Addiction

The genetic dimension of addiction

Narrator
Brian's natural hair colour, his height, and the length of his legs are partly determined by his genes. But the very underpinnings of his behaviour, the neurology of his brain, might also have an inherited component.

Brian
My theory is you know I was an addict or an alcoholic before I even had a drink.

Narrator
This is the test that Anne has been dreading most. It involves giving blood – but she can't stand needles.

Ann
We'll get a cup of tea after this. Have a lie down.

Dr Hugh O'Brien
It'll take 30 seconds.

Narrator
Blood, like every other cell in our body contains a full set of genes. They passed from our parents, our grandparents, back through our family line. For some families, genetic diseases like haemophilia come literally in the blood.

Dr Hugh O'Brien
Okay, small needle now. You look as though you've got good veins so don't worry.
Okay, that's all it is.

Narrator
For some families, genetic diseases like haemophilia come literally in the blood.

Dr Hugh O'Brien
And if you count up to about thirty we should be finished. You're doing very well. Do you feel OK? That's flowing nicely. Nearly finished.

Narrator
There's no question of a direct link between genes and drink. But there could be something more subtle going on.

Dr Hugh O'Brien
All right, finished.

Ann
Yeah.

Dr Hugh O'Brien
Do you want to just press on that? Would you like to lie down?

Narrator
Brothers and sisters are a good case for scientific study. For Brian and Anne's blood samples, it's destination USA.

A San Francisco-based group of scientists has lined up a large number of potential suspect genes.
In the laboratory, they put Brian and Anne's blood samples through a regime of diluting and spinning.
The technique will reveal the genetic blueprint for each of the siblings. This white strand is Anne's DNA.

Dr Kirk Wilhelmsen, The Gallo Clinic and Research Centre
Brian and Anne have half of their DNA in common. And they have half their DNA in common because they each got half their DNA from their parents, each of their parents. But they got different halves of their DNA from their parents. So if we look at a chromosome location where they both inherited the same bits of DNA from their parents, we think that's an unlikely location for the gene that causes Brian to be an alcoholic and Anne not to be.

Dr Kirk Wilhelmsen
So this is from the sibling pair we've been talking about?

Renato
Yes.

Dr Kirk Wilhelmsen
So this came from one chromosome and this came from the other. And it looks like they've inherited the same piece of DNA from both of their parents.
Can we look at another marker?

Renato
Sure.

Dr Kirk Wilhelmsen
Oh, so in this case you can see that they have inherited different chromosomes or at least one of their chromosomes in this case, and looks like they have one in common here. This may have been the same piece from the same parent, or it's possible that the parents just both happened to have this size fragment. This data looks great.

Narrator
But to figure out what this DNA might actually be doing, the scientists need to match it up against actual behaviour.

Ron
Okay, and the first time you ever drank alcohol in your life, when was that?

Brian
To be absolutely honest I wouldn't know when I took my first drink and I wouldn't remember it anyway because I'd have got drunk.

Ron
It's perfectly fine to estimate

Brian
I was probably pretty young, 16, 17 and my tolerance towards alcohol would have been very little or none at all.

Narrator
Simple traits like age of onset could correlate with certain stretches of DNA.
The scientists are throwing a battery of the most powerful and up-to-date technology at the problem. Even so, it's a tough one. Unlike single gene disorders such as haemophilia, they haven't even established what the genes are meant to code for.

Kirk Wilhelmsen
It's not clear what it is about alcoholism that's inherited. And so it may be that what's inherited in alcoholism is craving, the development of craving, or the learning process to become addicted, or the susceptibility to withdrawal, we don't know the answer to that in advance, and so what we're doing is collecting as much data as we can, so that we can divide our sample in ways that we can figure out what, in fact, is inherited.

Narrator
Time for more questions.

Kirk Wilhelmsen
In the human genetics of complex disorders like alcoholism and high blood pressure and asthma we're expecting many genes to be involved. And in fact these genes may not have simple patterns of how they produce disease. It may be, for instance, that a gene that predisposes to alcoholism also predisposes to one to have, say, a sense of adventure and novelty seeking.

Brian
I do like the adrenalin rush of certain things, you know I like excitement. Sometimes I like living dangerously as well.

Kirk Wilhelmsen
So the genes that are involved won't necessarily be a simple gene that produces alcoholism but it may produce a complex set of behaviours that are interrelated based on underlying chemistry.

Narrator
Brian has chosen to put the qualities that were once part of his addiction to positive uses. Whatever his genes say, he's not doomed to be an alcoholic. His genes are like a template, but he has some control over how it's used.