Dear Practitioners

Please find below an article by Scientist Martin Blaser. We found this very thought provoking and hope this is useful to you too.

Why antibiotics are making us all ill

Scientist Martin Blaser argues that we are suffering from a new wave of 'modern plagues' such as obesity and asthma because we have destroyed the naturally occurring bacteria in our bodies.

WHO reported recently: the world is headed for a post-antibiotic era, in which common infection and minor injuries which have been treatable for decades can once again kill.

Overuse of antibiotics is destroying our natural microbes, argues Martin, If we don’t change our behaviour, we face the prospect of an ‘antibiotic winter’.

My father had two sisters I never knew. In the little town where they were born, early in the 20th century, they did not see their second birthdays. They had fever. The situation was so dire that my grandfather went to the prayer house to change his daughter’s name to fool the angel of death. This happened twice. It did no good.

In 1850, four in 10 English babies died before their first birthday. Lethal epidemics swept through crowded cities, as people were packed into dark, dirty rooms with fetid air and no running water. Familiar scourges included cholera, pneumonia, scarlet fever, diphtheria, whooping cough, tuberculosis and smallpox.

Today, fewer than five of every thousand infants in Britain are expected to die before the age of one – a remarkable improvement. Over the past 150 years, most countries have been getting healthier. Chalk it up to improved sanitation, rat control, clean drinking water, pasteurised milk, childhood vaccinations, modern medical procedures and, of course, 70 years of antibiotics.

Yet recently, just within the past few decades, amid all of medical advances, something has gone terribly wrong. In many ways, we appear to be getting sicker. We are suffering from an array of “modern plagues”: obesity, childhood diabetes, asthma, hay fever, food allergies, oesophageal reflux and cancer, coeliac disease, Crohn’s disease, ulcerative colitis, autism, eczema. In all likelihood, you or someone in your family or someone you know is afflicted. Unlike most lethal plagues of the past that struck relatively fast and hard, these are chronic conditions that diminish and degrade their victims’ quality of life for decades. The most visible of these plagues is obesity.

At the same time, the autoimmune form of diabetes that begins in childhood and requires insulin injections (juvenile or type 1 diabetes) has been doubling in incidence about every 20 years across the industrialised world; in Finland, where record-keeping is meticulous, the incidence has risen by 550% since 1950. This increase is not because we are detecting type 1 diabetes more readily. Before insulin was discovered in the 1920s, the disease was always fatal. Nowadays, with adequate treatment, most children survive. But the disease itself has not changed; something in us has changed. Type 1 diabetes is also striking younger children. The average age of diagnosis used to be about nine. Now it is around six, and some children are becoming diabetic when they are two.

The recent rise in asthma, a chronic inflammation of the airways, is similarly alarming. There are 5.4 million people with asthma in the UK, affecting one in five households. One in 12 adults is afflicted. One in every 11 children suffers from the wheezing, breathlessness, chest tightness and coughing
Asthma is often triggered by something in the environment such as tobacco smoke, mould, air pollution, cockroach droppings, colds and flu. Once an attack begins, asthmatics gasp for air and, without rapid access to medication, are rushed to emergency rooms. Even with the best care, they can die.

Food allergies are everywhere. A generation ago, peanut allergies were extremely rare. Now, if you stroll through any preschool, you will see walls plastered with “nut-free zone” bulletins. More and more children suffer immune responses to proteins in foods, not just in nuts but in milk, eggs, soy, fish, fruits – you name it, someone is allergic to it. Coeliac disease, an allergy to gluten, the main protein in wheat flour, is rampant. More than a third of British teenagers and 15% of Australians suffer from hay fever. Eczema, a chronic skin inflammation, affects more than 15% of children in the US and 30% of Australian infants develop it in their first year.

These disorders suggest that our children are experiencing levels of immune dysfunction never seen before. And then there’s autism – a much discussed and debated modern plague that is a focus of my laboratory.

Nor are adults escaping these modern plagues. The incidence of inflammatory bowel disease, including Crohn’s and ulcerative colitis, is rising. When I was a student, oesophageal reflux, which causes heartburn, was uncommon. But the ailment has exploded in these past 40 years, and the cancer it leads to, adenocarcinoma of the oesophagus, is the most rapidly increasing cancer in many developed countries, and is a particularly nasty problem, especially for men.

Why are all of these maladies rapidly rising at the same time across the developed world and spilling over into the developing world as it becomes more westernised? Can it be a mere coincidence? If there are 10 of these modern plagues, are there 10 separate causes? That seems unlikely.

Or could there be one underlying cause fuelling all these parallel increases? A single cause is easier to grasp; it is simpler, more parsimonious. But what cause could be grand enough to encompass asthma, obesity, oesophageal reflux, juvenile diabetes, and allergies to specific foods, among all of the others? Eating too many calories could explain obesity, but not asthma – in which many of the ill children are slim. Air pollution could explain asthma but not food allergy.

Many evidence-free theories are floated to explain each disorder. Lack of sleep makes you fat. Vaccines lead to autism. Genetically engineered wheat strains are toxic to the human gut. And so on.

The most popular explanation for the rise in childhood morbidity is the so-called hygiene hypothesis. The idea is that modern plagues are happening because we have made our world too clean. The result is that our children's immune systems have become quiescent and are therefore prone to false alarms and friendly fire. A lot of parents these days try to ramp up their kids’ immune systems by exposing them to pets, farm animals, barnyards, or better still, by being pleased when they eat dirt.

I beg to differ. To me, such exposures are largely irrelevant to our health. The microbes carried by soil have evolved for soil, not for us. The microbes in our pets and farm animals also are not deeply rooted in our human evolution. The hygiene hypothesis has been misinterpreted.

Rather we need to look closely at the micro-organisms that make a living in and on our bodies – massive assemblages of competing and co-operating microbes known collectively as the microbiome. In ecology, a “biome” refers to the sets of plants and animals in a community, such as a jungle, forest, or coral reef. An enormous diversity of species, large and small, interact to form complex webs of mutual support. When a “keystone” species disappears or goes extinct, the ecology suffers. It can even collapse.

Each of us hosts a similarly diverse ecology of microbes that, over eons, co-evolved with our species. They thrive in the mouth, gut, nasal passages, ear canal and on the skin. In women, they coat the vagina. The microbes that constitute your microbiome are generally acquired early in life; surprisingly, by the age of three, the populations within resemble those of adults. Together, they play a critical role in your immunity and ability to combat disease. In short, your microbiome keeps you healthy.

And parts of it are disappearing.

The reasons are all around us, including overuse of antibiotics in humans and animals, caesarean sections, and the widespread use of sanitisers and antiseptics, to name just a few. Mothers give their microbes to their babies when they pass through the birth canal, but babies born by C-section miss that.

While antibiotic resistance is a huge problem – old killers like tuberculosis are increasingly resistant and making a comeback – there seems to be a separate problem, affecting people with such scourges as *Clostridium difficile*, a multiple-antibiotic-
resistant bacteria of the digestive tract, and Methicillin-resistant *Staphylococcus aureus* (MRSA), a spreading pathogen. In the presence of antibiotics, the resistant organisms are the ones more fit; it is the pressure of intensive antibiotic use that is increasing the presence of these resistant organisms. The antibiotics I take affect the level of resistance of the bacteria in the entire community. In that sense, antibiotics are unlike all other drugs – my heart medicine does not affect anyone but me.

But as terrible as these resistant pathogens are, the loss of diversity within our microbiome is far more pernicious. Its loss changes development itself, affecting our metabolism, immunity, and possibly even our cognition. Microbes in our guts have a role in the production of some of the building blocks of the brain, as well as the molecules that provide signals from one brain cell to another.

I have called this process “the disappearing microbiota”. For multiple reasons, we are losing our ancient microbes. This quandary is my central theme. The loss of microbial diversity on and within our bodies is exacting a terrible price. I predict it will be worse in the future. Just as the internal combustion engine, splitting the atom, and pesticides all have had unanticipated effects, so, too, does the abuse of antibiotics and other medical or quasi-medical practices (eg sanitiser use).

An even worse scenario is heading our way if we don’t change our behaviour. It is so bleak, like a blizzard roaring over a frozen landscape, that I call it “antibiotic winter”. We know that the “good bacteria” protect us against the “bad” ones, the pathogens that we may encounter over the course of a lifetime. As our populations of good bacteria become depleted, our susceptibility to the bad ones grows. I don’t want the babies of the study of parents and children) who received antibiotics in the first six months of life were more likely to be fatty at the age of seven years than children who didn’t receive antibiotics during that same period, when we took into account other important factors.

Ultimately we hope to apply our findings from mouse studies to humans. We seek to reverse the damage seen in people around the world, including establishing strategies for putting back the missing microbes. A key step in every approach is to reduce overuse of antibiotics in our children, starting now. My odyssey as a doctor and scientist for more than 41 years has given me important perspectives about our modern plagues, and a full slate of solutions. This is a challenge we can and must meet.

The Observer, Sunday 1 June 2014

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