, Heck & Savelkoul, 2012, p. 857). Finally, raw milk and homemade fermented dairy products have been found to hold salutogenic effects in immune diseases such as celiac disease (Lerner & Matthias, 2018). For patients with milk allergy, home-fermented dairy products are introduced later in the protocol following specific gradual steps (Campbell-McBride, 2020, pp 179-183).

Apart from fermented dairy, probiotics in the GAPS Diet come from fermented vegetables and fruits, prepared at home. Sauerkraut (fermented cabbage) has been found to contain the recommended range of lactic acid bacteria per gram (between 10⁶ and 10⁸) to be called a probiotic superfood (Orgeron, Corbin, & Scott, 2016). Fermentation of plant matter makes food more digestible, richer in bio-available nutrients and a good source of probiotics and enzymes (Campbell-McBride, 2020, pp 229-245).

Nuts and oily seeds (sunflower, pumpkin and sesame) are used in the GAPS Diet for making bread, cakes and deserts, and they are prepared by soaking, fermenting, and sprouting to remove antinutrients. Antinutrients (enzyme inhibitors, lectins, phytates, oxalates, etc) are substances in natural foods that can damage the human body, impair digestion and cause nutritional deficiencies (Campbell-McBride, 2020, pp 128-129). They are almost exclusively found in plant foods, particularly in their seeds (grains, beans, pulses, legumes, seeds and nuts). Enzymes inhibitors can impair digestion, protein synthesis, functioning of hormones and neurotransmitters and other important functions. Lectins can damage the immune system, the gut wall, the joints and many other organs. Phytic acid binds to

vital minerals and makes them unavailable for the body to use. Oxalates and oxalic acid also bind minerals in the body and can cause behavioural abnormalities, painful urination and chronic cystitis. Glucosinolates found in brassica vegetables bind iodine and can contribute to thyroid problems. Polyphenolic compounds, alkaloids, salicylates, saponins, tannins and flavonoids in plants can all cause problems, particularly when the person is unable to digest them (Akande, Doma, Agu, & Adamu, 2010; Freed, 1991, 1999; Pusztai et al., 1993; Sandstead, 1992; Van Damme, Peumans, Pusztai, & Bardocz, 1998). GAPS people have a damaged digestive system and cannot handle many antinutrients. That is why plant foods present the biggest challenge for this group of patients. The GAPS Diet removes the worst offenders such as grains (Cordain, 1999) and, in addition, insists on vegetables and seeds (beans, nuts and other) being prepared carefully before consumption, to make them more digestible (Campbell-McBride, 2020).

Apart from the GAPS Diet, the GAPS Nutritional Protocol involves a few nutritional supplements (mostly used at the beginning of the protocol and discontinued later) and lifestyle changes revolving around the reduction of toxicity from the environment (such as chemical compounds found in cleaning and beauty products). The protocol is described in detail in Dr Campbell-McBride's books *Gut And Psychology Syndrome* (2010) and *Gut And Physiology Syndrome* (2020).

CONCLUSION

All diseases begin in the gut! This statement, attributed to Hippocrates, is gaining monumental importance in the modern world. Gut dysbiosis is increasingly being observed in a growing list of psychiatric and physical problems, illustrating an intrinsic relationship between the state of the gut and the rest of the body. The GAPS Nutritional Protocol has been specifically designed to heal the human body starting from the root – the digestive system. This protocol has been used by people all over the world to heal from mental and physical illnesses for twenty years. Thousands of glowing testimonies have been published (Campbell-McBride, 2012) but scientific research is lacking. We highly encourage health practitioners and researchers, interested in addressing gut dysbiosis as the cause of mental and physical illnesses, to use the GAPS Nutritional Protocol in their practice and/or empirical studies.

DECLARATIONS

Competing Interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest. Dr Natasha Campbell-McBride is the creator of the GAPS concept and the GAPS Nutritional Protocol.

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Authors' Contributions

Sophie Delaunay-Vagliasindi wrote a first version of the manuscript. Natasha Campbell-McBride and Stephanie Seneff supervised and edited. All authors read and approved the final manuscript.

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Author's Information

Sophie Delaunay-Vagliasindi holds a MSc degree in Developmental Psychology from the University of Kent, UK. She is a certified GAPS Coach. She is specialising in the impact of gut flora on development and conducting research for non-profit organisations. Stephanie Seneff is a Senior Research Scientist at MIT in Cambridge, MA. She holds a B.S. degree from MIT in biology, and a Ph.D. in electrical engineering and computer science also from MIT. Her recent research interests are on the role of nutritional deficiencies and toxic chemicals in disease, with a focus on the mineral sulfur and the herbicide glyphosate. Natasha Campbell-McBride is a medical doctor with two postgraduate degrees: MMedSci (neurology), MMedSci (human nutrition). She is the creator of the GAPS concept and the GAPS Nutritional Protocol.

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