Bruce Pomeranz, PhD

Acupuncture and the *Raison D'Etre* for Alternative Medicine

Interview by Bonnie Horrigan
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Dr. Pomeranz's scientific achievements include being first to publish that analgesia in acupuncture is mediated by endorphins and that acupuncture accelerates wound healing by activating sympathetic nerve terminals in the skin.

Well known - for his work in the field of acupuncture, Bruce Pomeranz, PhD, has been a professor in the Department of Zoology at the University of Toronto since 1979, and a professor in the Department of Physiology since 1982. He received his doctoral degree from Harvard Medical School in 1967. Dr. Pomeranz has received numerous awards throughout his career including the Clifford Woolfe Award from the Acupuncture Foundation of Canada in 1994, the Weigand Foundation Lectureship from the University of Toronto in 1991 and the Dag Hammersjold Medal from the Academie Diplomatique tie la Paix (Brussels) in 1986. He has published over 66 papers on acupuncture research in refereed journals, and 8 acupuncture textbooks. Dr. Pomeranz is currently president of the American Society of Acupuncture (1992-1996), and serves on the advisory boards of the World Federation of Acupuncture Societies; Harvard Medical School, NIH Center for Alternative Medicine; and the University of Maryland NIH Center for Alternative Medicine.

*Alternative Therapies* interviewed Dr. Pomeranz at his office at the University of Toronto in Toronto, Ontario, Canada.

*Alternative Therapies*: How would you describe yourself?

**Bruce Pomeranz**: I'm a neuroscientist whose job is to disprove. Karl Popper, a famous philosopher of science, said you never prove anything, but you try to disprove your hypothesis. You do everything possible that any skeptic could think of to show that the hypothesis doesn't work; in spite of that, if it still survives, then you're okay.

**AT**: Is that what happened with your acupuncture-endorphin theory?

**Pomeranz**: Yes. I have spent 20 years disproving my hypothesis. Disproving it! The real impact came after we accumulated 16 lines of evidence. I'm not talking about 16 experiments—there could have been 2000 experiments. Sixteen lines mean there were 16 different kinds of experiments that were based on 16 different assumptions. The chances of all 16 having the same error and converging on the same answer is highly unlikely.

According to my hypothesis, acupuncture stimulates peripheral nerves that send messages to the brain to release endorphins (morphine-like compounds); these endorphins block pain pathways in the brain. In testing our acupuncture/endorphin theory, one line [of evidence] was based on measurement of endorphin levels. Endorphin levels went up, but that could have other meanings. Other things were also going up. How do you know that it wasn't just stress that raised the endorphins? So that one line of evidence, though very compelling, doesn't prove anything.
We got another line of evidence (by asking): What happens when you block the endorphins? We used naloxone, a powerful endorphin blocker, but you can argue that it's a drug and has side effects we don't know about. It may be blocking something else, not the endorphins; but naloxone worked, so we had two lines of evidence. They're very compelling, but they don't yet prove a darn thing. You have to have many lines, all of them independent.

In the subsequent years, we accumulated these 16 different lines of evidence all supporting our hypothesis. So my conclusion is that we have more evidence in favor of the acupuncture-endorphin hypothesis than we have for 95% of conventional medicine.

**AT:** Could you elaborate?

**Pomeranz:** Most medical theories are based on only a few lines of evidence. We don't know how most drugs work in conventional medicine. You give a drug and you know it binds to the drug receptor in the body. That's one line of evidence, but it doesn't prove that the drug is working on the receptor and thereby helping the patient.

Much of medicine resides on these one-dimensional proofs. Another common mistake is when you take one line of evidence and repeat the research over and over again. We don't trust one lab, right? They could be cheating. They could be doing the experiment slightly wrongly. So it's good to replicate in other labs. But 16 replications are not the same as 16 lines of experiments.

Other unknowns in conventional medicine are the side effects of drugs. There is very little research on this topic. I believe that the side effects of drugs are the raison d'être for alternative medicine. I have spent the last 2 years studying the side effects of drugs, and I'm writing a paper on this subject. I can't tell you the results right now, but I can tell you that it's 10 times worse than anybody thought.

**AT:** Is this your new focus?

**Pomeranz:** My new passion is this whole issue of why alternative medicine. I'm writing a book on the subject. As I write, I keep telling myself, "If conventional medicine works, why bother with alternative medicine?" Now, I love conventional medicine -- molecular biology is spectacular in its intellect, one of the great achievements of our lifetime -- but if it works and it's glorious, why do we need alternative medicine? Then I ask this other question, "Does conventional medicine really work?"

I've recently done a review of 85 papers assessing drugs used in conventional medicine. The side effects of drugs are horrendous. In contrast, the side effect profile for acupuncture is almost zero. If you do proper acupuncture, you can't hurt anybody. You can't say that about drugs. In the best of hands at Harvard and the Mayo Clinic, drugs are going to have a certain side effect profile. So as a first line of treatment, why not try the conservative, the safe acupuncture treatment?

To put my book on alternative medicine in perspective, 20 years ago I set out to disprove acupuncture. I thought it was full of beans because my mentor, Patrick Wall, said that acupuncture was just placebo, a distraction. He had traveled to China to investigate it, and he knew more about pain than I'll ever know, so who was I to argue? But a Chinese student of mine working in my lab studied acupuncture on anesthetized animals. If it was placebo, then it should not have worked, because for placebos you need consciousness. I thought it was very fishy that acupuncture worked in farm animals, That it also worked on infants had me wondering as well. So we did these experiments on anesthetized animals where there was no placebo going on, and we got acupuncture to block the pain pathways.
When I got these results, I didn't publish them, because I knew nobody would believe me. It didn't make sense because you had to give acupuncture for half an hour. You can block pain by rubbing yourself, or with transcutaneous electrical nerve stimulation (TENS), but that works in milliseconds through something called "the gate." Acupuncture took a half hour to get going and lasted an hour or two. It made no sense in ordinary neurophysiological terms, where things happen rapidly in fractions of a second.

So I just kept collecting the data. As luck would have it, at this time I was also researching morphine and pain. Because of this, I was at the conference in 1975 when endorphins were announced. The whole room broke out into euphoric hysterics. So I rushed back to Toronto because I suspected that it was endorphin effects that we were seeing. I suspected that it took half an hour for endorphins to build up, which is why it takes half an hour for acupuncture to start working.

**AT:** You immediately connected the presence of endorphins to your acupuncture research?

**Pomeranz:** Yes. Not only that, but the tools to study it were so simple. The key is naloxone, a drug that specifically blocks the endorphins. It binds to receptors. It was called a "morphine antagonist" in the early days, and now it's called an "endorphin antagonist." For example, if you have an unconscious addict in the emergency room and you want to know if it's an overdose of morphine, you inject tiny amounts of naloxone. Because it blocks so powerfully, if it's morphine, he will completely wake up.

So my hypothesis was that if endorphins were involved and if I injected tiny amounts of naloxone, it should block the acupuncture effects we were seeing on these cells. Sure enough, it did. So that's how 16 lines of evidence, 20 years of research, 66 papers from my lab, and 8 books on acupuncture got started.

**AT:** It seems that all our research is structured to find out why acupuncture works within the Western scientific paradigm. But why do the Chinese think it works?

**Pomeranz:** They have a whole different cosmology and to them it works [within their framework]. You can explain things many different ways. The question is, in the Popperian sense, is it falsifiable? If you explain what happened to you because god in her wisdom did something, how are you going to test that? When you try to falsify it, you're stuck. The traditional Chinese medicine (TCM) paradigm is energetic. Chi energy is flowing through meridians. This may be one possible explanation of a thousand things that are going on. But so far, I've looked at the evidence for chi. There's nothing.

**AT:** You can't find any evidence of chi?

**Pomeranz:** Not so far.

**AT:** But you described one experiment in which acupuncture needles were inserted, but not in the meridian points. It did not work; the pain was not blocked.

**Pomeranz:** That's very true, and that's easily explained by the ordinary nerve-endorphin story. You need to stimulate specific kinds of nerves. When you put the needle in the famous Hoku point, which is on the meridian, you're activating a certain kind of a nerve in the muscle. Not any nerve, because there are nerves all over the place. There are only certain nerves, and they're concentrated only in certain muscles that activate endorphins, and those are the points on the meridian that work well for pain because they release endorphins.

The second very important fact that is missed by too many people is that not only do you put the needle in, but you have to twirl it. It's very important to twirl the needle. You get an aching sensation from stimulating the nerves. It's called d'ai chi-not to be confused with chi, the energy.
AT: So the acupuncture points correspond with a certain type of nerve?

Pomeranz: Yes. Not all points, but certainly the ones involved with treating pain and releasing endorphins. Understand, the Japanese don't put their needle in very deep. They just put it through the skin. There are a lot of [acupuncture] points that don't have muscles or nerves you're going into tendons or into the ear lobe. But if you're doing those things, you're getting effects that are not [related to] endorphins. Only endorphin release requires nerve stimulation and d'ai chi; but, there's more to acupuncture than endorphins. I'm not claiming this is all of it. I'm just claiming a small part of it.

I would be delighted if chi could be found; but to me, that's like asking, "Is god a woman?" It's a belief as opposed to a real, testable theory.

Let me make myself clear. I think there are two ways of being a scientist or even a modern person. There's the empirical approach, which is trial and error: Does it work? If it works, then I'll use it. In alternative medicine you see this in spades. If chicken soup works, use it. You don't have to have a theory about chicken soup. Then there's the theoretical approach. To me, those are the two ways of handling yourself. If acupuncture works, then use it; it doesn't matter whether it works through chi or endorphins.

Modern medicine has gone down the theoretical route and alternative medicine has stayed closer to the empirical route. My favorite example to help explain the dichotomy is this: A cook will use spices - salt, pepper, cumin - and he will mix them in certain proportions and taste them. If it tastes good, he will use it next time, but there's no theory of spices. You don't have to know which nerves in your tongue are affected by which spice in what proportion. You do it empirically. The theoretical approach is the other one. And we could do it. We know which nerves cumin affects, we know which nerves salt affects, and we could work out an equation for which ones are the best, but we wouldn't end up cooking for another thousand years until we figured it out.

The Chinese were very empirical in the early days of acupuncture (2200 years ago). They were Taoists, and the Taoists didn't want to explain nature. They just wanted to be in harmony with it, so they were very empirical about nature. Now, the Chinese are no different from the rest of us. Two hundred years later (2000 years ago), along came the Confucists and the theoreticians, and they tried to explain how acupuncture works. And I think that's the problem with chi and yin and yang: they were explanations, theories. Unfortunately, they were not testable theories.

AT: Then why bother with theories?

Pomeranz: You don't need a theory to do empirical acupuncture: but, the advantage of having the endorphin theory is that you can improve the acupuncture treatment. For example, there's a cumulative effect of endorphins. The first treatment is mildly effective, the second, if given within hours or a day, is potentiated. Endorphins have a memory. If you give [the acupuncture treatment] the third time, it's even stronger. There's a reason for giving many treatments before you give up, or before you decide whether the patient is appropriate for treatment. Another feature of the endorphin theory is d'ai chi produced by nerve stimulation. Now, if you look at the literature on the controlled clinical trials of acupuncture, you will find that 90 percent of the papers don't mention d'ai chi. So you don't even know if they were stimulating adequately. Even worse, they'll give one or two treatments and decide whether it was effective. Well, one or two treatments are neither here nor there. You must treat appropriately to optimize endorphins.

Another advantage of the endorphin theory is that it fits the Western model. There are more Western-trained doctors who are buying into acupuncture because of endorphins. In a way, the endorphin and nerve hypothesis is easier for them. If they can do a Western diagnosis and then stimulate nerves -- which they understand -- it fits the medical model. Not that I am trying to usurp the TCM model. It's a progression. First, physicians learn acupuncture
because of the endorphin theory; they try it and see that it works, then they want to learn about TCM and chi. But where this is going to lead scientifically, I don't know. It may turn out that chi is what is going on. Many traditions talk about energy. Yogis talk about energy and prana. But so far, there is no evidence for chi or prana. Unfortunately, people often throw out the baby with the bath water. What scares me about acupuncture and chi, is that, ultimately, somebody may disprove chi. They may disprove it, but we shouldn't throw out acupuncture because chi doesn't exist.

AT: Because that's theory as opposed to the phenomenon?

Pomeranz: That's exactly right. In the ancient textbooks of acupuncture, they found 11 meridians. But because of the zodiac, they had to have 12 meridians. Do you follow me? Everything they did was to make it fit. Everyone needs an explanation. Nevertheless, we cook without a theory, we marry without one, we do incredibly intuitive things in our fives, but we think we have to have an explanation for everything. We think we must understand the world to control it. Instead, what we should do with our lives is be empirical: use trial and error.

Now, there is good empirical science and bad empirical science. Clinical controlled trials are good empirical science. Acupuncture has been shown to work based on clinically controlled trials.

AT: What do you think of meditation?

Pomeranz: There's no doubt in my mind that meditation works. It works for high blood pressure, it works for pain, and it works for arrhythmias. I suspect most of this can be explained by stress reduction and not by prana.

You can measure stress. Herbert Benson, for example, did a very elegant study many years ago that showed that meditators have a down-regulation of their adrenaline receptors. Stress is the over-secretion of adrenaline. A racing heart rate is a result of stress. And meditation produces the opposite.

To me, meditation works by reducing stress. Why is that good for you? Because stress slows down your immune responses. Stress causes heart trouble, arteriosclerosis, cancers -- many things are exaggerated by stress. Benson has shown that people who meditate routinely have chronically down-regulated their stress system. Their receptors are way down. There is a cumulative effect and a beneficial effect.

AT: Do you meditate?

Pomeranz: I've meditated for years. I started 30 years ago. My teacher was the granddaughter of Alexander Graham Bell. She was very interested in teaching scientists and I spent 20 years meditating through her groups. I am very interested in consciousness, and meditation is an empirical way to look at consciousness.

AT: You also did some research in homeopathy.

Pomeranz: Yes, I was one of the replicants on that notorious 1988 paper in Nature co-authored by Jacques Benveniste. Unfortunately, the scientific community went after us like the Spanish Inquisition going after heretics, but that's another story. If you ask me today, do I believe that homeopathy's for real, do I believe the phenomena that we saw, my answer is, "I don't know." I would love to do more research, but there is no grant money for homeopathy research. I believe it is real, but whether this is a Popperian, tested hypothesis? Not yet.
I'm doing other things now; for example, food sensitivity is one of the most exciting projects I have ever done.

**AT:** Is this your environmental sensitivities research?

**Pomeranz:** Yes. But it's a sad story. I received a million-dollar grant and was working with a brilliant professor from England. We got important results and actually developed a blood test. The skeptics claim that 95% of the [people who have environmental allergies] have psychosomatic problems, that there's nothing wrong with them because of the results of the IgE blood tests; but it doesn't have to be IgE mediated allergy. We found 70% of our patients had abnormal basophils. But my associate died of ovarian cancer when we were within a year of finishing, so I'm still sitting on the data.

Aldous Huxley once asked, "How could a needle in the toe possibly help your liver?" Then he added, "If it works, we ought to change our theory about the liver." Unfortunately, we keep hanging on to our old theories. That's modern thinking. What fits your paradigm is acceptable and what's outside your paradigm is not. For example, IgE theories preclude environmental sensitivity, and chemistry precludes homeopathic results.

**AT:** This is your famous white crow, isn't it?

**Pomeranz:** Yes. An empiricist sets out to study crows: white crows or black crows. He doesn't have a preconception if he's a really good empiricist. But if he's caught up in theories, he's just going to go on precedents, so he basically looks for only black crows. If he sees a white crow, he says, "Oh well, it must be a seagull, because there's no such thing as a white crow." And that's the tragedy of modern science.

It should be the other way around. First ask: What are the empirical observations? Then create a theory to explain them. You stick a needle into the patient and the pain goes away -- that's the observation. Now you could say it's placebo, because placebo does the same thing. But you must took a little closer. Placebo only works in 30% of the population. Placebo doesn't work in animals. It doesn't work under anesthesia, and it doesn't work on single cells. So then you have to say, "Well, it can't be placebo." So you persist and eventually find that endorphins can explain it.

If you do see a white crow, you've got to shoot it and stuff it to make sure it's a crow, and check that its genes are not a seagull's genes. The reason a white crow is a great example is that very often white crows are hard to find. It's easy to find a black crow. Any day of the week you can find one: but white crows are mutants. They're hard to find.

That's the trouble with homeopathy. It's a white crow. It's difficult to conduct experiments with homeopathy. The phenomenon comes and goes. I think a lot of parapsychology is like that: very subtle. When you're studying a subtle phenomenon, you're in a whole new ball game. Medicine and biology usually work with what I call "sledgehammer" experiments. In other words, you give a drug at a high dose and you see a large effect. You compile the statistics, and you say, "Yes, there's something happening." But if you treat something very subtly, the results are slow to come, hard to prove. How do you prove that you really healed [the patients], that they didn't heal spontaneously? How do you know that the change in symptoms wasn't going to happen anyway?

Patients prefer medicinal drugs because they are like sledgehammers. They go home and have side effects like nausea and feel that something's happened to them; but if they take a homeopathic medicine, not very much happens. I have a classic example: My homeopathic doctor said to me, "You know, if I'm really lucky you're not going to feel any different." I said, "What do you mean?" He said, "If you don't get a reaction, then you're okay. If nothing happens to you, I'm going to be really pleased." I said, "But how are
you going to know that you did anything?" And he said, "In the long run, 6 months from now, a year from now, you'll be a different person. You won't get all these exacerbations." So it's very subtle.

**AT:** And our society has a difficult time with that "6 months down the road" business.

**Pomeranz:** That's it. We're not patient. We don't believe in it enough. The Chinese believe in acupuncture, so they're willing to do it slowly, come back every week for months on end.

I've spent 30 years of my life looking for white crows. To study parapsychology, I've had long-running relationships with some of the most famous psychics on the planet, trying to figure out what was going on -- if it was going on in the first place. There were two questions for me: first, are they for real; and second, if real, how do the psychic phenomena work?

**AT:** Do you think it's real?

**Pomeranz:** Part of me knows there's something going on, and I would love to do the experiment to show it; but you can count these occurrences on one hand. I'm two-sided. On the one side, I'm extremely skeptical. That's my job, that's my training. I want Popperian proof. I'm from Missouri. I've got to be shown. On the other hand, I'm fascinated by the borderline stuff. To me, that's the frontier; that's the unknown.

But it is important to work with the most solid technology, so if you do get an answer, nobody will deny it. In other words, if you're going to go chasing white crows, you better be sure, when you find one, that it is a white crow. It's not enough just to look up in the sky and say, "I saw it," because they can say, It was an illusion." You have to shoot it, bring it down, stuff it, make sure it's got the DNA of a crow. That's been one of the problems with mind-body research.

It's very hard to do mind-body experiments and measure the outcomes. When you get into mechanisms such as the change in white blood cells with prayer, it's getting closer to good science, but I've been very frustrated by those experiments. I don't find the blood cell measurements that meaningful. Is an increase in white blood cells good for the patients or harmful? That's why I like the wound-healing experiments I've been doing lately. When a wound heals, the outcome is unambiguous; it's always good for the patient.

[We're investigating] acupuncture on would healing. We get huge effects: 50% faster wound healing. So it's good stuff, The Chinese have known it for thousands of years. They call it "surround the dragon." If you have a cut you just put 10 or 15 acupuncture needles around it. And 1 think 1 know how it works.

**AT:** How?

**Pomeranz:** It stimulates the sympathetic nerves in the skin around the wound. There's a healing effect. It's a beautiful story, actually. The neurochemicals that are released cause healing. The results are unbelievably wonderful. To me, they are as interesting as endorphins. It's a nice, whole other approach to acupuncture mechanisms that came from this empiricism.

**AT:** Is there anything you want to say in closing?

**Pomeranz:** I want to emphasize that acupuncture is better than placebo. The reason I'm saying this is that there have been quite a number of misconceptions about alternative medicine, some saying that it could all be placebo, or that it could all be mind. I have problems with that, because placebo, particularly for pain, is a mild, transient thing on some people. Acupuncture works much better than placebo. Acupuncture works on 70% to 80% of pain patients as shown in clinically controlled trials, and placebo...
only works on 30%. Moreover, the second acupuncture treatment is more powerful than the first, whereas placebo gets weaker the more you do it.

The nice thing about acupuncture is that it is an objective act. You can define how the needling was done, and everyone believes you can measure endorphins. So you have some solid end points. Most of my 66 papers were on the acupuncture brain circuits and how they were interconnected, and how the endorphins were working. That is tangible stuff. They were all published in major refereed basic science journals; but try to study healing by prayer - it's really tricky.

When you're a scientist, you'd love to make a discovery based on a 2000-year-old phenomenon. I studied acupuncture and found this endorphin story. Then there was this crazy homeopathy phenomenon. I studied it and the cells performed in a really amazing way when treated with high dilutions of chemicals. To me, these are wonderful clues with which to experiment. So I'm not out to discredit TCM or chi. I'm out to take TCM and find out how it works. So far, I've failed. But that doesn't mean that I hold the secrets of nature. Nature is far smarter than most of us.

**AT:** But, as you said, the failure of research on chi doesn't mean that acupuncture doesn't work. I think that's a great distinction.

**Pomeranz:** That's right. You shouldn't confuse theory with empiricism. Max Planck, who discovered quantum mechanics, said that a new idea will not win by the strength of its arguments; it will only win when the old generation dies out and the new generation accepts it as fact. That's what happened in quantum mechanics. When Heisenberg and Bohr were talking about it, everybody said they were nuts—it couldn't be; but the old generation died and the young kids said, "It's crazy, but it works. We'll accept it."

It's the same thing in alternative medicine. We say, "Homeopathy can't be." Then some young physicians say, "Reilly did some convincing double-blind studies. The next thing they're trying it and doing it and laughing all the way to the bank because it's working.

It's difficult to live through change. Change comes very slowly, but it comes. Thank goodness for the Office of Alternative Medicine: that's progress. That was unthinkable 5 years ago. The FDA recently took acupuncture needles out of the "experimental" category and legitimized it in America. There are now over 1 million acupuncturists outside China, and that number is growing. So we're moving, however inexorably slowly, in the right direction.

[http://www.medicalacupuncture.org/acu_info/interviews/pomeranzart.html](http://www.medicalacupuncture.org/acu_info/interviews/pomeranzart.html)