# From where I stand: a personal story about medicine and science

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I am a specialist physician in Addiction Medicine. I see patients who suffer from alcohol or other substance abuse problems. It takes considerable courage for them to face up to issues which often cause shame and despair. I see myself as an agent of hope, helping people move out of a sense of shame and defeat into a sense of hope, direction and purpose.

How did I get to practise this specialty? It was a twisting journey with a number of unexpected turns. So often it felt as if I was stumbling about in the darkness, hardly knowing whether the next step was the right one. There were some strange turnings, including failures as a young registrar at specialist exams and a middle age retrenchment when the government cut back its commitment to public hospital care. But looking back I can see God's hand leading me, sometimes more specifically during times of doubt and failure than in the times of dizzying success when the world seemed to be at my feet. I can only recall fragments of why I became what I became, and even the retelling of the story alters the details.

From the time I was a young Dutch boy in Holland, I was thrilled with longing and hope to be able to help those less fortunate than I, especially when I read how Jesus healed all those who were needy. We had a person in our church who was bent over with a great lump on his back. The story of Jesus healing the lady who was bowed over double (Luke 13:10ff.), made a particular impact. How I would love to be able to make the crooked straight, just as Jesus did! That was one of my earliest dreams. But how did I get from responding to a story describing such a spiritual authority, and such instant definitive healing to now being a defender of the difficult and somewhat unpredictable art of scientific medicine?

My journey encompassed migration to Australia when I was nine years old, a Victorian country primary school, high school, nurturing the hope to do medicine, repeating final year high school in order to get a scholarship to pay for medical school fees, evangelical student leadership at university to the neglect of my studies, marriage as a medical student, a more disciplined approach to my textbooks (yes, the Kingdom of God is found in my textbooks!) and finally the heady days of graduation celebration. Only

then did we realise that work was just beginning, calling for long dedicated hours to the care of the sick, almost to the neglect of my family.

The reality of clinical medicine is quite daunting. As medical students we were protected from difficult patients, both difficult people and difficult illnesses. Real life illnesses are so unlike the typical textbook cases, and they did not always respond to treatment the way they are supposed to. As an intern, I discovered the frustration of things not going right. Sometimes I'd say an extra prayer before putting that difficult drip into a patient, but even then the drip would not go in! There was the disappointment of finding patients who did not get better despite our best efforts and prayers. I wrote a poem at that time that started, 'I am no healer Lord, from me no emanations of health…' It was a far cry from my boyhood dream. I was recognising that we are in a world of decay and death, where death is often seen as failure. In spite of the miracles of modern surgery, antibiotics and other wonders, in the end we humans are frail children of dust and subject to death. We are like grass which grows for a while but withers and perishes. And yet in all this Christians especially are agents of hope, not only pointing to the new life to come after death, but also pointing to the presence of God in the midst of suffering. So we struggle with the human and faith dimension as we apply the science of clinical medicine.

## The role of science

I learnt from the middle of high school that Christianity and science are complementary. I am always grateful to the Research Scientists' Christian Fellowship for teaching me that God was the author of both the book of nature and the book of Scripture, and that therefore all truth was God's truth. So I did not need to fear the results of true science, or the true interpretation of Scripture. Any incompatibility is due either to our ignorance or to our blindness. In fact most of the early scientists saw themselves, in the words of Johannes Kepler as 'thinking God's thoughts after him'.[1] (Keppler 2005). Indeed Francis Bacon, an early English scientist coined the idea of the two books, the book of nature and the book of Scripture (Hess 2002), and many of the foundation members of the Royal Society were Puritan. Further Robert Boyle, the founder of chemistry set up a trust to fund the Boyle lectures aimed at:

> proving the Christian Religion, against notorious Infidels, viz Atheists, Theists, Pagans, Jews and Mahometans, not descending lower to any Controversies, that are among Christians themselves…
>
> quoted in Byrne 2005

John Polkinghorne, a Cambridge professor of particle physics turned priest, describes Christianity as the fertile field within which science

[1] 'I was merely thinking God's thoughts after him. Since we astronomers are priests of the highest God in regard to the book of nature', wrote Kepler, 'it befits us to be thoughtful, not of the glory of our minds, but rather, above all else, of the glory of God'.

flourished. Of course the roots of European science go back a lot further. These roots include the Greeks before Christ and Islam of the 14th century. Both India and China had their own forms of knowledge and research. In the search for the sources of science, the pragmatism of the Jewish Wisdom literature is often forgotten. It has its place, but it is curious that Judaism per se did not spawn science, nor did Christianity until the Renaissance and Reformation. Why did science flourish so successfully in Europe at that particular time? Polkinghorne and others argue that there was a unique set of metaphysical beliefs which were necessary to allow science to flourish. The early scientists were Christians who believed the world was rational, reflecting God's rationality; that it was ordered, reflecting God's faithfulness; that it was free to be itself and hence it was contingent, so that what it was could only be discovered by experiment and not just by rational reflection; and that it was not sacred and hence could be analysed by mere mortals[2].

Peter Harrison suggests another powerful reason for science to flourish particularly in Britain and Northern Europe. This was because Christians moved away from fanciful symbolic interpretations of the Scriptures to a more grammatical-historical approach (Harrison 2001).

I think however there is yet another reason underlying all of these and that is the questioning of established dogma by evidence. The reformation was a great age in which traditional authority was questioned. Luther challenged Aristotle's theology and Aristotle's science was also challenged. This questioning led naturally to the idea that dogma must be replaced by evidence. Hence by its nature science challenges tradition, and by criticism and experiment it has an inbuilt mechanism of continual renewal. This does not mean it has no traditions of its own, nor that politics rather than evidence has been used to sustain that tradition, but science is continually renewed by new discoveries, and dies when tradition beats down new ideas.

## What is science?

I suggest the following description:

> Science is an intellectual tradition of understanding the perceived world held by scientists. This tradition is continually being renewed by the scientific method by which the interpretation of the results of experiments leads to an alternative belief about perceived phenomena.

The first thing to acknowledge is that **science is a tradition of understanding**. Every tradition has the orthodox who preserve the tradition. It also has its heretics who challenge the tradition. Often today's heretics become tomorrow's orthodox.

[2] He put these four together in a lecture in Melbourne but I have been unable to find these four elements together in his writings — the nearest are orderly, contingent, worthy of study and secular (without using these terms) in Polkinghorne 1994, and rational and contingent in Polkinghorne 1986. Others have a slightly different quartet. Rhodes describes orderliness, intelligibility, reliability of human reason, and a belief in causality (Rhodes 1965).

There are a number of gatekeepers of the tradition. These include the examiners who decide who will be admitted into the tradition and who does not meet the standards of the tradition. Other gatekeepers include those who vet the proposals for research funding, and include the peer-reviewers who determine whether the results are published in the journals. Gatekeepers are supposed to be rational and objective, but personal and political considerations may determine what is accepted and what is rejected. Those who play the scientific game well succeed, while those who try to bluff the system fail.

Secondly **science is a belief system**.[3] Scientists believe its conclusions. There may of course be different schools of belief within the scientific discipline. Sometimes that belief is a hunch which still requires justification; at other times the belief system is accepted because the evidence for it is sound. That evidence consists in both reason and experiment, as I will outline below.

In talking about belief we sometimes make a distinction between *belief that* a proposition is true and *belief in* the trustworthiness of a person. Both forms of belief occur in science. The latter, sometimes described as *trust in* demands a degree of commitment, and of course the ultimate commitment is to a person, as in trusting your spouse or your doctor. *Belief in* is exercised when a scientist commits him/herself to proving an idea, and seeing it through to completion. Sometimes this is a lonely track, because the rest of the scientific community may not (yet) accept their suggestions. For example, Faraday's belief in electromagnetism was initially greeted sceptically, as was Semmelweiss' beliefs about hand washing after post-mortems. Semmelweiss died in despair, whereas Faraday lived to see his beliefs vindicated. Semmelweiss was vindicated posthumously. Their stories illustrate that they both believed in their ideas and did so in the face of scepticism from the scientific community.

Thirdly the **scientific tradition continually changes**. This was well articulated by Thomas Kuhn (1996). He argues that the current understanding of science, the so-called dominant paradigm, fits in best with the current plausibility structures of scientific understanding. However, as science progresses, more and more anomalies are identified, leading to an instability in the understanding of the dominant paradigm. Someone then suggests a better plausibility structure, one that fits the facts better. If this is accepted, then there is a paradigm shift to the new understanding.

What causes the paradigm shift? What causes the scientific community to change its belief system? The definition above suggests that this happens through the application of the scientific method, and I will defend that possibility below. But there are other possibilities. Scientists may be convinced by evidence, or by intuition or by social or political forces, but it may not be that straightforward. Max Planck observed,

[3] For a further discussion on this point see 'Science and Faith' (Gijsbers 2011), http://www.iscast.org/journal/discussions/gijsbers_a_2011-08_science_and_faith.pdf

> A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.
>
> Planck 1994

How scientific belief changes have been hotly debated!

There is even a debate on whether there is such a thing as a 'scientific method'. Different sciences pursue their tasks differently. Can we say they have a common method? Some sciences, like physics and chemistry, study the basic building blocks of matter, and can develop a fairly pure objective form of enquiry. They are largely based on measurement. Indeed, Lord Kelvin said,

> I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter may be.
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> Kelvin 1883

Such a comment may well apply to physics but is nonsense in a descriptive science like, say, botany or anatomy.

It is nonsense because the life sciences like biology, botany and zoology, are descriptive as well as experimental. The in-between sciences like biochemistry and molecular biology have their own ways of modelling their theories. Some of their models are three-dimensional models of shapes in space. The historical sciences like geology, palaeontology and evolution have their own experimental methods because they gather evidence for their theories by making more observations. The human sciences like anatomy, physiology, and psychology have quite a different methodology again. Anatomy is a descriptive rather than a measurement science, whereas physiology and psychology are a mixture of description and measurement. The social sciences like sociology, economics and political sciences, are inherently difficult because, although they are based on observations, the experimenter interacts with the subject and by that interaction changes the observation. These disciplines, like clinical medicine, are regarded by some as so complex that they can hardly be called science. Indeed, some medical scientists talk of the science of medicine in the laboratory and the art of medicine at the bedside (Weatherall 1996). They say this in spite of the Hippocratic tradition of careful reasoning based on astute observation at the bedside. Finally there is the Queen of the sciences, theology, now regarded as the forgotten science, but how do you characterise its methodology? How do you measure or experiment with God?

Notwithstanding these differences between the sciences, differences determined by the nature of the object under investigation, are there some common features from these very different disciplines which would be regarded as the scientific method? I suggest that the first common feature in these sciences is that its subject should determine its method of

inquiry. In chemistry and physics the subject is immediately present and can easily be experimented on. The historical sciences like palaeontology and geology require hypotheses to be proven by more observations, and there is little room for controlled experiments. In the human sciences controlled trials on human subjects are often unethical and our scientific hunches have to be settled some other way. It is particularly hard to devise experiments in the 'Queen of the Sciences' – theology! When God is the subject of our science we are in very different territory, for to learn to know a person is very different from studying about that person.

In these sciences, which dominates: experiment or reason? Francis Bacon describes the following:

> Those who have handled sciences have been either men of experiment or men of dogmas. The men of experiment are like the ant, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes a middle course: it gathers its material from the flowers of the garden and of the field, but transforms and digests it by a power of its own. Not unlike this is the true business of philosophy; for it neither relies solely or chiefly on the powers of the mind, nor does it take the matter which it gathers from natural history and mechanical experiments and lay it up in the memory whole, as it finds it, but lays it up in the understanding altered and digested. Therefore from a closer and purer league between these two faculties, the experimental and the rational (such as has never yet been made), much may be hoped.
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> Bacon 1620

Science, according to Bacon is a mix of experiment and reason. Henri Poincaré makes a similar point when he says,

> Science is built up with facts as a house with stones, but a collection of facts is no more science than a heap of stones a house..
>
> Poincaré 1905

How are reason and experiment related? Traditional descriptions of the scientific method (usually expounded by physicists) start with perceptive observations of some phenomena in the world. These observations give rise to testable hypotheses, that is, educated guesses about why it is so. A good hypothesis is one which can be subjected to experiment. The experiment then establishes whether the hypothesis is correct or not. If the hypothesis is correct, the experiment establishes the theory; if incorrect, it can lead to the establishment of an alternative theory, or to further experimentation.

Some critics of science regard all this as rather naïve. Science is much more intuitive, much more of a stumbling in the dark than the logic outlined above. Indeed, Arthur Koestler describes renaissance cosmologists as Sleepwalkers (Koestler 1968). Abraham Kaplan makes the useful distinction between logic-in-use and reconstructed logic (Kaplan 1998). The former is what scientists do and the latter is the justification for the conclusions they come to! There is some truth in this. What we conclude may be arrived at quite differently from the subsequent

justification for our conclusion! But the justification is necessary, for science is a shared pursuit, in which new ideas can only be accepted by convincing your colleagues. Thus good science requires the proper formulation and testing of hypotheses and good science requires that a strong conclusion be based on good evidence and a sound interpretation of that evidence.

Somehow in grappling with the essentials of science, we need to maintain the distinction between conjecture and traditional beliefs on the one hand, and truth on the other. We need to maintain the distinction between what we think we know and what is actually the case. As far as possible we have to establish the evidence for the truth of what we believe. And that truth needs to be established by finding out what is there — by experiment. That experiment needs to convince not just me, but others also. The objective experiment is crucial.

Let me illustrate by retelling the following myth. About the sixteenth century in a little town of Pisa, Giovanni was debating with Giuseppe about whether a pistol ball would fall to the ground faster than a cannon ball. Giovanni maintained that, because a pistol ball was smaller, it would fall faster, while Giuseppe maintained that a cannon ball was heavier and that therefore it would fall faster. The debate became more and more heated as each invented more and more reasons why their belief was the right one. It would have gone on a lot longer but Galileo came along and settled the matter, by dropping the pistol ball and the cannon ball from the top of the Tower of Pisa. They both fell to the ground at the same time. One real experiment had negated thousands of thought experiments. Theoreticians now had a new set of facts to work with, but the facts were established, and the theory has to fit the facts.

I think this distinction between fact and theory is fundamental to science. This is best illustrated by the IMRAD structure of scientific journal papers, in which a paper is written under the headings Introduction, Method, Results and Discussion. The key challenge is: where are your data? How valid are the data? How reliable is the evidence drawn from the data? Have you interpreted the data correctly?

Much has been made recently that all facts are theory-laden. That is, we interpret the facts within a theoretical framework. Thus when the ancients looked at the sky, they saw pinpricks in a canopy letting in the light of the glory beyond the sky. We moderns see millions of nuclear reactions, speeding away from a big bang into outer space. The ancients saw the sun rise in the east and set in the west. We see the same phenomena as the earth spinning on its axis. I would contend, however, that although all facts are theory-laden, the theories are approximating closer and closer to the truth — to what is really there. Such an approach is called a critical realist approach (McGrath 2006A). Thus scientific theories are not just human guesses, but our best approximation to reality. Truth in this context is the degree of approximation to that reality. For a good common sense view of such a position, see philosopher John Searle's book (Searle 1999).

Alister McGrath (McGrath 2006B) points out that therefore theories are much more powerful than facts for theories explain why the observations are the way they are, they help us to understand the relations between observations and they allow us to predict new phenomena. When these predictions are confirmed they strengthen the theory. Popper, in turn, argues that the real challenge is to find those observations which challenge the theory, which disprove the theory (Popper 1963).

Scientists often develop models of their theory. These may be simple mathematical models, an equation like F=ma, or more complex models like a model of the solar system, or a model of the structure of DNA. These models are not reality, but abstraction from reality. Nevertheless they are related to reality, and for a critical realist like me, they are not only useful, but attempt to be true.

What of the conclusions of the experiment and discussion? When science was young, we talked of laws, implying that we had discovered the basic rules by which the universe was run. As science matured we tended to call these conclusions theories (thus atomic theory, or the theory of evolution), and more recently conclusions are held even more tentatively.

Christians of course think of the laws of nature as the activities of God, and wonder at the order and rationality of the universe. These laws, however, are our discovery and describe what we have observed. They are descriptive laws rather than prescriptive laws. That is, they are not the rules of the universe but simply our best understanding of how the universe works. Thus we hold these laws tentatively. Miracles could be seen as a temporary suspension of these laws, or it may be that deeper laws, which we do not yet know, are at work. As an example, the other day I saw drops of water defying gravity. This is an enigma until you realise I was describing drops of rain on the windscreen of my car. The wind on the windscreen was blowing the drops upwards; forces other than gravity were at work on these drops. (Should these drops going up be called drups?) So miracles are better seen as deeper and unknown laws at work rather than as the suspension of the laws of the universe. But the important point is that God is at work in both, nature and supernature.

## Scientific method in medicine

Like other intellectual traditions, medicine has grown out of a history which is not entirely science-based. There have been all sorts of wild beliefs about disease, its causes and its cure. Indeed, medicine, healing and religion have been closely intertwined throughout the ages, and there are a number of long and ongoing traditions concerning healing.

In Scripture there is considerable overlap in the words used for healing and the words used for salvation. This is most clearly seen with the woman with the haemorrhage whom Jesus healed while on the way to Jairus' house (Luke 8:43ff). No one had been able to heal (therapeuthenai) her, but later her faith healed (sosoken) her. The same

phrase, your faith has saved you, is used to the woman who was a sinner in Luke 7:50.[4]

Scientific medicine is traditionally seen as starting with Hippocrates, who, apart from giving medicine its oath, and thus establishing an ethical base for the practice of medicine, also accurately described a number of clinical conditions. His approach of systematic observation and recording makes him (or his school) the 'Father of modern medicine'. Along with scepticism of many cures, and his dictum, 'first do no harm', he suggested some sensible remedies. Hippocrates was the forerunner of the naturalistic form of science. By this I mean that he would invoke physical rather than divine causes for disease. He said, 'Men believe only that it is a divine disease because of their ignorance and amazement'. (Hippocrates 400 BCE).

The healing tradition developed, but still contains a strange amalgam of facts and fancies. Once one of the most celebrated 'facts' was that the human liver has five lobes, because, Galen, a Roman physician, said so. The fact that Galen had based his observation on pigs was overlooked, and it was not until the sixteenth century, that Vesalius, by direct observation, showed that the human liver had only two lobes[5]. This revolution in anatomy was not without controversy as there was considerable social resistance to the study of dead bodies. But this direct observation helped establish the medical tradition of contending with what is demonstrably there, rather than being true because tradition says so.

John Wesley provides a good example of the amalgam of fact and fancy. He was widely educated and in 1747 published a book called *Primitive physic or an easy and natural method of curing most diseases* (Wesley 1747). How little they knew back then, compared to the knowledge explosion we are currently undergoing! His approach to fever is a good example. In Wesley's time they described a variety of different fevers. There was the Ague (an intermittent fever), which can be further classified into tertian (appearing every other day) and quartan (missing two days). There were other fevers. Wesley describes high fever, intermitting fever, fever with pains in the limbs, a rash fever, a slow fever and a worm fever. When Wesley wrote in the late 18th century, the Peruvian bark (also known as the Jesuit bark) was used by the Jesuits to treat fevers, in particular malaria. This had been introduced into Europe in 1640, and was available in London from 1677. However, there were biases against its use. Wesley wrote: 'Children have been cured by wearing a waistcoat, in which bark was quilted'. (Wesley 1747 p. 38). Commentators on this section say that he was referring to Peruvian Bark, and that Wesley was prejudiced against the bark taken internally.

[4] For a detailed discussion of the link between healing and salvation see Harold W Taylor's book, especially the first chapter (Taylor 1993). Taylor is with the Order of St Luke, a group of people who seek to encourage greater links between health and the ministry of the church.

[5] Vesalius actually followed Galen's dictums and based his study of human anatomy on the teachings of Galen, verifying or contradicting Galen's teachings with direct observations (Vesalius, 1543, 1555).

To fully understand Wesley's mistakes requires quite a broad understanding of scientific medicine. Scientific medicine requires a careful classification of symptoms and their clusters, a classification of the causes of these diseases, an understanding of microbiology, an understanding of drugs and their use in treatment, and the evaluation of treatment outcomes.

Wesley's classification of ague has some merit, and there is some correlation between the different agues and the different causative organisms. But it is not until the 19th century that a Christian, Captain Ronald Ross in India, would establish that the causative organism of this form of ague is the protozoon, plasmodium. There are different plasmodia. P. vivax and P. malariae are the commonest. The diagnosis of malaria was made by seeing the organism in the blood by special staining techniques. This led to the warning that you cannot diagnose the disease just by its symptoms. Malarial fevers can be constant rather than intermittent, and there are other causes of intermittent fevers, not just malaria.

We now know a lot more too about the Peruvian Bark. It was first found in Peru by the Jesuits who brought it back to Europe. By 1649 it was available in the apothecaries of Britain, but there was widespread prejudice against its use. The active component, quinine, is now made synthetically. We know the right dose that will be beneficial and not toxic and we know that there are some people who develop severe side-effects (cinchonism) if they take the drug. We thus have come a huge way from the applying and ingesting of unrefined natural substances to identifying, purifying and studying the active ingredients and hence of identifying appropriate clinical effects and outcomes. This is the science of pharmacology.

Since the Second World War, controlled trials have been an important part of the scientific evaluation of the clinical effects of drugs. The earliest studies looked at the different treatments for TB, and it quickly became clear that, for tuberculosis, a single drug might work for a while, but the germ would soon become resistant to the antibiotic. Thus, after some improvement, the patient would deteriorate. This led to treatment with a combination of a number of different antibiotics. Further, we now know how long we should treat patients with these drugs before we can expect a cure.

But I am here more interested in the method by which efficacy was proven. It is not sufficient to see that a chemical would kill the germ in the laboratory; we had to study the effect of the drug on the disease in a person. What is more we had to make sure that the recovery was not due to the spontaneous recovery from the disease, but that it was the drug itself that caused the patient to get better. How would we define recovery in a patient? We have to have observable outcomes, like improvement in the patient's physical well-being, improvement in the shadows on X-Ray and clearing of the germ from the patient's sputum. But how would we know recovery was not spontaneous? We would give half the sufferers the drug and the other half an inactive placebo, and see which group had the best outcome. Such clinical trials led to a degree of confidence and

certainty about the efficacy of the drug, and the earliest clinical trials like this were done in patients with TB.

Back to Wesley's child with ague. These days a simple blood test would establish the diagnosis, and the child would be treated with a potent anti-malarial drug. It may not be quinine, as we now know that in many places malaria is quinine-resistant, so we would choose the drug according to the latest epidemiological knowledge. Further there are steps that can be taken to decrease the chances of re-infection, including simple measures like mosquito netting, draining places where the mosquito can hatch, and so on.

Not all medicine can be related to a germ causing an illness for which an antibiotic provides a cure, although the story of peptic ulcer (an ulcer in the stomach or duodenum) is an outstanding example of recent scientific development. When I was a lad at medical school, peptic ulcer disease was regarded as a psychosomatic condition caused by stress. As a young doctor, a lot of research went into looking at the production of acid from the stomach, and drugs which switched off stomach acid were heavily promoted. When Drs Marshall and Warren in Western Australia first suggested peptic ulcers were caused by a bacterium called Helicobacter pylori, they were greeted with a considerable degree of scepticism. Yet in 2005 they won the Nobel Prize for their discovery that peptic ulcer disease is a disease caused by a particular germ.

In spite of that story, not all diseases are caused by infection! Though we know that some cancers may be caused by germs, most likely viruses, there are other causes of cancer, like smoking and industrial exposure to chemicals. However, we do not know the causes of the bulk of cancers. We don't have a good understanding of degenerative diseases, like Alzheimer's, and although we understand quite a bit about atherosclerosis, heart attacks and strokes, there are still a number of mysteries we do not understand.

## Neuroscience

But the mysteries of physical diseases are minor when we compare them with the enigmas of mental illnesses. We have learnt a lot about what makes the human brain work (neuroscience), and we have made huge strides in the understanding of mental illnesses, yet there is so much we are ignorant of. Some of Wesley's cures for lunacy included rubbing the head several times a day with vinegar in which ground ivy-leaves had been infused, or to take daily an ounce of distilled vinegar, or to boil juice of ground ivy with sweet oil and white wine into an ointment which was anointed every other day for three weeks chafed warm onto a shaved head, and to give three spoonfuls of juice warm every morning. In the 1950's we still did not have many ways of treating major mental diseases. Insulin coma had been replaced by a crude electroconvulsive therapy, and mind-altering drugs were just beginning to be discovered. In the last 55 years there has been an explosion of knowledge of whole new classes of mind-altering drugs to help us deal with schizophrenia, major depression, bipolar disorders, epilepsy and even addiction. These drugs have been felt

to be so successful that there is a view that psychiatric diseases are simply (or in that wonderful reductionistic phrase, 'nothing but') a chemical imbalance of the brain. In fact, radical neurosciences would claim that we ourselves, as persons, are nothing but a series of neurological impulses, and that psychological diseases are nothing but disorders of brain chemistry (Crick 1994).

Wiser neuroscientists recognise the fragmented nature of our current understanding of neuropsychological diseases. The types of psychological symptoms and the clusters of symptoms, like those of the different fevers, have been well described, and even codified in systems like the American Psychiatric Association's Diagnostic Statistical Manual of Mental Disorders, but the reasons why they are that way are less well understood. Look at depression for example. Depression is a whole set of symptoms centring on a flat mood, no feelings, a sense of hopelessness, even to the point of suicide, poor energy, poor sleep and low appetite. There are many causes of such a cluster of symptoms, including taking the wrong drug. Thus older blood pressure tablets would often cause depression as an unwanted side-effect, which would lift when the tablets were stopped. Alcohol is another drug which can make a person feel depressed. Then there are non-drug causes of the symptoms of depression; for instance, grief and loss are potent causes. Thus a person who is sacked from work, or a person who has lost their spouse, can feel quite depressed, and when these things occur unjustly, as in an unfair dismissal from work or the loss of a close relative through murder or a car crash, the grief and anger can become profound. It can sometimes be severe and prolonged enough to lead to depression. We could take this analogy further. The workaholic who loses his job, will suffer more than the person who is confident of his abilities and who believes he will quickly find another job. Here then the syndrome of depression (feeling low) is the result of personal responses (or lack of them) to the social circumstances the person is in.

These considerations lead to a disturbing observation described by various authors as the 'medicalisation of distress' (Summerfield 2001). Thus a person may feel sad and bereft by the death of a loved one or the loss of a job. That is a normal reaction and should be acknowledged as such. However, that sadness may be wrongly labelled as depression and they may then think that all that is needed is a drug. Likewise a person may feel stress, a normal reaction. If, however, that stress becomes anxiety and that anxiety is medicalised, they may be tempted to think that an anti-anxiety drug will be all that is needed. From my perspective as an addiction medicine doctor, I see many people who have subsequently become dependent on their anti-anxiety drugs. These people need not only to withdraw from their addictive substances, but also to be re-educated about coping with stress without resorting to drugs.

Now it is important to get this straight. In the right context, anti-depressants and anti-anxiety drugs are very useful in helping people with depression and anxiety, but by themselves and without patients developing better coping strategies, drug therapy is deficient. We need a broader understanding of grief and depression, stress and anxiety.

Then we need to move from the psychological to the social dimension of a person's illness. Different cultures respond differently to the same traumas. It is interesting even to see how social fashions have changed diagnoses. A good case can be made out for arguing that post-traumatic stress disorder became an accepted disease because radical psychiatrists wanted to punish the US government for blundering into Vietnam (Summerfield 2001).[6] The trauma felt by returned soldiers became medicalised and subject to compensation. Their alcohol and other drug dependence was understood, and even excused. This does not mean that there was no distress, nor can we simply tell a person to 'pull up your socks'. Such a callous approach does not help the stressed, or the depressed. But how in the face of horror do we cope? What is legitimate and what is unacceptable? How do we best handle hurt? How do we stop people spiralling downward into a well of misery and prevent the fall into victimhood and disempowerment?

This question is particularly acute for those traumatised by the holocaust of World War II. One has to be careful how to address this issue, for any comment by those who have not suffered those unspeakable horrors is in danger of being seen as insensitive. Yet Simon Wiesenthal, holocaust survivor and Nazi hunter, in his moving book (Wiesenthal 1997) invites a number of friends to comment on his experience where a dying SS soldier begged Wiesenthal's forgiveness for the soldier's brutality towards an innocent Jewish family. Wiesenthal is silent, but wonders whether his silence is enough, in spite of showing enormous compassion in his silence. The friends' responses vary, and include one by Desmond Tutu, (Tutu 1997) whose witness to the Truth and Reconciliation Commission (Tutu 1999) brings the light of forgiveness to a very dark place of murder and brutality. Forgiveness is costly and can be wrongly applied, but by the same token a lack of forgiveness can sometimes so eat away at the resenter that there is ongoing psychological pain. No amount of alcohol, no anti-anxiety drugs and no antidepressant can take that pain away.

The holocaust is not the only genocidal trauma; Bosnia and Rwanda spring to mind, and there are other less public ones. Nor is genocide the only trauma people suffer. My patients have often suffered all sorts of abuses; emotional abuse, physical abuse and sexual abuse. How do we move them from a sense of disempowerment and victimhood to becoming empowered and moving on? Do they need to forgive in order to do so? Does forgiveness imply letting the abuser go scot free? My Jewish counselling colleague and I (Gijsbers, Freeman 2006) are in a continuing dialogue on that one, just as Tutu and Wiesenthal are.

All this means that we must understand psychological disorders, and indeed all illness within a broad biopsychosocial framework to do justice to the complexity of the condition. We can neither say on the one hand that depression is a biochemical deficiency of the brain, nor on the other hand can we dismiss anti-depressants as useless. Nor can we attribute all

[6] I am aware that this is an opinion piece and hence open to considerable debate, but the point of view is one worth evaluating. For a balancing opinion see Mezey, Robbins 2001.

psychological pain to a lack of forgiveness. Each person's journey and each person's story about that journey is unique, but each illness experience has biological, psychological, social and even spiritual dimensions.

What of the spiritual dimension? Before the scientific revolution, religion and healing were quite close. Just as with the science-faith controversy, there is a dominant myth that medicine and religion have also become at least estranged, if not enemies. Religious sceptics and unbelievers have encouraged that myth, but the truth is that a lot of the development of scientific knowledge and a lot of health delivery around the world has been part of the worldwide Christian movement. Further there is a new and growing interest in the spiritual dimension of illness and coping, as seen by the increasing number of publications on spirituality in mainstream medical journals (Cook 2004). If we understand the spiritual dimension as the person's deepest drives and motivations arising out of their core values and beliefs and expressing itself in devotion, passion and action, especially towards God, then clearly these issues affect the way a person sees their illness, their hopes of recovery or their death.

For some, their spiritual struggle is acute as they grapple with premature death, grief, loss, and a sense of abandonment by God in whom they have trusted. At one level all illness is a testing of one's trust in the goodness of God, so much so that some people abandon their faith as a result of their illness. To others the illness experience is the dark night of the soul, where hope fades and there is just a grim hanging on. Still others are able to work through their grief and inexplicably find great comfort from God and from others in their pain.

## Addiction

There are even more intense debates about the nature of the disease of addictions. Some in our community see addiction as immoral behaviour which should be punished, the so-called 'tough on drugs' approach. Others insist that addiction is an illness requiring treatment. Still others insist on it being a behavioural problem which needs good behaviour to be re-learnt, and others insist it is a spiritual problem requiring a spiritual solution.

Once again the broad biopsychosocial approach is probably the best way of understanding addiction. Biologically addictive drugs stimulate the pleasure centre of the brain. Other activities (such as sex and gambling) may also cause pleasure. Drug taking can thus be regarded as artificial instant chemical enjoyment. For sufferers who are not at peace with themselves, alcohol or other drugs offer 'a chemical holiday from intolerable self-hood', to use Aldous Huxley's rich phrase. Addiction can thus be described by the anaesthetic effect of alcohol and other drugs on people as well as the retreat into a state of chemical pleasure. In doing so, we are already moving away from a strictly biological viewpoint to a more personal one. For a brief time, the person is outside themselves and their problems. However, the next day they do not just face the same problems they have been avoiding, but they also have to face the feeling

of shame and despair that comes from a lack of self-mastery. This then can lead to a vicious cycle in which they say, 'What's the use, this has got me beaten, I might as well give in to it again'. Once addiction becomes established, cravings can occur. These are intense irrational drives to use, which the addict finds difficult to overcome and the non-addict finds baffling. Why do they do something so obviously self-destructive?

Alcohol and drug dependent people find that they need more and more of the addictive substance for it to have the same effect that it used to. This is called tolerance. Along with that, they find that sudden cessation of the drugs or alcohol can lead to uncomfortable feelings, called withdrawal symptoms, which usually consist of shakes, agitation, restlessness, insomnia, and even nausea, vomiting and diarrhoea. Sedative agents like alcohol, opiates (including morphine and heroin) and benzodiazepines like Valium, are the worst. In that situation people are hooked and usually will need some medical help to get over these symptoms. This is the detox part of the addictive illness. While it has a strong and obvious biological component, it also is affected by the person's psychological state. However, stopping is only the beginning of recovery. At a personal level they suddenly have to face those issues they have been avoiding. By itself drug withdrawal is insufficient, and a strong relapse prevention program needs to be put in place because the commonest outcome following withdrawal is relapse.

Relapse prevention is thus an important part of the total recovery process. Once again there are biological psychological and social dimensions to the problem. Those who are intolerant of themselves need to learn how to gently accept themselves. This is the psychological dimension. Of course, there are often all sorts of relational issues, issues of anxiety and depression, which complicate the psychological dimension. Sometimes there can be a frank psychological illness. On the physical side, cravings for alcohol can be controlled with medication. On the social side, through counselling and group support, patients can climb out of their addiction. Alcoholics Anonymous witnesses to a spiritual form of recovery. The twelve steps describe how people come to an end of themselves, surrender themselves to a higher power (however you perceive him to be) and then make restitution for the damage done by their addiction. Recovery involves helping others to come to this new life. Such a process started with the founders encountering the Oxford Movement, which was based on the Keswick convention, and there is no doubt that the earliest practitioners of AA were committed to Christianity. Subsequently there has been a tension within AA between those who want to maintain their core commitment as a clear Christian commitment, and those who want this to be a generic spirituality for any who come, of whatever spiritual persuasion. Carl Jung in a letter to one of the founders of AA used the phrase *spiritus contra spiritum*, the Spirit against the spirits, or the power of God's spirit driving out the drive to drink. How that actually works is a mystery, but thousands attest to its efficacy.

## Science and Christianity

Where does all this leave us? First I hope I have demonstrated the usefulness of science and how it has helped us to understand the world. We have this understanding of the world in common with other Christian believers and with non-believers.

Secondly I have shown there is a science to clinical medicine but that clinical medicine is a particularly difficult discipline, subject to change and growth. It is actually underpinned by many sciences, including anatomy, physiology, pathology, microbiology and pharmacology, but that these sciences are varyingly successful applied to the clinical problem, depending on the nature of the disease. I hope I have shown that these basic disciplines work well with physical diseases, although even there the wider context is important, but that psychological distress requires a broader approach, in spite of the strides made in neuroscience. There is a lot more to research and I am sure there are some surprises in store, so that whatever we hold, we hold with humility, and subject to further clarification.

Thirdly I hope that I have shown that for the Christian there is a whole extra dimension to clinical practice. This will include the generic term 'spirituality' but for the follower of the Lord Jesus Christ this spirituality takes a particular shape and spills over into compassionate care and broader issues like non-judgmental acceptance, repentance and forgiveness. Again while these are not peculiar to Christians, Christians should be at the forefront of practice in these areas. Is there something particular about the gospel that other believers don't have? I would suggest that a living faith in a God, Father Son and Spirit, gives poise and confidence, a sense of grace and power. I would suggest the knowledge of sins forgiven through the death of Christ, and the power of the indwelling Spirit of Christ, are pearls of such price that they outweigh anything else, and my sadness is that my fellow colleagues in healing have not yet seen the richness of these gifts so freely given by God. What a magnificent truth to know that God is there to love me and to provide for me, to teach me to be like him, and to give me God's strength in my life for God. How good it is to share this great gift with all who love and serve God and to live in a community of care and support for God. These are immeasurable gifts, and transform both the art and the science of medicine as well as the pursuit of science.

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Throughout history, disease has been a subject of fear and fascination in equal measure. However, each revolutionary medical discovery has brought us a crucial...Â  However, each revolutionary medical discovery has brought us a crucial step closer to understanding the complex mysteries of disease and medicine. As a result, we have been able to develop medicines and treatments that have been instrumental in saving millions of lives. Hereâ€™s a chronological list of the top medical advances in history so far: Vaccines (1796). It is difficult to pinpoint when vaccines became an accepted practice, mostly because the journey to discovery was long and complicated. 1. History of medicine. Medicine is among the most ancient of human occupations. It began as an art and gradually developed into a science over the centuries. There are 3 main stages in medicine development: Medicine of Ancient Civilizations, Medicine of Middle Ages and Modern Medicine. Early man, like the animals, was subject to illness and death. At that time medical actions were mostly a part of ceremonial rituals. The medicine-man practiced magic to help people who were ill or had a wound. New civilizations, which developed from early tribes, began to study the human body, its anatomic com Medical science is under a constant state of evolution. However, there are a host of innovations that not only changed the medical field but the world.Â  Inventions like functional magnetic resonance imaging, the artificial heart, and disposable catheter changed medicine forever. By Kashyap Vyas. Jun 25, 2020. 1, 2. Medical science is one of the most scientifically progressive fields. Over the years, breakthroughs in medical science have either created an alternative to dangerous or ineffective procedures or have found new solutions to historic challenges. Technology has played a significant role in many of these medical changes. Today we will look back on the inventions that revolutionized medical science. 1. Medical thermometer. Source: Pixab