

# LOW-LEVEL ELECTRIC CURRENT AND CANCER—A PROMISING, BUT LANGUISHING NON-TOXIC CANCER THERAPY

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## INTRODUCTION—SCIENTIFIC BASIS OF GEIPE CANCER THERAPY

At biochemical level, all cancers are alike. In order for a cell to divide in any organ, its DNA strand must be replicated. Of the various enzymes involved in the process of DNA synthesis, none is more critical than ribonucleotide reductase (RnR), which provides the building blocks—four bases—of DNA, by reducing the corresponding, abundantly available, bases of RNA. The activity of this RnR enzyme is most closely linked to malignant transformation and tumor cell proliferation.<sup>1</sup>

This rate-limiting enzyme is, therefore, a well-recognized target for rational design of cancer chemotherapeutic drugs.<sup>2</sup> However, effectiveness of such drugs to inhibit the activity of RnR enzyme is limited and toxic side effects are many.

In the article, “Targeting a key enzyme in cell growth: a novel therapy for cancer” published in 1997, a cancer treatment was proposed which would arrest the activity of ribonucleotide reductase by biophysical means.<sup>3</sup> This therapy is predicated on the fact that the active site of the enzyme contains a tyrosyl free radical, which is essential for its activity.<sup>4</sup> Such free radicals or unpaired electrons can be destroyed by free-floating electrons—easily available in the form of direct electric current. Thus, gentle direct current (DC) electrotherapy should block the enzyme RnR by disabling its active site, resulting in halt of tumor growth. This therapy is sometimes called Gentle Electrotherapy to Inhibit a Pivotal Enzyme (GEIPE).

## COMPELLING EXPERIMENTAL EVIDENCE

Long before the mechanism was proposed on how low-level electric current might stop cancerous growth, about 10 cancer electrotherapy studies had been reported in the scientific literature. The results of all these studies are consistent with the mechanism involving destruction of the free-radical-containing active site of the enzyme RnR.

The first such study was published in 1959 in the journal *Science*.<sup>5</sup> It reported “complete disappearance of tumor” in 60% of test animals after 21 days when they were treated non-invasively with 3-mA direct current at 3 V for about five hours per day. An even more remarkable study was published in 1985 in the journal *Cancer Research*, reporting 98% reduction in tumor mass—virtual cure—with 2.4-mA DC at

less than 3 V, one hour per day for five days.<sup>6</sup> It should be noted that poor results were obtained in a few studies that employed higher voltages, since at more than 4 V, electrochemistry takes place, resulting in toxic byproducts and leaving fewer electrons to quench the free radical.

## EFFECTIVENESS IN HUMAN PATIENTS

Over the years, the author has built various GEIPE devices, constantly improving them and has treated a few patients whose cancer no longer responded to conventional treatments or who were averse to conventional toxic therapies.

One Nigerian physician, after consulting with the author, successfully treated a large malignant squamous cell carcinoma of the sinus cavity in a woman with a GEIPE device (Figure 1).

The treatment was given eight hours daily and lasted for eight weeks. Further details of this case study can be found in the article published recently.<sup>7</sup>

Another patient benefiting from the Gentle Electrotherapy was a 93-year-old man from Florida, whose protruding carcinoma on the face was treated in non-clinical settings at home by his engineer relative, who built an all-electronic GEIPE device (Figure 2).

The duration of this therapy was about four hours a day for 12 weeks.

Other patients have also benefited from GEIPE therapy to varying degrees. It is primarily suited for those patients whose tumors are on, or near, the surface of the body.

## UNIQUE DIFFICULTIES IN ESTABLISHING GEIPE THERAPY

More than 15 years ago, the MD Anderson Cancer Center, Houston and the National Cancer Institute of USA acknowledged the validity of this approach to treat cancer in correspondence with the author (personal communication). However, no effort has been made by any institution to explore and standardize this treatment, as the process would present unique challenges.

To establish any treatment and get approval from Food and Drug Administration (FDA), human clinical trials in three phases must be completed, which involve a sizeable investment—usually hundreds of millions of dollars—on the part of the sponsoring institution. This investment is recouped if and when the treatment is approved by FDA, and the institution gets exclusive rights to market the patented treatment. However, in case of Gentle Electrotherapy, there would

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**Figure 1.** Progression in condition of Nigerian Patient.



**Figure 2.** Progression in condition of patient from Florida.

be no return on the investment since after approval the non-patentable procedure would be in the public domain. Therefore, GEIPE cancer therapy, as promising as it is, can never be explored and established through standard channels.

Nonetheless, this non-toxic cancer therapy has the potential to substantially lessen the suffering of cancer patients, as it is likely to be more effective than the current therapeutic modalities in quite a few cases. Through this article, the author wishes to make health care professionals, at large, aware of this promising, but still-experimental, cancer treatment option, and hopes that an alternative way will be found to establish it.

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