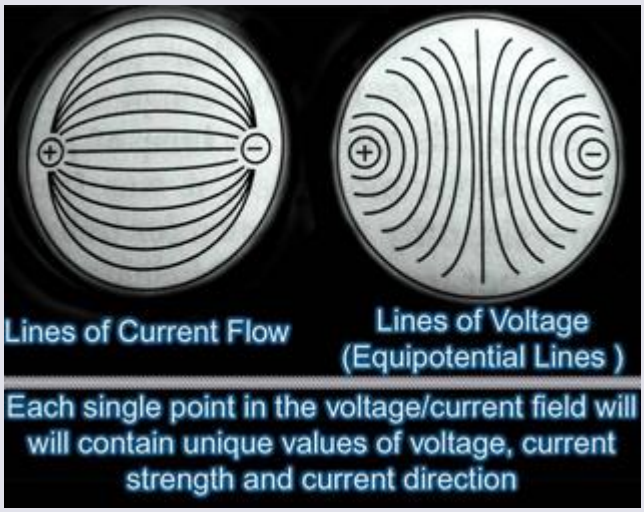
Dr. Robert O. Becker, MD
Silver Ions: Altered Cell Morphology, Anti-bacterial Properties, and Stimulated Tissue Growth and Healing

Dr. Robert O. Becker, M.D., orthopedic surgeon and medical research doctor, is one of the early pioneers responsible for the resurgence of silver use in medical applications. Dr. Becker's primary area of personal interest has always been exploring the possibility of complete tissue and organ regeneration in humans. Through his fascinating journey which spans over three decades of dedicated research, he has brilliantly explored bioelectric and electromagnetic systems, reaching to understand and control the growth and healing process in complex organisms. Much of the following information was taken directly from the books The Body Electric and Cross Currents.



Robert O. Becker - The Discovery of Silver

Dr. Becker first used silver in 1971. His experiments at this time focused on proving that minute amounts of electrical current could dedifferentiate cells and stimulate limb regeneration in rats. For his experiments, Dr. Becker elected to use a platinum electrode as the negative pole (cathode) and a pure silver electrode as the positive pole (anode) with a 106 - 108

Megohms resistor wired into the circuit. He implanted the device in 35 rats, and achieved the most notable results using 1 nanoamp of current.

In 1972, Dr. Becker was ready to begin experimentation with electrical stimulation for bone growth in humans, particularly in cases where broken bones (nonunions) refused to heal. Again, Dr. Becker chose to use silver, primarily because he believed silver was less likely to chemically react with tissues and he believed that silver would transmit the electrical current most efficiently.

Testing conducted by Dr. Becker's team demonstrated that the positive pole of a silver electrode in a low current circuit would kill all forms bacteria within a 1/2 inch radius. Dr. Becker hypothesized that this effect was due to the delivery of silver ions directly into the adjacent tissues. Never-the-less, his primary concern was that the positive current at the treatment site might cause delays in healing. Up to this point, research indicated that growth stimulation occurred at the negative electrode.

Dr. Becker eventually concluded that while all five of metals they tested stopped growth of all bacteria, the current required for all types except silver required dangerously high levels of current. Dr. Becker hypothesized that the other metals killed bacteria by poisoning the bacteria and normal cells. Eventually, Dr. Becker confirmed that the silver deactivated or killed all bacteria with no side effects with small (and safe) levels of current.

Dr. Becker eventually began experimenting with silver-impregnated nylon as a form of wound dressing designed to kill bacteria; he continued to use "positive current" to kill bacteria and "negative current" to stimulate tissue/bone growth. Becker's team commonly used between 100 to 200 nanoamps of electrical current per centimeter of electrode in their research. Dr. Becker concluded that other researchers were using far too much current in related experimentation, and that electricity exceeding one volt posed the possibility of dangerous side effects in nearby tissues.

In 1977, Becker first noticed that the silver anode (positive pole) appeared to actually be stimulating bone growth as well as eliminating infections. By 1978 he had repeated this phenomenon a number of times, and decided to reevaluate the theory that only the negative current stimulated tissue growth.

In 1980 Dr. Becker, through extensive research and experimentation, concluded that the current was not the determining factor with this stimulated growth. Rather, it was the silver ions that were responsible for the accelerated healing at the anode. He found that cells within 5 millimeters of the silver were actually altered. In cultures, Dr. Becker demonstrated that silver ions effected cell changes to the extent that the cells grew extremely quickly, producing primitively formed cells including fully dedifferentiated cells and rounded fibroblasts. Furthermore, the process of using silver ions to stimulate healing resulted in a 50% reduction in the healing time.

While it is universally accepted by knowledgeable researchers that silver ions can, in fact, alter cell morphology, some dispute the claim that actual cell dedifferentiation occurs. However, these conflicting findings may be due solely to the actual amount of current used; increased levels of current may in fact interfere with the process. Dr. Becker is virtually alone in the belief that the amount of current used should be minute, approaching the same levels of the natural DC current present in the human body.

Before Becker's research group dissolved, Dr. Becker found that silver ions, electrically injected, could suspend the mitosis of (cancerous) malignant fibrosarcoma cells. Dr. Becker hypothesized that cancer cells, regardless of the initial cause, were cells caught in a partially differentiated and primitive state. However, this promising research was never fully explored.

Dr. Becker's conclusion was that low-current silver electrodes stimulate bone formation by dedifferentiating cells and possibly stimulating periosteal cells. Dr. Becker's greatest cautionary note is the observation that high levels of current will stimulate cancer cell growth; the key is low-current with pure silver electrodes.

Research Points of Interest

- Red blood cells of a frog can be dedifferentiated by using extremely small amounts of current, measured in billionths of amperes.
- Bone growth stimulation occurred with platinum electrodes (at the negative electrode) at a maximum of 3 micro amps (generated by a power source delivering an initial 100 micro amperes)
- The average amount of voltage required to induce electrolysis in human tissues was 1.1 volts of direct current (any amount of current above this point can cause cell damage or cell death)
- Becker's group demonstrated that by using silver electrodes and 0.1 micro amperes of current, bone growth stimulation still occurred, and nonunion fractures healed.
- Dr. Becker noted that cancer cell growth was stimulated by 300% using the 10 microampere method.

- Dr. Becker noted that the combined effect of the proper level of current and the delivery of silver ions could dedifferentiate cancer cells; both elements must be correctly applied for any results (the activation of primitive-type genes in a cell nucleus).
- Dr. Becker realized that the silver electrode method could be used on a patient's cells, and that large quantities of primitive cells could be stored for use at later date.

In January of 1980, primarily due to political reasons, the inflow of research grant money stopped, and Dr. Becker was forced to close his laboratory, even though he was likely on the verge of incredible breakthroughs in full tissue and organ regeneration in humans.

Dr Robert O. Becker
The Body Electric & Cross Currents