

## Have scientists finally discovered the answer to addiction?

**A ground-breaking trial in Scotland is leading a growing number of experts to think there's a cure for addiction. But what is NeuroElectric Therapy, and does it really work? Paul Vallely reports**

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The winds were wild that day. They whipped round the farmhouse and thrashed the lowland conifers this way and that, bending them to near breaking point. It was like some grim metaphor for what had been going on all week inside the building.

Lower Johnshill Farm stands up a farm track well back from the road in the dour countryside somewhere to the south of Glasgow. Nearby lies a golf course and an old people's home as big as a small town. To the side, huge pylons carrying thick electricity cables bisect the length of the small valley. Only a Glaswegian could have dubbed it "beautiful Lanarkshire countryside".

This unlikely setting had more to commend it, however, than a dubious rural idyll. Inside the house, not far from the little town of Lesmahagow, two trials have just been held for a revolutionary new treatment which claims, astonishingly, to be able to remove the cravings of heroin addicts in a matter of mere days.

If it works as billed, it could, at last, be a cure for the epidemic of drug addiction - cocaine addiction has tripled in the last 10 years and heroin has quadrupled in the last 15 - which is spreading with alarming speed throughout the developed world. And Scotland was the place to try it out because it now has more drug addicts per head of population than anywhere else in the world.

The farmhouse interior was unremarkable. Inside the living room were three large sofas, set around an unlit open fire. "No admittance. Closed session" said a note on the glass of the door to the room, inside which a group of women sat in animated conversation. On the walls were stuck notes, in varying sizes, which gave a clue to what was going on. "The harder we suffer, the better we recover," one said. "If you're going through hell, keep on going," said another. "The best is yet to come J," said a third.

It looked pretty standard rehab stuff. But the largest, by the fireplace, was more intriguing. "Methadone is a crutch to the vulnerable," it said. For this pilot trial is turning upside down much of the conventional wisdom about the chemistry of addiction.

They broke for lunch and invited me in. I glanced surreptitiously around the group. It was clear enough who was being treated and who were the therapists. The women, most of whom

had taken their final fix just five days before, were gaunt. They appeared tired and weak. Yet they were not the focus of attention. Their eyes, like the clinicians, nurses and drug rehab experts, were on a tall, broad-shouldered 24-year-old man with spiky hair and a broad grin who was serving the soup.

Barry Phillips underwent the same treatment that the six women were experiencing exactly a year ago to the day. After five years on heroin, and four previous attempts to kick the "devil's dandruff", as he called it, he is now free of the habit - and of all cravings to return to it.

His unsuccessful attempts at quitting included the standard drug-detox treatments, plus the "cold turkey" of stopping with no prescription drugs to cushion his withdrawal symptoms. His successful attempt involved the little black box which the six recovering addicts were wearing, from which two leads projected, running to two electrodes taped behind the women's ears. To the unsuspecting eye it looked only as if they were using iPods.

In fact, they were wearing the latest version of a device pioneered by a Scottish surgeon, Dr Meg Patterson. Working in Hong Kong in the early Seventies, she discovered that low pulses of electricity, used by Chinese surgeons as a form of electro-acupuncture to control pain during surgery, had an extraordinary side-effect. They removed all cravings for drugs from the opium addicts who constituted around one in six of the hospital's patients.

Over the 30 years that followed she, and later her family, worked on a succession of prototypes of the device which was now on trial in the sequestered Lanarkshire farmhouse. NeuroElectric Therapy (NET), she hypothesised, stimulates the brain to resume production of the natural endorphins that drug-use kills off. But the treatment has never met with the approval of the scientific establishment. The Lesmahagow trial, run by Dr Patterson's children, and funded by a Scottish drugs charity, could change all that.

What NET claims is that, by using the pocket-sized stimulator continuously for six to 10 days, the acute pains of cold turkey are drastically reduced. NET's chief clinician, the inventor's son Lorne Patterson, a psychiatric nurse, says it provides withdrawal relief of between 50 and 75 per cent for most patients. "Some experience much more," he said, "as the gentle electric pulses stimulate the brain to heal itself." More than that, he added, 95 per cent of patients finish the treatment with no craving for the drug.

"I was sceptical," Barry told the six women, "but I decided to give it a go." Barry signed up to try out the new treatment for a fly-on-the-wall TV programme, Coming Clean, being made by the Bafta award-winning director Norman Stone. "On cold turkey I'd lasted no more than 24 hours. In the first few days I could still see clearly in front of me a spoon, a needle and a bag of heroin; that's all I wanted to do. But as the days went on, that picture faded. By the end the cravings had gone. And they have never returned." It was exactly a year to the day since he had had his last fix. The six women had baked him a cake to celebrate his "re-birth" day. "I'm strong now," he said, "though without NET I'd be a member of the living dead."

But would the Lesmahagow trial back up his claims?

Things were already looking mixed. The week before, six male addicts had been subjected to the programme. Two were kicked out for bringing drugs into the farmhouse and using them while on the NET machine. Two had walked out before the end of the trial, though there was

to be an intriguing development with both of them. And two had completed the course and left saying that they were free of cravings and intended to stay clean.

The second week of the trial was already looking better. A tougher regime had been imposed upon the women. They were searched as they entered the house and their money, lighters and mobile phones were all confiscated. "This isn't a pain-free ticket out of addiction," said Lorne Patterson, "though it does help cushion the more acute symptoms of cold turkey - which most people have tried before they come to us."

So it was with the six women. Margaret, 22, from Ayr, had been on heroin since she was 15 when she went to visit a friend and the girl's mother - a dealer - gave her daughter and Margaret free heroin for a week, until they were hooked and became customers. She had been on the drug for seven years, and had tried various ways of coming off, in vain. Five days earlier she had her last hit - 0.5g of heroin - and the next day she had put on Lorne Patterson's NET machine.

"The first day was quite easy," she recalled, "but in the night vomiting and sweating set in along with shaking, twitching, runny nose and eyes and mind running wild. It was pretty grim. But it has got better day by day. Now I've had no cramps for two days. I got unplugged from the machine yesterday. I felt fine. I've thought about heroin but not craved it. I'd say it's worked for me."

The others all, with varying degrees of conviction, agree. "I've had all the symptoms of cold turkey," said Laura, 27, a law student, "but it's a lot quicker. I haven't had any cravings for two days. I haven't even thought about heroin."

"On the second night I started hallucinating," said Liz, also 27, a mother of three children, who had been on heroin for 10 years, "but by the next morning I felt better. Jack McConnell saw me on my worst day. I'd like him to see me now."

Jack McConnell is Scotland's First Minister. Disturbed at the apparent failure of the nation's anti-heroin strategy - which relied on replacing heroin with methadone, which can be taken orally, thus avoiding the problems associated with needle-use - Scotland's premier visited the farmhouse pilot on its second day. He has asked his officials to review the methadone programme and investigate the electro-therapy.

He is not the only one intrigued by the possibility that a cure has been found for heroin addiction. The Inspector of Prisons in Scotland, Andrew McLelland, visited the farmhouse in person and the Governor of Edinburgh Prison sent two observers to the pilot. So did Phoenix Futures, the largest provider of rehab services in the UK. And so did a team from the Centre for Drug Misuse Research at Glasgow University led by Professor Neil McKeganey. NeuroElectric Therapy is beginning to look like an idea whose time has come.

It has been a long time arriving. It was in the 1970s that Meg Patterson used her anti-addiction machine to treat her first celebrity patient, Eric Clapton. Rock stars including Pete Townshend, Keith Richards and Boy George all kicked their heroin habit using the device. Given such high-profile clients, several of whom publicly endorsed NET over the years, how was it that the world did not beat a path to Dr Patterson's door?

A number of factors combined to keep NeuroElectric Therapy in relative obscurity. The first was medical suspicion of the exotic Chinese business of acupuncture, a practice of which western science has only relatively recently accepted as effective, struggling, as it does, to explain how it can work. The second was that NET's inventor, though a distinguished surgeon, was operating outside her accepted field of expertise.

Moreover, the work she was pioneering was enormously complex. In seven years of work with 186 patients she used the machine to successfully treat a wide range of addictive drugs: heroin, opium, amphetamines, benzodiazepines, cocaine, crack cocaine, methadone, nicotine and alcohol - all of them requiring the machine to operate on different frequencies and wave shapes.

And although the success rates she reported were phenomenal - with 95 per cent of patients claiming they were free of craving, 75 per cent that they were free of anxiety and a drop-out rate of just 1.6 per cent over a period of seven years - she was unable to explain exactly how the treatment worked.

She was also battling against a scientific and medical culture whose paradigm is essentially pharmacological. Though physicians used aspirin for over a hundred years before they knew about prostaglandins, they were not to be that easily persuaded to allow electricity to be pulsed into a patient's head - even if it was the barely perceptible pulse from a nine-volt battery, a thousand times more gentle than the current approved for electro-convulsive shock therapy.

When Dr Patterson applied for official funding to run proper clinical tests she was refused it, though the medical research council told her it would be interested to see the results if she could finance the trials herself. And many research grants were in the gift of large pharmaceutical companies which stood to lose billions of dollars a year if daily doses of methadone were replaced by a one-off treatment powered by a £3 battery. Dr Patterson died in 2002 without seeing her discovery applied more widely to treat addicts, though one of her obituaries in the British Medical Journal said she ought to have been awarded the Nobel Prize.

Her family persisted, raising \$3m for yet another generation of prototypes. They tried, too, to organise the kind of clinical trials the scientific community would find convincing. In 1992 they set up a randomised double blind trial at the University of Pennsylvania in Philadelphia, with two groups of patients, one receiving NET, the other receiving a dummy box, and with neither the individuals nor the researchers knowing who got which to rule out the possibility of NET's efficacy being caused by a placebo effect.

It did not succeed. If one group had had a box that made the skin tingle, and the other a box that produced no sensation, then it would have been apparent to everyone who was getting the placebo. So the dummy group was given a box set at the wrong frequency but whose low 0.2mA of current appeared to be enough to provide a degree of active treatment. In both groups, 88 per cent of the detoxes were successful.

This latest pilot study at Lesmahagow was funded by a small Glasgow charity, The Third Step, in an attempt to break the scientific deadlock. There has been another key development. The new push is being masterminded not by Dr Patterson's medic children - Lorne, the

psychiatric nurse, Sean, a professor of neurophysiology, or Myrrh, a nursing student - but by Myrrh's husband, Joe Winston, who is an American businessman.

Winston has digitised the old NET machine with its 40,000 possible combinations of currents, frequencies and wave patterns - which required six months' supervised clinical training to use. The new box has a computer-coded key for each of the main drugs. It is far simpler to use clinically. Pilot projects like the one at Lesmahagow are now underway with 50 prototype boxes in Australia, Romania, the Ukraine and the United States where a trial with 108 patients has just finished in Kentucky.

There are sceptics to be convinced. One is Dr Laurence Gruer, the director of public health science for the NHS in Scotland. Until recently he was the drugs co-ordinator for Greater Glasgow and a member of the UK government's key advisory body on drug misuse. "Because the brain runs on electrical impulses it is possible, even plausible, that NET might be capable of operating at that level in the short term. But can it help deal with the deeper psychological conditioning that drugs produce?"

There were two people missing from the group as lunch began. They returned soon after, a woman with lank black hair, hollow cheeks and a drained air who looked a deal older than her 35 years, and a lithe man with a self-confident crew cut. He was Joe Winston, Dr Meg Patterson's son-in-law and the man responsible for the resurgence of NeuroElectric Therapy. They had spent the morning in court.

"Cecilia did it," he announced cheerily. The woman smiled wanly. A hubbub of congratulation suddenly surrounded her.

Winston had that morning offered to accompany one of the six women on the NET trial to court where she was to fight a custody battle. Her opponent was her own father, who had been caring for her five-year-old son for the latter part of the 15 years during which she had been enslaved by heroin. "I was going to tell the court that Cecilia was doing well on the treatment, that her cravings had disappeared, and that she was now on the way to recovery," he said.

Before the hearing began Cecilia had approached her father outside the court and appealed for him to drop the case. Her father's response set out the long strained history of failed parenting and broken promises of his daughter. Winston listened and then said to Cecilia: "Your Dad has a point. You have let him and your son down too many times before. Even if NET has removed your cravings you still have those relationships to rebuild. You have to go round and cook tea every night and put your son to bed; you have to earn your way back into your Dad's trust and your son's." Her father listened, and agreed to postpone the case.

Cecilia's case was doubly interesting. She and one of the other women, Sharon - who, at 39, was the oldest addict in the trial - had been off heroin for several months already. But in that time for both the cravings had continued. "I've had no heroin since December," said Sharon, "but I've been on Valium since then. The cravings have been chronic. But since I put this NET box on they have vanished." Cecilia agreed: "They have gone so completely that I took the box off yesterday. It's remarkable."

Such a result was routinely claimed by Dr Meg Patterson, who in 1984 published a study suggesting that 80 per cent of addicts were completely free of cravings and drug-free up to eight years after treatment.

Many scientists are sceptical of the idea that NET reduces cravings permanently. "It sounds a bit unlikely," said Dr Gruer. "New imaging techniques allow us to see what kind of activity is going on in particular parts of the brain. It shows that the brains of people addicted to cocaine are not back to normal even several months later. So it's fairly implausible that, just by applying a low electrical current, NET could have a long-term impact."

At the Centre for Drug Misuse Research in Glasgow, Professor Neil McKeganey, widely acknowledged as Scotland's foremost authority on drug abuse, is not so dogmatic. "We don't fully understand the nature of cravings, or the process by which they may be reduced," he said. "Psychologically, heroin addicts frequently describe their separation from the drug as resembling, but being more agonising than, losing a husband or wife. But physiologically craving is like the feeling that you get when you need to urinate. It builds to become so strong that you focus almost entirely on the need to release the pressure. Your whole body focuses on it. It becomes a deep physical urge." NET seems to allay that. "And what the Lesmahagow pilot studies have done is bring to the forefront of many people's minds the business of recovery." That is a significant shift.

Over the past two decades there has been a shift of emphasis in anti-drug strategies. Fears of an Aids epidemic meant that the idea of getting users off drugs completely was dropped in favour of just minimising risks. So methadone was offered as an alternative to heroin because it removes the risks associated with needle use. Today, around 20,000 of the 51,000 heroin addicts in Scotland are on methadone. But Prof McKeganey's research - he has contact with more than 1,000 heroin addicts across Scotland - has prompted increasing disillusion with the methadone-substitution programme that has been the backbone of the UK's anti-heroin strategy.

"The received wisdom is that you get them off heroin and on to methadone, and then keep them on that for the rest of their lives, like prescribing insulin for a diabetic," he said. In the United States, Generation Grey is still on methadone they were prescribed in their twenties. In the Netherlands methadone is handed out in old people's homes.

"The problem is that after three years of methadone use only 3 per cent of addicts had given up drugs," Prof McKeganey said. Worse still, almost all of those on methadone also use heroin, because though methadone may reduce cravings it doesn't provide the high that heroin does.

The cost of all this, in Scotland alone, is £100m a year. And between 10,000 and 20,000 new addicts are becoming hooked each year. So the population of users could double or even treble within a decade.

What NET has already done is challenge that orthodoxy. "It says there may be ways to get addicts off drug use entirely," said Prof McKeganey, "and start them on the road to recovery."

The atmosphere in the farmhouse had become intense and claustrophobic. The women needed an outing, Joe Winston decided. We piled into cars and headed for New Lanark, a model village on the upper reaches of the River Clyde where the 19th-century philanthropist

and textile-mill owner Robert Owen had, in a previous age, tried to combine a successful business with a social utopia.

With the six women, half of whom were still wearing their NET machines, was a formidable phalanx of people determined to offer them support in their first re-encounter with the outside world.

The quietest but, it emerged, perhaps the most formidable, was a diminutive white-haired woman named Maxie Richards. This retired primary school teacher became involved with drug addiction by making tea in a rehab centre 20 years ago. Since then she has become one of Scotland's most experienced drugs counsellors who has taken more than 1,000 addicts to live in her own home.

Next came a burly recovering alcoholic, John Mullen, whose Third Step charity had raised the £40,000 for the Lesmahagow pilots. Then there was Scott Walker, one of two workers from Phoenix Futures, the largest provider of rehab services in the UK. With them came NET's most high-profile guinea pig, Barry Phillips, and its current driving force, the New Jersey businessman Joe Winston.

As the group toured the New Lanark village, which includes the world's first nursery school, the talk was all of coping strategies. Barry and Scott were offering tips on how to re-establish normal sleeping patterns and how addicts needed help out of chaotic lifestyles with skills most people take for granted, such as how to keep control of a household budget.

So could it be that it is such intensive support systems that really lie behind the success of NET rather than any physiological changes produced by electro-stimulation? And might it only work with those who were ready to come off heroin anyway? Could any alternative strategy - hypnosis, meditation, yoga, prayer or whatever - be just as effective if combined with strong support from others?

Prof Neil McKeganey is open to that possibility. "Perhaps. You can't get answers to questions like that from this pilot - which is why we need a proper study. But even if NET does work as its practitioners suggest, getting off drugs is not the same as staying off drugs. The hard part for any addict is re-engineering their life after detox to build a non-addictive framework to their lives."

That much became clear from a private conversation between the youngest two of the women, Rona and Margaret, as they sat down to rest while the others in the party toured the Victorian nursery school. Rona is a middle-class addict with a private school background who was first offered cocaine at an ice rink at the age of 15.

Two days earlier, during the trial, she had been hospitalised suddenly with liver problems. "While I was in," she said, "I was lying in bed and I saw two syringes on a tray. As I looked at them I suddenly realised that I wasn't thinking of stealing them. Heroin wasn't at the front of my mind any more.

"But the craving is still a wee bit in my head. The prospect of being completely drug-free frightens me. I just want to go back to the person I was five years ago. I'd like to go back to having a few drinks and a few spliffs and just using drugs recreationally."

Margaret nodded in agreement. "A wee bit of cannabis or drink won't hurt you. It's just a wee giggle."

Scott Walker of Phoenix Futures listened, and kept his counsel.

It was the last day of the trial. But before their "graduation" ceremony there was one final session, chaired by Myrrh Winston.

"You six are going to be your own core support group," she began. "You'll be here for each other when we have gone back to the States. But there is one issue I want to get out right at the start. Two of you," she said, nodding at Rona and Margaret, "are talking about going out partying. It's important to get this out in the open so the group knows.

"Because you need to know: pot is a drug, eckie [ecstasy] is a drug, alcohol is a drug. And all drugs are dangerous for you, even valium - if a doctor tries to prescribe it for you it's up to you to tell the doctor.

"Rona, you are the least strong of the ladies here." Rona tossed her long blonde hair and shrugged. "Your commitment isn't as strong. You have a sick liver - you cannot drink. Margaret, if you take Rona partying you need to know that you're going to bear some responsibility for her downfall. You'll help her hurt herself."

"It's just a wee spliff," riposted Margaret.

"Drum that idea right out of your head," Liz told the others. "I started on cannabis. You can't go back to it."

"I used to smoke a joint on my way to work," shrugged Rona. Margaret pursed her lips and stayed silent.

"You think I'm picking on you," Myrrh told her. "Well, I am. Because I see danger signs. If in this group you're not picking on each other, you're not doing the best for each other.

"Don't smoke a joint," added Myrrh. "You're making excuses. That's bad. You are drug-free now. You have a choice. It is your choice."

And so it went. At the end of the meeting Maxie dished out a 2007 diary to everyone. "Let's get the first meeting in your diaries," she said.

Down the road, at the local hotel, Joe Winston was addressing the families of the six women before bringing the women into the room to be re-united with their parents, partners and children. He had discarded the casual clothes he had been wearing all week and put on a suit.

"After cold turkey it takes four to six months for the body to adapt and that gives families the time to adjust, too, to the fact that the person they love is changing. We've accelerated that to four to six days. You haven't had time to adjust.

"Many of you have been put through the wringer; heroin has an amazingly destructive impact on relatives. But I need to tell you that the woman who'll walk in here in a few minutes is not an addict. She is drug-free now. All six of them are. Many of you will be afraid to hope that



this can be true; you have had so many hopes dashed in the past. But unless you hope and trust them they won't be able to hope and trust in their new selves.

"It is a new person we're going to hand to you. It will be as if they had a broken arm which is now set, but still not strong. Trust them. One more time. Lift them up. Greet them eye to eye. So please welcome, drug-free, clean, Liz Wilson..."

It was an immensely emotionally charged moment. Each of the six entered the room to music they had chosen (Cecilia's was "Stayin' Alive"). As they were presented with a certificate and hugged each therapist and fellow former-user in turn, their families stood and applauded with tear-stained ferocity.

"I feel quite emotional," said Laura's mother. "When I brought her last week I had my doubts. The transformation is amazing. She looks much happier and healthier. She's interacting, she's more confident. It's astonishing, in a week."

Behind her, Cecilia's father was hugging Joe Winston, the man with whom he had had the showdown outside court just a few days before.

"I have hope. I didn't have any when I came here," said Liz's aunt. "This is the first day of the rest of their lives."

"It's quite remarkable how quickly it has happened. There should now be properly clinically controlled trials," said Laura's father, a microbiologist. "It seems very successful."

They could now come. Initial reports suggested that all six women were cleaned by the process, as were two of the men, and that - amazingly - the two men who had quit the trial early had made contact to say that even the incomplete treatment had curbed their cravings. All of that will be taken with a pinch of salt by the scientists. Heroin addicts are notorious liars. ("There is something about opiate addiction, more than any other, which seems to turn lying into a game," said Joe Winston.) And relapse rates are always high with heroin. But even allowing for all that, the initial Lesmahagow results were impressive.

Even the sceptic Dr Laurence Gruer seemed upbeat. "The next step is that we need to see the data from the trials, with at least three months' follow-up, to see what the relapse rate has been. If it suggests that the results are better than you would expect from doing nothing you could then move to a bigger trial with a statistically valid sample. We shouldn't discount it at this point in time and I hope that something positive will come out of it."

The Scottish Prison Service has now asked the Centre for Drug Misuse Research at Glasgow University to come up with a proposal for a study involving the entire population of one Scottish prison. Prof McKeganey is also developing a proposal, with Joe Winston, for an NHS-funded study at University of Glasgow to track the impact of NET on the chemistry of the brain.

"The prison system is the appropriate location to try this out," said Professor Neil McKeganey. "At least 70 per cent of prisoners in Scottish jails are drug-dependent. It is a real crisis." His proposal is to take a prison of 700 inmates, monitor the drug use of individuals, along with their current treatments and rates of improvement, over three to six months. He

will then introduce NET to the whole prison population and monitor the outcomes over a similar period.

"Politicians must now provide the resources necessary for such a trial," he said. "The Royal College of Psychiatrists estimates that only a quarter of 1 per cent of the budget to fight drugs misuse is spent on research. We spend £12m a year on methadone. This study could be done for £200,000. Not to do it would really be a scandal."

For more information on NeuroElectric Therapy contact <http://www.netdevice.net>