Gut and Psychology Syndrome (GAP Syndrome or GAPS)

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We live in the world of unfolding epidemics. Autistic Spectrum Disorders, Attention Deficit Hyperactivity Disorder (ADHD/ADD), schizophrenia, dyslexia, dyspraxia, depression, obsessive –compulsive disorder, bi-polar disorder and other neuro-psychological and psychiatric problems in children and young adults are becoming more and more common.

In clinical practice these conditions more often than not overlap with each other. A child with autism often is hyperactive and dyspraxic. There is about 50% overlap between dyslexia and dyspraxia and 25-50% overlap between hyperactivity and dyslexia and dyspraxia. Children with these conditions are often diagnosed as being depressed and as they grow up they are more prone to substance abuse or alcoholism than their typically developing peers. A young adult diagnosed with schizophrenia would often suffer from dyslexia, dyspraxia or/and ADHD/ADD in childhood. Schizophrenia and bi-polar disorder are often described as two sides of one coin. We have created different diagnostic boxes to fit our patients in. But a modern patient does not fit into any one of them neatly. The modern patient in most cases fits into a rather lumpy picture of overlapping neurological and psychiatric conditions.

When we examine these patients in a clinical setting, we find that apart from so-called mental problems, they are also physically very ill. Digestive disorders, malnourishment, allergies, asthma, eczema, chronic cystitis, thrush and fussy eating habits are a consistent part of the picture.

What is a typical scenario we see in clinical practice?

Before examining the patient it is very important to look at the health history of the parents. Whenever the parents are mentioned people immediately think about genetics. However, apart of genetics there is something very important the parents, mother in particular, pass to their child: their unique gut micro-flora. Not many people know that an adult on average carries 2 kg of bacteria in the gut. There are more cells in that microbial mass than there are cells in an entire human body. It is a highly organised micro-world, where certain species of bacteria have to predominate to keep us healthy physically and mentally. Their role in our health is so monumental, that we simply cannot afford to ignore them. We will talk in detail about the child's gut flora later. Now let us come back to the source of the child's gut flora – the parents.

After studying hundreds of cases or neurological and psychiatric conditions in children, a typical health picture of these children's mums has emerged.
A typical modern mother was probably not breast fed when she was a baby, because she was born in 60s or 70s when breast-feeding went out of fashion. Why is it important? Because it is well known that bottle fed babies develop completely different gut flora to the breast fed babies. This compromised gut flora in a bottle fed baby later on predisposes her to many health problems. Having acquired compromised gut flora from the start, a typical modern mum had quite a few courses of antibiotics in her childhood and youth for various infections. It is a well known fact

that antibiotics have a serious damaging effect on the gut flora, because they wipe out the beneficial strains of bacteria in the gut. At the age of 16 and sometimes even earlier the modern mum was put on a contraceptive pill, which she took for quite a few years before starting a family. Contraceptive pills have a devastating effect on the beneficial (good) bacteria in the gut. One of the major functions of the good bacteria in the gut flora is controlling about 500 different known to science species of pathogenic (bad) and opportunistic microbes. When the beneficial bacteria get destroyed the opportunists get a special opportunity to grow into large colonies and occupy large areas of the digestive tract. A modern diet of processed and fast foods provides perfect nourishment for these pathogens and that is a typical diet a modern mum had as a child and a young adult. As a result of all these factors a modern mum has seriously compromised gut flora by the time she is ready to have children. And indeed clinical signs of gut dysbiosis (abnormal gut flora) are present in almost 100% of mothers of children with neurological and psychiatric conditions. The most common health problems in mothers are digestive abnormalities, allergies, auto-immunity, PMS, chronic fatigue, headaches and skin problems.

A baby is born with a sterile gut. In the first 20 or so days of life the baby's virgin gut surface gets populated by a mixture of microbes. This is the child's gut flora, which will have a tremendous effect on this child's health for the rest of his/her life. Where does this gut flora come from? Mainly from the mother.
So, whatever microbial flora the mother has she would pass to her new-born child.

Gut flora is something we do not think much about. And yet the number of functions the gut flora fulfils is so vital for us that if some day our digestive tract got sterilised we probably would not survive.

The first and very important function is appropriate digestion and absorption of food. If a child does not acquire normal balanced gut flora, then the child will not digest and absorb foods properly, developing multiple nutritional deficiencies. And that is what we commonly see in children and adults with learning disabilities, psychiatric problems and allergies. Many of these patients are malnourished. Even in the cases where the child may grow well, testing reveals some typical nutritional deficiencies in many important minerals, vitamins, essential fats, many amino-acids and other nutrients. The most common deficiencies, recorded in these patients, are in magnesium, zinc, selenium, copper, calcium, manganese, sulphur, phosphorus, iron, potassium, vanadium, boron, vitamins B1, B2, B3, B6, B12, C, A, D, folic acid, pantothenic acid, omega-3, 6, 9 fatty acids, taurine, alpha-ketoglutaric acid, glutathione and many other amino-acids. This usual list of nutritional deficiencies includes some most important nutrients for normal development and function of the child's brain, immune system and the rest of the body.

Apart of normal digestion and absorption of food healthy gut flora actively synthesises various nutrients: vitamin K, pantothenic acid, folic acid, thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), pyridoxine (vitamin B6), ciancobalamine (vitamin B12), various amino-acids and proteins. Indeed, when tested people with gut dysbiosis always present with deficiencies of these nutrients. Clinical experience shows that restoring the beneficial bacteria in their gut is the best way to deal with these deficiencies.

The majority of children and adults with neurological and psychiatric conditions look pale and pasty. When tested they show various stages of anaemia, which is not surprising. To have a healthy blood we require many different nutrients: vitamins (B1, B2, B3, B6, B12, K, A, D, etc), minerals (Fe, Ca, Mg, Zn, Co, Se, boron, etc.), essential

amino-acids and fats. These patients not only cannot absorb these nutrients from food, but their own production of many of them in the body is damaged. On top of that people with damaged gut flora often have particular groups of pathogenic bacteria growing in their gut, which are iron-loving bacteria (Actinomyces spp., Mycobacterium spp., pathogenic strains of E.Coli, Corynebacterium spp. and many others). They consume whatever iron the person gets from the diet, leaving that person deficient in iron. Unfortunately, supplementing iron only makes these bacteria grow stronger and does not remedy anaemia. To treat anaemia the person requires all the nutrients we have mentioned, many of which healthy gut flora supplies.

Apart from taking a direct part in nourishing the body, beneficial bacteria in the gut act as the housekeepers for the digestive tract. They coat the entire surface of the gut protecting it from invaders and toxins by providing a natural barrier and producing a lot of anti-bacterial, anti-viral and anti-fungal substances. At the same time they provide the gut lining with nourishment. It is estimated that 60 – 70% of energy, the gut lining derives, is from the activity of bacteria, which live on it. So, it is no surprise that when the gut flora is abnormal the digestive tract itself cannot be healthy. Indeed most children and adults with learning disabilities, psychiatric disorders and allergies present with digestive problems. In many cases these problems are so severe, that the patients (or their parents) talk about them first. In some cases they may not be very severe, but when asked direct questions the parents describe that their child never had normal stool, that their child suffered from colic as a baby and that tummy pains, bloating and flatulence are a common part of the picture. Adult sufferers describe the same kind of symptoms. In those cases where these children and adults have been examined by gastro-enterologists inflammatory process in the gut was found along with faecal compaction and an over-spill syndrome. Dr. Andrew Wakefield and his team at the Royal Free Hospital in London in the late 90s found an inflammatory condition in the bowel of autistic children, which they have named Autistic Enterocolitis. Schizophrenic patients were always known to have serious digestive problems. Dr. Curtis Dohan, MD has devoted many years to researching digestive abnormalities in schizophrenia. He found a lot of similarities between coeliac disease and the state of the digestive tract in schizophrenics. Indeed, in my clinical practice long before these patients develop psychotic symptoms they suffer from digestive problems and all other typical symptoms of gut dysbiosis pretty much from the start of their lives. Children and young adults with ADHD/ADD, OCD, depression and other neuro-psychological problems are very often reported to suffer from digestive abnormalities.

What other symptoms of gut dysbiosis do we know?

Well-functioning gut flora is the right hand of our immune system. The beneficial bacteria in the gut ensure appropriate production of different immune cells, immunoglobulins and other parts of the immunity. But most importantly they keep the immune system in the right balance. What typically happens in a person with gut dysbiosis is that two major arms of their immune system Th1 and Th2 get out of balance with underactive Th1 and overactive Th2. As a result the immune system starts reacting to most environmental stimuli in an allergic or atopic kind of way.
A baby is born with an immature immune system. Establishment of healthy balanced gut flora in the first few days of life plays a crucial role in appropriate maturation of the immune system. If the baby does not acquire appropriate gut flora then the baby is left immune compromised. The result is lots of infections followed by lots of courses of antibiotics, which damage the child's gut flora and immune system even further. The most common infections in the first two years of life in the children with neurological, psychological and atopic disorders are ear infections, chest infections,

sore throats and impetigo. At the same time in the first two years of life the child receives a lot of vaccinations. A child with compromised immune system does not react to vaccinations in a predicted way. In most cases vaccines deepen the damage to the immune system and provide a source of chronic persistent viral infections and autoimmune problems in these children. There has been a considerable amount of research published into the state of the immune system in children and adults with learning disabilities and psychiatric problems. The research shows deep abnormalities in all major cell groups and immunoglobulins in these patients. The most common autoantibodies found are to myelin basic protein (MBP) and neuron-axon filament protein (NSFP). These antibodies attack the person's brain and the rest of the nervous system.

So, the modern patient (child or adult), who we are talking about, did not get normal gut flora from the start and then got it damaged even further by repeated courses of antibiotics and vaccinations. As a result these children and adults commonly suffer from digestive problems, allergies, asthma and eczema. But apart from that in people who then go on to develop neurological and psychiatric problems something even more terrible happens. Without control of the beneficial bacteria different opportunistic and pathogenic bacteria, viruses and fungi have a good chance to occupy large territories in the digestive tract of the patient and grow large colonies. Two particular groups which are most commonly found on testing are yeasts (including Candida species) and Clostridia family. These pathogenic microbes start digesting food in their own way producing large amounts of various toxic substances, which get absorbed into the blood stream, carried to the brain and cross the blood – brain barrier. The number and mixture of toxins can be very individual, causing different neurological and psychiatric symptoms. Due to the absence or greatly reduced numbers of beneficial bacteria in the gut flora, the person's digestive system instead of being a source of nourishment becomes a major source of toxicity in the body.

<u>So, what kind of toxins are we talking about?</u>

There are many toxins, which we have not studied very well yet. But some toxins have received a considerable amount of research. Let us have a look at them.

<u>Acetaldehyde & Alcohol</u>
The most common pathogenic microbes shown to overgrow in the digestive systems of children and adults with neuro-psychiatric conditions are yeasts, particularly Candida species. Yeasts ferment dietary carbohydrates with production of alcohol and its by-product acetaldehyde. Let us see what does a constant exposure to alcohol and acetaldehyde do to the body.

Liver damage with reduced ability to detoxify drugs, pollutants and other toxins.

Pancreas degeneration with reduced ability to produce pancreatic enzymes, which would impair digestion.

Reduced ability of the stomach wall to produce stomach acid.

Damage to immune system.

Brain damage with lack of self-control, impaired co-ordination, impaired speech development, aggression, mental retardation, loss of memory and stupor.

Peripheral nerve damage with altered senses and muscle weakness.

Direct muscle tissue damage with altered ability to contract and relax and muscle weakness.

Nutritional deficiencies from damaging effect on digestion and absorption of most vitamins, minerals and amino acids. Deficiencies in B and A vitamins are particularly common.

Alcohol has an ability to enhance toxicity of most common drugs, pollutants and other toxins.

Alteration of metabolism of proteins, carbohydrates and lipids in the body.

Inability of the liver to dispose of old neurotransmitters, hormones and other by-products of normal metabolism. As a result these substances accumulate in the body, causing behavioural abnormalities and many other problems.

Acetaldehyde is considered to be the most toxic of alcohol by-products. It is the chemical, which gives us the feeling of hangover. Anybody who experienced a hangover would tell you how dreadful he or she felt. Children, who acquire abnormal gut flora with a lot of yeast from the start, may never know any other feeling. Acetaldehyde has a large variety of toxic influences on the body. One of the most devastating influences of this chemical is its ability to alter the structure of proteins. Acetaldehyde – altered proteins are thought to be responsible for many autoimmune reactions. Children and adults with neuro-psychiatric problems are commonly found to have antibodies against their own tissues.

<u>Clostridia Neurotoxins</u>
There are about 100 different Clostridia species known so far. They are present in the stools of people with autism, schizophrenia, psychosis, severe depression, muscle paralysis and muscle tonus abnormalities and some other neurological and psychiatric conditions. Many Clostridia species are normal inhabitants of a human gut. For example Clostridium tetani is routinely found in the gut of healthy humans and animals. Everybody knows that tetanus is a deadly disease, due to an extremely powerful neurotoxin Clostridium tetani produces. Clostridium tetani, which lives in the gut, is normally controlled by the beneficial bacteria and does us no harm, because its toxin cannot get through the healthy gut wall. Unfortunately, patients, which we are talking about, do not have a healthy gut wall. In gut dysbiosis this powerful neurotoxin can get through the damaged gut lining and then cross the blood-brain barrier affecting the person's mental development. Many other species of Clostridia (perfringens, novyi, septicum, histolyticum, sordelli, aerofoetidum, tertium, sporogenes, etc) produce toxins similar to tetanus toxin as well as many other toxins. Dr. William Shaw at Great Plains Laboratories describes in detail number of autistic children, who showed serious improvements in their development and biochemical tests while on anti-Clostridia medication. Unfortunately, as soon as the medication was stopped the children slipped back into autism, because these children do not have healthy gut flora to control Clostridia and not to allow their toxins through the gut lining into the bloodstream. In many cases Clostridia were not identified in the stools of these children, because Clostridia are strict anaerobes and are very difficult to study. We need to come up with some better ways of testing for these potent pathogens.

Yeasts and Clostridia have been given a special opportunity by the era of antibiotics. Broad-spectrum antibiotics do not touch them while killing the beneficial bacteria in the gut, which are supposed to control the yeasts and Clostridia. So, after every course of antibiotics these two pathogenic groups get out of control and overgrow. The patients that we are talking about usually are exposed to numerous courses of antibiotics pretty much from the beginning of their lives.

Gluteomorphins & Casomorphins or opiates from gluten and casein.
Gluten is a protein present in grains, mainly wheat, rye, oats, barley. Casein is a milk protein, present in cow, goat, sheep, human and all other milk and milk products. In the bodies of children and adults with autism and schizophrenia these proteins do not get digested properly due to the fact that their digestive systems are full of abnormal microbial flora and hence unhealthy. As a result of misdigestion gluten and casein turn into substances with similar chemical structure of opiates, like morphine and heroin. There has been quite a substantial amount of research done in this area by Dohan, Reichelt, Shattock, Cade and others, where gluten and casein peptides, called gluteomorphins and casomorphins, were detected in the urine of schizophrenic patients and autistic children. Incidentally, these substances were also found in patients with depression and rheumatoid arthritis. These opiates from wheat and milk get through the blood-brain barrier and block certain areas of the brain, just like morphine or heroin would do, causing various neurological and psychiatric symptoms. Based on this research the gluten and casein free diet (GFCF diet) has been developed.

Dermorphin & Deltorphin
These are two frightening toxic substances with opiate structure, which have been found in autistic children by a biochemist Alan Friedman, PhD. Dermorphin and deltorphin were first identified on the skin of a poison dart frog in South America. Native people used to dip their darts into the mucous on these frogs in order to paralyse their enemy, because deltorphin and dermorphin are extremely potent neurotoxins. Dr Friedman believes that it is not the frog that produces these neurotoxins, but a fungus, which grows on the skin of this frog. It is possible that this fungus grows in the gut of autistic children, supplying their bodies with dermorphin and deltorphin.

Organic Acid Testing available now in many laboratories around the world identify various metabolites of microbial activity in the gut, which get absorbed and finish up in the patient's urine. Many of these metabolites are highly poisonous substances.

Low Serum Sulphate is a common picture in these patients, which is an indirect indication of toxicity in the body, because sulphates are essential for many detoxification processes and normal metabolism of brain neurotransmitters. In many cases the person may be getting plenty of sulphates through the diet, but they all get consumed by the detox pathways struggling with the river of toxicity, which is constantly coming from the person's gut. At the same time another large group of bacteria, which commonly overgrow in the gut dysbiosis situation are sulphate-reducing bacteria, which make sulphur unavailable for the body to use. These bacteria metabolise sulphate coming from food into sulphites, many of which are toxic like hydrogen sulphide for example, which is the gas with rotten egg smell. Some parents of autistic, hyperactive and other children tell me that their child's stool has this characteristic smell.

The mixture of toxicity in each child or adult can be quite individual and different. But what they all have in common is gut dysbiosis. The toxicity, which is produced by the

abnormal microbial mass in these people, establishes a link between the gut and the brain. That is why I have grouped these disorders together and gave them a name: the Gut and Psychology Syndrome (GAP Syndrome). The GAPS children and adults can present with symptoms of autism, ADHD, ADD, OCD, dyslexia, dyspraxia, schizophrenia, depression, sleep disorders, allergies, asthma and eczema in any possible combination. These are the patients who fall in the gap in our medical knowledge. Any child or adult with a learning disability, neurological or psychiatric problems should be thoroughly examined for gut dysbiosis. Re-establishing normal gut flora and treating the digestive system of the patient has to be the number one treatment for these disorders, before considering any other treatments with drugs or otherwise.

Gut And Psychology Syndrome (GAP Syndrome or GAPS) establishes the connection between the state of the patient's gut and the functioning of the brain. This connection has been known by medics for a very long time. The father of modern psychiatry French psychiatrist Phillipe Pinel (1745–1828), after working with mental patients for many years, concluded in 1807: "The primary seat of insanity generally is in the region of the stomach and intestines." Long before him Hippocrates (460-370 BC), the father of modern medicine has said: "All diseases begin in the gut!" The more we learn with our modern scientific tools, the more we realise just how right they were!

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