Contents

Acknowledgements vii
About the Authors ix
Introduction x
Part I: Life is an arms race that we are already losing 1
Chapter 1  Life is an arms race 3
Chapter 2  Infections that drive modern Western diseases 7
Chapter 3  The immune system is our standing army 16
Chapter 4  Your enemy is fiendishly clever – An example of how cunning 'flu viruses are 22
Chapter 5  We are already losing the arms race 27

Part II: The starting point is to improve our defences 33
Chapter 6  The general approach to avoiding and treating infection: improve the defences with diet, micronutrients and sleep 35
Chapter 7  The general approach to avoiding and treating infection: energy delivery mechanisms 43
Chapter 8  The gut microbiome: inoculate the gut, feed it and train the immune system 49
The Infection Game

Chapter 9  Vitamin C – our most important weapon  54
Chapter 10  Iodine – a great all-rounder  61
Chapter 11  Electromagnetic radiation: the good (heat and light) and
            the bad (electro-smog)  67
Chapter 12  Dentists, doctors and other foreign bodies  73
Chapter 13  Herbals: delicious doctoring – they too fight the
            arms race and can help us  78
Chapter 14  Use your brain  84
Chapter 15  Groundhog Basic  98

Part III: How to treat acute infections that have got past our defences  101
Chapter 16  Who is the enemy?  103
Chapter 17  Groundhog Acute  110
Chapter 18  Acute coughs, colds, ‘flus and their complications  113
Chapter 19  Measles, mumps, rubella, chicken pox and other such
            friendly immune programmers  125
Chapter 20  Acute gut infections: diarrhoea and vomiting  128
Chapter 21  Urinary tract infections (UTIs)  130
Chapter 22  Skin infections  133
Chapter 23  Sexually transmitted diseases (STDs)  142
Chapter 24  Dental infections and mouth ulcers  144
Chapter 25  Fermenting gut: you are on the slippery slope –
            chronic disease is upon you  148
Chapter 26  Fungi and yeast: these are often the early invaders  152

Part IV: Do you have a chronic infection? How to diagnose and treat  157
Chapter 27  Chronic infection: are you infected?  159
Contents

Chapter 28  Principles and diagnoses of chronic ‘stealth’ infections: 163
Which tests?

Chapter 29  The general principles of treating stealth infections 172

Chapter 30  Groundhog Chronic 174

Chapter 31  Chronic infection of the gut: microbes that have
   moved in and made themselves at home in the gut wall 180

Chapter 32  EBV and other herpes viruses 184

Chapter 33  Lyme disease: Borellia burgdorferi 189

Chapter 34  Bartonella and Babesia 196

Chapter 35  Mycoplasma and Chlamydia 202

Chapter 36  Rickettsia (Ehrlichia and Anaplasma) and Yersinia 206

Chapter 37  Preventing antibiotic damage to the gut microbiome 209

Chapter 38  All other infections 212

Part V: Be prepared for the kill 213

Appendix 1  First aid box contents 215

Appendix 2  Where to get useful products 218

References 221

Glossary 233

Postscript 238

Index 242
The hypothesis – disease, degeneration and death are all driven by infection.

*A mathematical proof, like a chess problem, to be aesthetically satisfying must possess three qualities: inevitability, unexpectedness and economy.*

*A Mathematician’s Apology* 1940 Godfrey Harold Hardy (1887 – 1947)

**Inevitability**: We will all die. My job as a doctor is both to postpone that moment for as long as possible and also to maximise quality of life – quantity and quality.

**Unexpectedness**: We have been led to believe that infection is a killer of the past. Wrong. We now know our big killers, from cancers and coronaries to dementia and diabetes, are largely driven by infection. Slow-burn herpes viruses, once acquired, live in our bodies for life to create immunological havoc. Microbes in the fermenting gut drive gut tumours. They also drive psychiatric disease and arthritis. Neurological disease is the commonest cause of death in Westerners and all varieties have an infectious driver. Indeed, it is difficult to find a pathology (illness) that does not have an infectious associate.

**Economy**: The solutions are intellectually simple but practically difficult. Cheap and effective defences are within the grasp of us all. We have all the weapons we need. What follows in this book provides the intellectual imperative and practical know-how to conquer the established, prevent the potential and postpone the inevitable.
Introduction

This book, then, possesses the three qualities of a mathematical proof to our hypothesis. However, life is not a single chess problem but rather a succession of different problems, a *game* of chess – in the black corner we have our clever, manipulative and determined opponents which range from the rhinovirus pawns of the common cold and the nasty knights of neisseria, to the *Borrelia* bishops and the rotten rooks of retrovirus. In the white corner we have our standing army to defend the middle ground of disease. We have our paleo-pawns that form the front line, our vitamin C castles and our herbal knights in shining armour; our iodine purple-robed bishops and our antibiotic queens. It really is a case of War and Peace.

Read on. Use your brain. Just do it.

**Stylistic note:** Use of the first person singular in this book refers to me, Dr Myhill. One can assume that the medicine and biochemistry are mine, as edited by Craig Robinson, and that the classical and mathematical references are Craig’s.
Part I

Life is an arms race that we are already losing
Chapter 1

Life is an arms race

There ain’t no such thing as a free lunch.*
Or maybe there is...

You and I are a free lunch for bacteria, yeasts, viruses, fleas, flies, ticks, worms and… what else? These invaders have been struggling for survival for all the many billions of years during which we have been evolving. Their struggle has always had the ultimate aim of making themselves at home in our very comfortable bodies. They have developed extraordinary and complex strategies to succeed. In response, we have evolved defences, including a fantastic immune system which is just as intelligent and adaptive as these invaders. Indeed, the immune system shares many attributes with the brain – it is intelligent, decision making and just as mysterious.

We currently think we have won this arms race, but we are wrong. We have been lulled into a false sense of security by drugs and vaccinations. We are in the ‘phoney war’ – the enemy is evolving fast and is just over the horizon. Resistance to antimicrobials is already a major cause of death and the efficacy of vaccination has been over-egged. We need a fresh approach to the arms race.

Footnote: This phrase is thought to have derived from the 19th-century practice in American bars of offering a free lunch to entice in drinking customers. Robert Heinlein’s 1966 novel, The Moon Is a Harsh Mistress, brought the phrase into common usage.
The Infection Game

*The threat of antibiotic resistance [to mankind] is much more serious than global warming.*

Dame Sally Claire Davies, DBE FMEDSCI FRS, Chief Medical Officer for England (1949 – )

*We need a new antibiotic to be developed every 15 years for eternity to control new infections.*

Professor Jeremy Nicholson, Medical Director of the MRC NHR National Phenome Centre

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**Historical note** – The ‘Phoney War’ (German: ‘Sitzkrieg’) was an eight-month period at the start of World War II during which there were no major military land operations on the Western Front. It began in September 1939 and ended with the German *Blitzkrieg* attack on France and the Low Countries in May 1940. We must not forget that the *Sitzkrieg* ended with the *Blitzkrieg*. We should prepare for our own personal *Blitzkriegs*.

Of course, as a doctor, patients do not visit me when they are well. They come with diseases. My special interest has been treating people with chronic fatigue syndrome (CFS). Pure CFS results from poor energy delivery mechanisms. Myalgic encephalitis (ME) results when the fatigue is accompanied by inflammation. I now know that this inflammation is often driven by microbes, such as herpes viruses (especially Epstein Barr virus), *Borrelia* (Lyme), *Bartonella*, *Babesia*, *Mycoplasma*, *Rickettsia*, *Yersinia* and many others. What is so fascinating is that these microbes have co-existed with and evolved alongside our ancestors for millions of years. The fact that they are starting to cause infections *now* is symptomatic of our declining ability to resist them. This is a direct result of modern Western diets and lifestyles. We are already losing the arms race. The *Sitzkrieg* is nearly over and the *Blitzkrieg* will soon be upon us.

So, when people come to me with their ME (remember ME implies inflammation, which in turn often implies infection), it is not sufficient for me simply to tackle the particular microbe that is suspect or has been identified. I must take a holistic view. Indeed, if people with ME (PwME) have one microbe on board, then it is highly likely
that they will have others on board too, for the very same reasons that they have the one that is suspected or has been identified. This means my job must have at least a two-pronged approach.

• First, I must teach people a general approach to avoiding and treating infection and start to get them ahead of the game with their own personal arms race. Here I am being a ‘doctor’ in the proper sense of the word – doctor is an ‘agentive’ noun of the Latin verb docēre meaning ‘to teach’.

• Secondly, I need to put in place effective strategies that will tackle the particular microbe or microbes that have successfully made themselves at home in the PwME’s comfortable body and are making life a misery in the process. The misery results from fatigue (because the immune system is using up all available energy) and inflammation (which results in every chronic symptom the body can experience).

Even if you do not suffer from CFS/ME, the above interventions are important for two further reasons:

1. Most chronic diseases, as detailed in Chapter 2, are driven by infection.

2. As a species, we are heading for disaster. Declining immunity puts us at risk of death with the next epidemic. Indeed, throughout evolution more people have died as a result of infection than any other cause. Most recently, the Spanish ‘flu (H1N1) epidemic at the end of World War 1 killed an estimated 50-100 million people.

Historical note: For those who are interested please see Influenza: The Once and Future Pandemic by Jeffery K Taubenberger, MD PhD, and David M Morens, MD¹ which looks at the 1918 pandemic in detail, with reference to possible future pandemics.

The interventions I ask people to make are difficult. Understanding the how and the why is empowering and gives us the necessary determination to make these changes.
The Infection Game

Knowledge is Power.

Sir Francis Bacon, *Meditationes Sacrae* (1597)
(22 January 1561 – 9 April 1626)

The exact quotation is ‘for knowledge itself is a power whereby he knoweth’ which is even more apposite here – not only do we need to have the knowledge but we also need the wisdom to apply that knowledge.
Chapter 2

Infections that drive modern Western diseases

We all love it, especially me, when single infections cause singular diseases with specific symptoms that resolve with an antibiotic. These conditions make me look like a magician and feel like a god! The patients are awfully grateful too. But life is no longer that easy – microbes are sneaking in at the back door aided by modern junk food and unhealthy lifestyles.

‘Cherchez la femme,’ said Alexandre Dumas in the 1854 novel The Mohicans of Paris, implying that no matter what the problem, a woman was at the root cause. (Alexandre Dumas (24 July 1802 – 5 December 1870), also known as ‘Alexandre Dumas, père’, was a French writer most famous nowadays for writing The Three Musketeers.) We now know better. It should have been ‘Cherchez l’homme’ – but I digress and my editor is a man who has nonetheless had the title of honorary woman bestowed upon him! In the case of chronic modern illnesses, we should say: ‘Cherchez les microbes, les sucres, la junk food, les pesticides, les métaux lourds et la vie moderne!’

We now recognise that the potentially lethal conditions listed in Table 2.1 have the infectious associations shown in the right hand column (see next page).
Table 2.1: Infectious agents associated with serious conditions

<table>
<thead>
<tr>
<th>Disease</th>
<th>Associated microbes and infections</th>
<th>Mechanisms</th>
<th>Other causal associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dementia: this is now the commonest cause of death in Westerners.²</td>
<td><em>Borrelia</em> (Lyme disease) <em>Toxoplasma</em> Herpes virus 1 (cold sores) Herpes virus 2 (genital herpes) Herpes viruses 6 and 7 Cytomegalovirus Cryptococcus Cystercercosis Mycoplasma Syphilis HIV Creutzfeld Jacob disease (CJD) (the infectious particle is uncertain) Possibly <em>Helicobacter pylori</em> and <em>Chlamydia pneumoniae</em> Fungal infection</td>
<td>There is a cumulative effect – the greater the infectious burden and the greater the antibody response to that, then the greater the inflammation and risk of dementia. I suspect ‘prion’ protein is the biofilm (i.e. the shield) that defends microbes from our immune system. Non-REM sleep clears this protein (amyloid) from the brain (see Chapter 6 (page 41).</td>
<td>Sugar (sugar feeds microbes) and refined carbohydrates. Dementia is also known as ‘type 3 diabetes’. The ketogenic diet can reverse dementia.³ Dr Dale Bredesen used a ketogenic diet and supplements to reverse cognitive decline in Alzheimer’s patients. Lack of deep, non-REM sleep is not just a risk factor but also a predictor of Alzheimer’s. Heavy metals and pesticides damage the immune system. Arterial disease – this is also driven by sugar and other infections.</td>
</tr>
<tr>
<td>Arterial disease</td>
<td>Oral infection (gram negative bacteria), especially gum disease Herpes viruses <em>Helicobacter pylori</em> <em>Chlamydia pneumoniae</em> Cytomegalovirus Bartonella Yersinia</td>
<td>Arterial disease impairs blood supply, resulting in heart disease, dementia and organ failure</td>
<td>Sugar is also a risk factor – again sugar feeds microbes. Microbes in the mouth easily get into the bloodstream. Simple chewing can result in bacteraemia (bacteria in the blood).</td>
</tr>
<tr>
<td>Cancer: 20% of all cancers have a single infectious associate; others are multifactorial.⁴</td>
<td><em>Helicobacter pylori</em> Epstein Barr virus Human papilloma virus Hepatitis B Hepatitis C</td>
<td>Infections drive inflammation, which drives cancer</td>
<td>Diabetes (ergo sugar) doubles the risk of cancer of the colon, rectum, breast, womb, kidney, bladder, liver, pancreas, lymphoma and probably others. (See also our book <em>Prevent and Cure Diabetes</em> for a more detailed analysis.)</td>
</tr>
<tr>
<td>Chapter 2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Stomach cancer</strong></td>
<td>Abnormal gut microbiome, including <em>Helicobacter pylori</em> Anaerobic bacteria</td>
<td>As above</td>
<td>Vitamin C kills microbes in the upper gut and so prevents the fermentation of nitrates to nitrites and nitrosamines</td>
</tr>
<tr>
<td><strong>Oesophageal cancer: now the fastest increasing cancer in Westerners</strong></td>
<td>Human papilloma virus My guess is also microbes from the upper fermenting gut</td>
<td>As above</td>
<td>Sugar, smoking and alcohol are also risk factors</td>
</tr>
<tr>
<td><strong>Colon cancer</strong></td>
<td>Abnormal gut flora resulting from Western diets <em>Streptococcus bovis</em> Schistosomiasis</td>
<td>I suspect, abnormal fermentation products</td>
<td>Paleo-ketogenic diets and vitamin C are highly protective</td>
</tr>
<tr>
<td><strong>Oral cancer</strong></td>
<td>Gum disease</td>
<td></td>
<td>Smoking and alcohol are also risk factors</td>
</tr>
<tr>
<td><strong>Gall bladder cancer</strong></td>
<td><em>Salmonella typhi</em> Liver flukes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cervical cancer</strong></td>
<td>Human papilloma virus</td>
<td></td>
<td>The contraceptive pill and smoking further increase the risk</td>
</tr>
<tr>
<td><strong>Lung cancer</strong></td>
<td><em>Chlamydia pneumoniae</em> HIV</td>
<td></td>
<td>Smoking accounts for 75% of cases Air pollution accounts for most others Sugar and refined carbohydrates are risk factors</td>
</tr>
<tr>
<td><strong>Bladder and kidney tumours</strong></td>
<td>HTLV1 (see page 10) In Africa, bladder cancers are largely caused by the parasite Schistosoma that leads to schistosomiasis</td>
<td>Chronic inflammation due to bacterial translocation …</td>
<td>… that is, microbes which spill over from the fermenting gut and are excreted in urine are a risk factor Smoking Pesticides⁵</td>
</tr>
</tbody>
</table>
### The Infection Game

<table>
<thead>
<tr>
<th>Disease</th>
<th>Associated microbes and infections</th>
<th>Mechanisms</th>
<th>Other causal associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphomas</td>
<td>Retrovirus e.g. HTLV1 (human leukaemia T cell virus type) Epstein Barr virus HIV</td>
<td>Viruses hijack the cell’s normal mechanisms for replication</td>
<td>Toxic chemicals, especially pesticides</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>HTLV1</td>
<td>Ditto above</td>
<td>Ditto above</td>
</tr>
<tr>
<td>Skin cancer</td>
<td>Beta papilloma virus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>SV40 (simian vacuolating virus 40 or simian virus 40, a polyomavirus found in both monkeys and humans) from vaccination (many vaccines are now contaminated with SV40) plus asbestos exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Retrovirus, e.g. XMRV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Retrovirus HERV</td>
<td></td>
<td>Contraceptive pill and HRT are risk factors</td>
</tr>
<tr>
<td>Vascular tumours</td>
<td><em>Bartonella</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain tumours</td>
<td>Human polyoxoma virus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaposi's sarcoma</td>
<td>Human herpes virus 8 (HHV8)</td>
<td></td>
<td>Becomes apparent with the immune-suppression of AIDS</td>
</tr>
</tbody>
</table>

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#### Notes:
- **HTLV1**: Human T-cell Leukaemia Virus Type 1
- **HIV**: Human Immunodeficiency Virus
- **Beta papilloma virus**: Associated with skin cancer
- **SV40**: Simian vacuolating virus 40, a polyomavirus found in both monkeys and humans
- **XMRV**: X Chromosome-Mounted Retrovirus
- **HERV**: Human Endogenous Retrovirus
- **Bartonella**: Pathogenic bacteria
- **HHV8**: Human herpesvirus 8
- **AIDS**: Acquired Immunodeficiency Syndrome
Chapter 2

The following chronic degenerative conditions also have infectious associations:

**Table 2.2: Infectious agents associated with chronic degenerative conditions**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Associated microbes</th>
<th>Possible mechanisms</th>
<th>Other associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myalgic encephalitis (ME)</td>
<td>All herpes viruses, especially Epstein Barr virus, <em>Borrelia</em> (Lyme), <em>Bartonella</em> and <em>Babesia</em>, <em>Mycoplasma</em></td>
<td>The low grade immune activity punches an immunological hole in the energy bucket</td>
<td>See our book, <em>Diagnosis and Treatment of CFS and ME – it's mitochondria, not hypochondria</em> 2nd Edition for a more detailed analysis</td>
</tr>
<tr>
<td>Osteoarthritis and connective tissue disease</td>
<td>Most cases are due to allergy to foods and/or microbes from the fermenting gut</td>
<td>These easily spill over into the bloodstream with the potential to drive inflammatory reactions at other sites (e.g. joints). This is called bacterial translocation</td>
<td>Arthritis is part of metabolic syndrome. See our book <em>Prevent and Cure Diabetes – delicious diets not dangerous drugs</em> for a more detailed analysis</td>
</tr>
<tr>
<td>Acne <em>Proprionibacterium acnes</em></td>
<td>Ditto above</td>
<td>Ditto above</td>
<td></td>
</tr>
<tr>
<td>Inflammatory arthritis</td>
<td>Ankylosing spondylitis is associated with <em>Klebsiella</em>, Rheumatoid arthritis is associated with <em>Proteus mirabilis</em>, rubella virus, <em>Bartonella</em>, <em>Yersinia</em></td>
<td>This is not acute infection but an inflammatory process driven by infection. Some cases respond well to antibiotics</td>
<td>Most cases respond well to the paleo-ketogenic (PK) diet (see page 234 and our book, <em>The PK Cookbook</em>) and vitamin C to bowel tolerance (see Chapter 9, page 55). (The PK diet is very low in carbs and high in saturated fat and fibre so the body can run on fatty acids rather than glucose.)</td>
</tr>
</tbody>
</table>
The Infection Game

<table>
<thead>
<tr>
<th>Disease</th>
<th>Associated microbes and infections</th>
<th>Possible mechanisms</th>
<th>Other associations</th>
</tr>
</thead>
</table>
| Ulcer disease, oesophagitis, gastritis, duodenitis, cholecystitis | *Helicobacter pylori*  
Upper gut fermenters  
(yeasts, aerobes, anaerobes – that is, abnormal gut microbiome)  
Bacteria: Mycoplasma, Legionella, Leptospira, Salmonella  
Fungi: Aspergillus  
Parasites: Toxoplasma, Cryptosporidium, Ascaris | The pancreas is particularly susceptible because it has an open door (the bile duct) to the gut through which microbes from a fermenting gut can easily pass | Alcoholism  
Gall stones  
Also associated with selenium deficiency and poor antioxidant status |
| Pancreatitis                                 | Virus: mumps, coxsackie, hepatitis B, cytomegalovirus, Varicella zoster, Herpes simplex  
Bacteria: Mycoplasma, Legionella, Leptospira, Salmonella  
Fungi: Aspergillus  
Parasites: Toxoplasma, Cryptosporidium, Ascaris |                                                                                        |                                                                                      |
| Hepatitis                                    | Hepatitis B and C  
Mycoplasma  
Yersinia |                                                                                        |                                                                                      |
| Crohn’s disease                              | *Mycobacterium paratuberculosis avium* (MAP) – similar to Johne’s disease in cattle  
Acquired from milk – may be cured with antibiotics. Unfriendly gut microbes drive an inflammatory reaction | Also responds well to the PK diet  
Some cases are cured by antibiotics |                                                                                      |
| Ulcerative colitis                           | Abnormal gut flora  
Unfriendly gut microbes drive an inflammatory reaction |                                                                                        | Responds well to the PK diet. Can be cured by faecal bacterio-therapy (see page 232) |
## Chapter 2

### Autoimmunity in general

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cause</th>
<th>Effect</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autoimmunity is directly associated with abnormal gut microbiome</td>
<td><em>Mycoplasma</em> is associated with many autoimmune conditions</td>
<td>Microbes spill over into the bloodstream, so antibodies are made against them; these cross-react with the self. This is called molecular mimicry. I think of this as allergy to microbes. Gluten increases gut permeability and the risk of the above.</td>
<td>Sugar and refined carbohydrates. Antibiotics. Vaccination is a major risk factor for many autoimmune conditions, including type 1 diabetes. Vitamin D deficiency also increases the risk. The PK diet is an essential part of management.</td>
</tr>
</tbody>
</table>

#### Autoimmunity specifics: multiple sclerosis (MS), thyroiditis, cardiomyopathy, primary biliary cirrhosis, rheumatoid arthritis, systemic lupus, Sjogren’s syndrome

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cause</th>
<th>Effect</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epstein Barr virus is associated with at least 33 different autoimmune conditions</td>
<td>All herpes viruses target the brain and immune system</td>
<td>Ditto</td>
<td>Ditto</td>
</tr>
</tbody>
</table>

#### Autoimmunity specifics: idiopathic thrombocytopenic purpura, systemic sclerosis, Crohn's disease, Guillain–Barré syndrome

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cause</th>
<th>Effect</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Helicobacter pylori</em></td>
<td>Ditto</td>
<td>Ditto</td>
<td>Ditto</td>
</tr>
</tbody>
</table>

#### Autoimmunity specifics: glomerular nephritis, rheumatic heart disease

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cause</th>
<th>Effect</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcal infection (which can be treated by long-term, low-dose penicillin)</td>
<td>Ditto</td>
<td>Ditto</td>
<td>Ditto</td>
</tr>
</tbody>
</table>

#### Autoimmunity specifics: narcolepsy, Guillain–Barré syndrome

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cause</th>
<th>Effect</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine flu vaccination</td>
<td>Vaccination bypasses normal immune defences in the gut</td>
<td>Ditto</td>
<td>Ditto</td>
</tr>
</tbody>
</table>
The Infection Game

<table>
<thead>
<tr>
<th>Disease</th>
<th>Associated microbes and infections</th>
<th>Possible mechanisms</th>
<th>Other associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain conditions – all neurological disease may be associated with infection, including Alzheimer’s, motor neurone disease, Parkinson’s, CJD, multisystem atrophy</td>
<td>Many are related to abnormal gut microbiome, including autism, epilepsy, psychosis, schizophrenia, dementia, depression; also to <em>Borrelia, Mycoplasma, Ehrlichia, Anaplasma</em></td>
<td>Nishihara⁶ has shown where there is fermenting gut we have fermenting brain where neurotransmitters may be fermented into morphine, amphetamine and cocaine-like molecules. No wonder psychosis is a symptom – I would be psychotic with cocaine and crystal meth on the menu!</td>
<td>Responds well to the PK diet. Indeed, the starting point for treating all neurological and psychiatric disease is a PK diet. However, I would want to do extensive testing for ‘stealth’ microbes (see page 106) because conventional treatment for neurological degeneration is so limited.</td>
</tr>
<tr>
<td>Kidney disease, interstitial cystitis and prostatitis</td>
<td>Abnormal gut flora <em>Bartonella</em></td>
<td>This is not acute infection but an inflammatory process driven by microbes at levels lower than that which defines infection</td>
<td>Responds well to the PK diet and vitamin C to bowel tolerance. Some cases respond well to antibiotics</td>
</tr>
<tr>
<td>Respiratory problems – chronic sinusitis, rhinitis, pharyngitis, bronchitis, pneumonia etc</td>
<td>Infection (often <em>Mycoplasma</em>) and/or allergy to gut microbes</td>
<td>May present with halitosis</td>
<td>Pollution further drives inflammation. It is the total load – the total immune insult – which triggers inflammation</td>
</tr>
</tbody>
</table>
| Eye disease – retinitis, optic neuritis, conjunctivitis, etc | *Chlamydia*  
*Bartonella*  
*Yersinia* | | |
| Ear problems – otitis media, labyrinthitis | *Streptococci* and *Haemophilus*  
Flu and cold viruses | | Often follow coughs, colds and influenza (see Chapter 18 for treatment) |
Chapter 2

At the moment, things do not look good.

*See how numerous are my enemies and how fiercely they hate me!*

Psalm 25:19, *The Bible* (New International Version)

But fear not… read on for the answers.