

YOUR BRAIN IS FANTASTIC!

(But what if it gets hurt?)



by Paul Freedman & John Cooney

Tell the truth, now: What do you know about your brain? Next to nothing, right? Sure, you're familiar with the visible bits of your body – like arms and legs and hips and ears. You've even got a nodding acquaintance with other more hidden bits – like lungs and heart and arteries and veins. But your BRAIN? Admit it: you couldn't tell your *hypothalamus* from your *hippocampus* if your life depended on it! And as for your *cerebral cortex* ... or your *corpus callosum* ...

Don't feel bad. After all, where do you start?

When you look at the human brain, it's all much-of-a-muchness. An unimpressive, grey, lumpy thing about the size of a good grapefruit. It doesn't move or pulse or hum or 'do' anything – it just sits there. It has no feelings: you can poke it or cut it, but it can't feel pain. And apart from the two halves, it's hard to tell one bit from another – even if you know the tricky names, where on earth do they belong?

But it's when you look INSIDE the brain that things get massively mindboggling!

Your brain (believe it or not) is 'driven' by 10 to 15 billion nerve cells! Which happens to match the number of stars in our home galaxy, the Milky Way. Another way to look at it? You have twice as many brain cells as there are brains on Planet Earth! Quite a few, eh?

Those brain cells are called neurons. They receive messages (from your eyes or ears or the surface of your skin, for example) then sort of 'discuss' this information amongst themselves – before firing off signals, triggering muscles and other organs into action.

The neurons are linked up (like an unbelievably complex telephone network) by threadlike connections called axons ... 100,000,000,000,000 of them! (That's one hundred million million – laid end-to-end they'd wrap several times around the earth!) These

are the 'telephone wires', controlled by special neuron-centres which act like switchboards, directing signals from one area of the brain to another.

For example, the words you're reading right now are registering in what's called *Broca's Area* – on the left side of your brain. But the ideas those words spark off are being referred to several other areas for processing and sorting out. Messages are being flashed in all directions by (wait for it) electricity! A tiny charge runs along the axon to another neuron.

But there's more. Each neuron has a thousand – and sometimes as many as 10,000 – axons. What colossal organisation! We're talking 10 billion workers, each with a thousand or more contacts, and an unimaginable number of possible combinations!

Exhausting, isn't it? All those billions

of cells, thundering away in support of YOU! And the energy it takes to operate this powerhouse? No more than that used by a 20-watt light bulb!

How's that for conservation?

But brace yourself, because there's something else you may not know. Your brain does not feel pain, BUT IT CAN BE INJURED! In fact, a bump on the head can RUIN YOUR LIFE – and the lives of your loved ones!

When you think of our major health problems today, the ones most likely to pop into your mind are things like cancer, stroke and heart-attack. Chances are, you wouldn't think of BRAIN INJURY – right? And yet this rather anonymous and little-known affliction plagues many of our fellow Kiwis.

Research suggests that as much as 5% of our population is affected to some degree by brain injury, bringing long-lasting loss-of-function. And this loss can range hugely ... from headaches to loss of memory; vision problems to a state of helpless, child-like dependence on caregivers.

Met Auckland couple, **HONOR** and **BRAD**. Honor, a fitness instructor and athletics coach, had an accident nearly two years ago. She was outside, putting a young trainee through some 'resistance' drills. She and the young man were linked together inside two large resistance bands – like big, stretchy rubber-bands. The young man's job was to run in front as fast as he could, with Honor providing resistance, anchoring him by pulling back on the rubber-bands.

Honor: "We did the first run, and I thought, 'Oh dear, he's a bit strong for

me!' On the second run I nearly lost it. And on the third, I *did* lose it – I went flying! I whacked my head really hard on a rock beside our driveway, and also hurt my arm.

"I knew I'd done something serious, but I didn't lose consciousness ..."

Brad rushed his wife to hospital where the more obvious injury to her arm received most attention and they returned home. But it wasn't long before the injury to her head made itself felt.

Honor: "I began to find I wasn't coping with, well ... just everyday things. As a mum you're used to doing 50 things at once, but all of a sudden I was struggling. I was having to really concentrate on every little thing – and a lot of the time I couldn't really do even that one little thing I was trying to concentrate on.

"Before I knew it, I didn't have the energy to get up and do *anything!*"

You'd imagine that with head injuries so common, diagnosis would be relatively straightforward ... but getting the full picture can be tricky. Discovering just how much damage has occurred inside the brain, how severely it's likely to impact the patient, and how long this process might take, is more of an art form than a science.

DOCTOR PETER BERGIN, a specialist neurologist based at Auckland Hospital, explains: "There are no specific symptoms that would make you say, 'Aha – there's a brain injury!' It's a combination of symptoms ... like difficulty concentrating, poor memory, inability to make decisions, dizziness, fatigue, headaches.

"Diagnosis itself isn't too difficult, so long as you can get the history of a head injury. But prognosis is more difficult,



Peter: “Motor accidents – they’d be number one.”

Grapevine: “How about sports ... especially contact sports, like rugby and boxing?”

Peter: “Yes, certainly. With varying degrees of severity. People who play sport can get episodes of concussion. And *repeated* episodes can produce long-term effects. But they probably won’t be anywhere near as severe as someone who’s been in a car-crash, where they have skull fractures and intra-cerebral haemorrhage.

“However, you don’t have to play contact sports to be at risk. Falling off the roof causes lots of brain injuries. People – particularly middle-aged people

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and so is understanding why symptoms develop and determining how severe they are. If the main symptom is headaches, for example, there are no tests to actually determine whether they’re as bad as the patient claims they are. It’s entirely subjective. If somebody comes in and they’ve been involved in a motor accident and they say, ‘I’ve got these terrible headaches,’ you wouldn’t be surprised if a scan showed there had been some bleeding. However, plenty of people complain of very bad headaches following a head injury, but their scans are perfectly normal.”

Grapevine: “So what are the most common causes of brain injury?”

– getting up there to fix a leak or clean the guttering – these all involve a real risk of falling. And when you fall that far, it’s very likely you’ll suffer a head injury.

“People fall down inside stairways, too, and get head injuries”

M meet Bay of Plenty couple, **JOHN** and **PAM**. Their lives were turned upside down when John was involved in a head-on car-crash back in 1997. John was alone in the car when it happened, and he remembers nothing of the accident at all – which made defending his case more than a bit scary when the police charged him with reckless driving.

Pam: “I knew from having looked at

the scene that it wasn't John's fault. The accident happened just past a dangerous corner and on John's side of the road. I sat at that spot and watched 72 cars come round that bend – and saw how many swung across the centre line. So we went to the lawyer. But it was 18 months of tension and worry, and John didn't handle that well. I had to deal with most of these things ... and it wasn't pleasant.

"Because of his head injury, when John got up in court, he didn't help himself by being flippant. (That's very common after brain-damage, apparently.) So he handled himself with ... well, not as if it was all a joke, but certainly not the way he would've done normally."

John: "Fortunately it all came out okay.

– told us, in various ways, that they lived with a *different person* from the one they'd married.

Pam: "Anyone who's had a brain injury tends to get all the attention. The caregiver's often forgotten. And yet they've got *double* the responsibility. It's a whole new life ... in a flash ... and everything's changed!"

Brad: "One classic change I noticed in Honor was cooking. She couldn't even go to the fridge and choose what to do. If I cook, I rip open the fridge, 'What've we got?' ... make a mental check-list of what I see ... and work out the possible meals I can make. Honor would open the fridge and just go blank – there's no way she could do *any* of that decision

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Halfway through the court case, the judge said 'Stop!' He didn't care whether the other car was going sideways or backwards. He could see I was on my side of the road, and that was that."

But being 'in the right' doesn't make living with brain injury any easier. Just reading these words you'll probably get the impression that John and Honor are fine – but listen to the interview tapes and you'll hear things a print-out can't really reveal: the long pauses for thought ... the slight slurring ... the hesitant starts to sentences that don't get finished.

And both caregivers – Pam and Brad

stuff. She'd have to rely on me. I'd go through that process with her, and we'd decide on something – then, focusing on that one thing, she'd have a go at trying to cook it."

Another thing most of us would expect is that the degree of impairment would match the severity of the head wound ... but this isn't always the case.

Doctor Peter Bergin again: "Some people have what seems to be a very minor head injury, and yet they're troubled with symptoms for a long, long time afterwards. But other people have what seems to be a quite severe head

injury, and yet make a remarkably good recovery. And I'm not sure that *anybody* knows *why*. You'll see people who've got significant intra-cranial blood (they've had bleeding into the brain at multiple sites!), yet they can make what seems to be a complete recovery. Whereas other people, whose tests are all entirely normal, are seriously debilitated, their lives turned upside-down for a very long time."

Honor's head injury didn't seem too bad at first, as Brad explains ...

Brad: "During the initial consultation, the doctors spent most time trying to figure out what was wrong with Honor's arm – which was painful, and quite a big distraction. They didn't seem too concerned about the head injury at first – it just sort of floated under the radar. I kept a careful record of what was said, and in one report, for example, they say: 'Skin abrasion noted on left forehead – no raccoon's eye and no battle's sign' ... whatever that is."

(In medical terminology, 'Battle's Sign' – or mastoid ecchymosis – indicates a fracture of middle cranial fossa of the skull, and may suggest underlying brain injury. 'Raccoon's Eye' refers to the patches of darkness or black surrounding the eye/s if a fracture of the cranium has occurred.)

Honor: "But there *was* more wrong with me, of course. And far from getting better, I started to get worse. I guess I'd put the pain and the lethargy down to the wound in my arm. But I recall struggling to have a shower, for example, and I couldn't remember if I'd washed my hair or not. It was so hard to do even simple things like that.

"Then one morning I just ... passed out."

While it's not easy to determine the extent of a brain injury, there *are* some techniques that make assessment and choice of therapies better-focused today than they were years ago. One big giveaway that a head has been seriously hurt is what's known as a 'brain-bleed' ... not a cut on the outside, but *internal* damage.

Dr Peter Bergin: "A brain-bleed indicates that the brain has received a severe blow ... and the blood vessels are damaged. The brain may have smacked up against the skull with enough force to rupture smaller blood vessels. That bleeding itself then causes further injury, by increasing pressure on the brain – and there's a limit to how much increase of pressure it can withstand. The skull is, after all, a closed cavity, and if there's too much fluid getting into it, then the person can die."

Grapevine: "These days, along with X-rays, you have some pretty high-tech gadgets helping you diagnose head injuries, right?"

Peter: "Yes. We use MRI and CT scans, detecting haemorrhage, predominantly, and skull fractures. And there are other problems we can detect. Somebody who's had a skull fracture may also have disturbance of the sinuses – and if there's fracture through the sinuses entering into the intra-cranial cavity itself, then that person is at risk of meningitis."

Grapevine: "What does blood look like on a scan? There must always be blood and fluid all through the skull – does blood-that-shouldn't-be-there look visibly different?"

Peter: "Oh, you don't need to be an expert to identify a sizeable bleed. Fresh blood on a CT scan looks white, while

most of the brain is a sort of grey colour. The cerebral spinal fluid is dark grey – almost black – and the brain is a mid-grey. So bleeding really stands out. But it depends on the type of scan. The most sensitive scanning we have at the moment is susceptibility-weighted MRI scanning, where blood looks black.”

Grapevine: “What was that about ‘susceptibility-weighted?’”

Peter: “It’s just a technical term. With MRI scanning it’s a matter of how you tweak the dials and how you get the signal back: you can have it sensitive for fluid or for tissue. But susceptibility-weighted imaging is particularly sensitive for blood. So even in someone who’s had

Whereas, if you have the same impact and hit a concrete wall – or a car dashboard – then you *are* likely to.”

Grapevine: “So what exactly happens inside your head when you suffer an impact like that?”

Peter: “Well, in a mild-to-moderate head injury, the brain will actually hit up against the skull. The frontal lobes, particularly, hit the frontal part of the skull – and the temporal lobes hit the sphenoid wings.”

Grapevine: “Sorry ... sphenoid wings? Are we flying here?”

Peter: “These are different sections – sort of cavities – of the inter-cranial space. Despite what you might think, the brain is VERY well cushioned. That’s what

“As a mum you’re used to doing 50 things at once, but all of a sudden I wasn’t coping. I was having to really concentrate on every little thing – and a lot of the time I couldn’t really do even that. Before I knew it, I didn’t have the energy to get up and do anything!”

a ‘normal’ CT brain scan and there’s no blood apparent, you’ll sometimes still find evidence of injury with leakage of blood on that particular MRI sequence.”

It’s obvious that brain-bleeding isn’t good ... but how bad a crack on the head do you need to seriously injure yourself? And how bad a bump creates a ‘genuine concussion’?

Dr Peter Bergin: “It doesn’t have to be particularly severe. Any sudden knock – an acceleration or sudden stop – can cause injury to the brain. If you’re going along horizontally, and you hit the ground and slide along it, you might injure your shoulder or your ribs or something – but you’re unlikely to injure your head.

cerebro-spinal fluid does. But it’s still not *perfectly* cushioned. If your head decelerates too fast, or hits something solid, then the cerebral spinal fluid is pushed out of the way by the brain – which then bashes into the hard skull.”

So what does it *feel like* when you’ve cracked your head hard enough to damage the inner workings?

Honor: “There wasn’t much to see. I didn’t spill lots of blood. Not much evidence that I’d really whacked my head. I just started feeling worse, couldn’t stand up, started vomiting ... things like that.

“At the beginning it was like I was in a cloud. I wasn’t really all that aware of what was going on. I can remember trying to



SYMPTOMS

BRAIN-INJURY SIGNS TO WATCH OUT FOR:

- tiredness
- blurred vision, sensitivity to bright light
- clumsiness, dizziness
- sensitivity to loud noise
- feeling muddled, slow thinking
- depression, anxiety, unusually worried
- headaches, often in back or side of head
- more easily irritated, bad-tempered at times
- broken, disrupted sleep patterns
- up-and-down moods
- difficulty remembering things
- poor performance at work, study, school
- difficulty concentrating, paying attention
- tearfulness, overreacting to small things
- lower-than-normal self-esteem
- children may become hyperactive, irritable, tearful
- young people may get more easily exhausted

(adapted from an ABI Rehabilitation NZ brochure – www.abi-rehab.co.nz)

do things like ... well, I remember my daughter asking me to transfer some money, and I just couldn't. And if I had to make a decision ... I simply couldn't do it."

One facet of head injury that everyone we talked to mentioned was *tiredness*. Not just the 'being puffed' that a quick sprint around the block brings on, but a deep down, aching-heart, bone-tiredness that settles in almost as soon as you wake in the morning and stays with you all day. We asked Doctor Peter why a head injury should so often produce such a symptom.

Peter: "I don't know quite what the mechanism is. Fatigue is a common problem with a lot of neurological conditions. You can get physical fatigue with muscle diseases – and though this might

with multi-tasking – poor memory – headaches."

So, you're tired, you're grumpy, you're frustrated, you hurt, you can't concentrate. What sort of therapy can help with a set of problems like these?

Honor: "When they referred me to ABI (*Auckland Brain Injury Clinic*) that's when I started getting help. We saw a physio (therapist) who tested my balance. I hadn't even realised it, but I'd lost all my sense of balance. That's why I was having so much trouble walking.

"They gave me a heap of exercises to help with dizziness.

"We met Allison – an occupational therapist. She helped me to try and get structure in my day. I'd got to the point

Anyone who's had a brain injury tends to get all the attention. The caregiver's often forgotten. And yet they've got double the responsibility. It's a whole new life ... in a flash. Everything's changed – it's like they're living with a different person from the one they'd married.

slow you down in terms of physical exercise, you usually still have enough energy and interest to do Sudoku or crosswords or read something.

"But following a brain injury, people just have no motivation or energy for doing *anything* – either physical or intellectual. They don't know *why* they're feeling tired all the time. They haven't been physically exerting themselves; they've slept well; they haven't been running a marathon ... but they feel constantly tired.

"Once again, however, there's enormous variation. Fatigue is common – along with difficulty concentrating – difficulty

where I wasn't sleeping well, and when I did sleep everything was all out of whack. She got me getting up at the same time each morning, trying to put a routine into the day's tasks."

Brad: "I copied down what they put in her first neuro-psyche assessment. It talks about what her goals were:

Client's Goals. Honor said, 'I don't want to do all the stuff I used to do before. I don't like going out. I'm embarrassed about how I am. I'm a totally different person. I have no desire to be that other person again.' Also she said, 'Going back to work scares me to death. I can't imagine doing what I used to.'

She was interested in working towards the following goals: (1) Tidy the house. (2) Get the washing done.

“That was it ...”

There have been some high profile cases recently where rugby and rugby league players have been concussed and continued playing. We asked Doctor Peter if we sports-mad Kiwis don't pay enough attention to the signals our bodies are giving us?

Peter: “Yes, I do think that. But I hope it's beginning to change. Certainly the managers of the All Blacks are now very conscious of ensuring that players don't play if they've suffered a head injury. I'm not sure about other codes, and I suspect that it may not be so good at lower levels ... possibly in club rugby people don't know as much about how sensitive and vulnerable our brains really are.

“Part of the problem is that on TV people can be in a fight, get knocked unconscious, and they get up, shake their heads, pour a glass of water over themselves – and they're back to normal! But in reality, it's not that quick or straightforward. People who get K.O.ed often have symptoms that last for weeks, and sometimes a lot longer.”

So when all's said and done, what do our brain-injured friends believe they've learned as a result of what's happened to them? And what advice would they give to someone in the same boat?

Brad: “The most vital thing is GO AND GET HELP! Basically, go to your GP – that's probably the best starting point. If you've really banged your head and you're having concussion symptoms which aren't going away, you NEED a specialist – even if it's only to rule brain injury out.

“And if you're the caregiver, you need to have the courage to TRUST YOUR GUT! If your instinct says that something's wrong, trust your gut – even if the doctors or coaches or experts are seeing it differently!”

Honor: “I still worry about what people think. They look at me and assume, ‘Oh, she's right back to normal!’ But I know I'm not. I walk a very fine line. If I overdo things (and it happened a few weeks ago), I'll just shut down again. And it's hard, because people can't see anything wrong. If I try and explain, then I worry they'll just think I'm a hypochondriac ...”

John: “You've got to understand what's happened to you. If you can understand, then that knowledge helps you control it. And it also gives you the facility to do something about it. It allows you to monitor yourself. For example, if you find you're getting tired, go and have a lie down because that's what your body needs.”

Pam: “You need to read anything you can get on brain injury. ‘Brain Injuries – The Facts’ is one book that'll help you understand what's going on. And it's a lay person's book. You know, heavy medical tomes for doctors probably aren't much use for lay people.

“As a caregiver, you also need to be very strong. And very patient. And you've got to be able to walk away sometimes – because otherwise you'd strangle them, to be honest!” (They both laugh ...)

KEEPERS OF THE VINE



**WHAT DO YOU THINK?
HAVE YOUR SAY!**



GO TO GRAPEVINE'S FACEBOOK PAGE. SHARE YOUR POINT-OF-VIEW AND READ WHAT OTHERS RECKON.