Healing Centre

"First, Do No Harm"

Treatment of Cancer with Electro-Acupuncture

An 8 CEU hour course

Take the Test

An introduction to Electro-Acupuncture Cancer Therapy

An 8 CEU hour course

There exists within the domain of acupuncture a near miraculous modality for treating skin cancers and tumors close to the surface, including many which are often inoperable and otherwise untreatable - such as cancers of the mouth, tongue, throat, and face. This treatment also works well for breast cancers. The technique is relatively easy to learn, and other than the stress of the body processing out enormous numbers of dead cancer cells, it produces almost no negative side effects.

In the winter of 2000 I had the privilege of studying this method with Drs. Friedrich Douwes and Marian Reichl, M.D. at the Klinik St. George (KSG) in Bad Aibling, Germany. They have successfully used electrotherapy, also known as electrochemical tumor therapy (EChT), Galvanotherapie, and electro-cancer treatment (ECT) as a stand alone treatment for hundreds of cases. Some of the results are truly spectacular, as the photos accompanying this course will show.

[I personally prefer to think of it as electro-acupuncture cancer therapy, especially since the Chinese were among the first to develop this therapy. Dr. James Tin Yau So taught us about this in his first class at the New England School of Acupuncture in 1976.]

ECT was developed in Europe by the Swedish professor Nobel Laureate Bjorn Nordenstrom and the Austrian Dr. med. Rudolf Pekar, who claims a 73% rate of remission for a period of not less than three years for patients treated with ECT. Pekar does note, however, "that in my practice, I have only been able to treat mild and moderate tumours."

Electro-Cancer Treatment was introduced to the Chinese in 1988. However, clearly it had been understood on some level by the Chinese earlier than this, because in 1976 Dr. James Tin Yau So taught us a variant of this technique in his first class at the New England School of Acupuncture. Since 1988 the practice of ECT has spread widely throughout China. In 1992 one researcher, Dr. Xin Yu-Ling, MD, published a report documenting his results treating 2516 patients, and by 1993 it was already being used in 818 Chinese hospitals. How tragic that decades have slipped by without knowledge of ECT being widely disseminated among our profession in the U. S.

The therapy employs galvanic electrical stimulation to treat tumors and skin cancers. Dr. Reichl, who heads this department at KSG, says that ECT is used most often as an adjunct with whole-body or local-region hyperthermia (see accompanying article "*Too Hot for Cancer*" by Dr. Harvey Kaltsas, A.P.)

Using both treatments, millions or even billions of cancer cells can be killed – and when killing cancer cells, more is obviously better. This calls for a note of caution, however. The dead cancer cells are highly toxic, which is why a healthy lymphatic system is crucial to transport their detritus for efficient elimination from the body.

An ECT session resembles a normal electro-acupuncture treatment, but as practiced at KSG, with some differences. The KSG protocol uses local anaesthesia to minimize the sensation of a stinging electric current to be caused by the introduction of low voltage galvanic current. This use of chemical anaesthetic could perhaps be circumvented by first running alternating current through the needles to provoke endorphin release. The physician then inserts a platinum, gold, or silver needle into the center of the tumor and attaches a positive electrode from a galvanic stimulator. The physician then places negatively charged needles around the tumor, no farther than 1.5 centimeters apart.

The needles used at KSG were hollow hypodermics through which solid gold, platinum, and silver needles were threaded. Any skillful acupuncturist could instead insert solid needles only into the afflicted areas, with or without a guide tube, thus obviating the need for hypodermics and/or anaesthetics. Indeed, this is the protocol the Chinese followed, which will be discussed later. Alternatively, superficial skin patch electrodes are placed on the skin, or a combination of superficial skin patches and needles are used. Voltages of 6 to 15 volts are used, dependent upon tumor size. The most common size of tumor treated is about 3 to 5 centimeters in diameter. Tumors as large as the 5 to 10 centimeter range have been killed with ECT.

To enhance the cancer-cell-killing power of ECT, sometimes small amounts of chemotherapy agents are applied to the skin and drive into the tumor by a kind of sweating effect of the electric current ("iontophoresis"). An interesting and possibly quite instructive study would be to place Co-Enzyme Q-10 beneath the skin patch electrodes prior to their electrification. In 2006, a research team from the University of Miami Leonard M. Miller School of Medicine discovered that Co-Q-10 induces apoptosis in malignant melanoma cells *in vitro*. A television news report of the event purported that the UM team had a 56% success rate curing malignant melanoma *in vivo* with this method, although I've found no written confirmation of this report.

For skin cancers, current is passed between positively charged needles placed beneath the base of the tumor and a negatively charged skin patch commonly applied to the surface.

ECT works by influencing the acid/alkaline (pH) levels within the tumor and causing electrolysis of its tissue, which is more susceptible to direct current than normal tissue. The pH change depolarizes the cancer cell membranes and causes tumors to be gently destroyed. After treatment, for a couple of days the treated area will be inflamed as the body breaks down the waste of dead cancer cells. Then scar tissue forms where once there was tumor.

The ECT process also appears to generate heat shock proteins around the cancer cells, inducing cell-specific immunity. This process triggers Natural Killer cells. Drs. Douwes and Reichl have documented some cases in which this process has also provoked tumor death in distant metastases.

At Klinik St. Georg, ECT is used for small breast tumors, isolated nodes of the axillary (armpit), supraclavicular (above the collarbone) and thorax (chest) areas; tumors of the ear, nose and throat area, especially after radiation and chemotherapy an in areas where surgery is impossible; skin cancers; gynecological tumors; and soft-tissue tumors.

In China, Dr. Xin Yu-Ling, MD and his associates treated a much wider variety of cases with impressive results. At the First International Conference of Bio-Electrotherapy for Cancer held in Beijing in 1992, Dr. Xin reported the following: more than 35% of cases were put into full remission; 43% had partial remissions; 15% showed no change; and in only 7% of the cases did the disease progress during therapy. (See Table 1).

Table 1. Cancer Reduction Efficiency of Bio-Electrotherapy as Experienced by the Administering Oncologists in China
Results from Applying Galvanotherapy to Chinese Cancer Patients

Cancer type	Patient Load Number (#)	CR		PR		NC		PD		CR+PR	
		#	%	#	%	#	%	#	%	#	%
Total	2516	885	35.2	1080	42.9	379	15.1	172	6.8	1969	78.3
Lung cancer	593	168	28.3	298	50.3	76	12.8	51	8.6	466	78.6
Liver cancer	389	98	25.2	196	50.4	74	19.0	20	5.1	294	74.7
Skin cancer	366	244	65.8	95	26.0	20	5.5	10	2.7	336	91.8
Breast cancer	288	78	27.1	82	28.5	59	20.5	9	3.1	160	55.6
Metastatic lymphoma	190	49	25.8	89	46.8	31	16.3	21	11.1	138	72.6
Rhabdomyosarcoma	113	29	25.7	56	49.6	19	16.8	9	8.0	85	75.2
Malignant melanoma	95	56	58.9	34	35.8	4	4.2	1	1.1	90	94.7
Facial tumor	72	28	38.9	29	40.3	11	15.3	4	5.6	57	79.2
Metastases in breast and abdominal wall	66	17	25.8	25	37.9	15	22.7	9	13.6	42	63.6
Thyroid cancer	57	20	35.1	24	42.1	9	15.8	4	7.0	44	77.2
Oral cancer	53	11	20.8	34	64.2	5	9.4	3	5.7	45	84.9

Key: CR is Complete Remission, **NC** is No Change, **PR** is Partial Remission, **PD** is Partial Deterioration

To put these ECT results from China in proper perspective, the American Cancer Society finds a 5% remission rate in response to chemotherapy to be satisfactorily effective. ECT's 80% remission rate far surpasses the success rate for any chemical or radiologic therapy used in America.

The Chinese reported even more impressive statistics at the Second International Conference of Bio-Electrotherapy for Cancer held in Stockholm in 1993: over 80% of 4,000 cases treated were either in complete or partial remission.

Besides the positive results achieved, ECT has been shown not to carry the adverse side effects associated with chemotherapy, radiation, and surgery. Healthy tissue is left intact. Moreover, the body is able to grow back healthy tissue in psychologically sensitive areas such as the face, which could be otherwise so mutilated by surgery or radiation as to erode the will to live, besides impairing vital oral and respiratory functions. With ECT the body's immune system is strengthened, sometimes resulting in cancer specific antibodies being formed to attack metastases. When given supportive nutrients and when the lymphatic system is assisted, the liver is not compromised, unlike with chemotherapy and general anaesthesia.

During the 1992 Conference in Beijing, participants formed the International Association for Biologically Closed Circuits in Medicine and Biology (IABC). In 2006 the IABC held its Ninth International Congress in Sao Paolo, Brazil. The IABC has a website which intends to educate practitioners about this field, and it has published the following articles online, among others:

The Medical Mission of the IABC

CELLS, TISSUES, & EChT

BIOPHYSICS OF BCEC (Biologically Closed Electric Circuits)

CLINICAL STUDIES – EchT

IN VIVO – IN VITRO STUDIES

We have included these articles in this course for your edification, as well as the announcement of the IABC's last conference in Sao Paolo.

In addition, please find before and after photographs of patients from the Klinik St. Georg who have been treated with ECT. The photos and the progress they document are remarkable. As difficult as some of these cancers are to look at, imagine the plight of the humans involved and how appreciative they are to get their lives back. Their gratitude is reward enough for the pioneering doctors who use Electro-Cancer Treatment. Please note the time frames in which recovery took place and the remarkable ability of the human body to regenerate and heal (make whole) itself.

They say that a picture is worth a thousand words, and that a journey of a thousand miles begins with a single step. May these pictures launch you on your journey to introduce this effective acupuncture related modality to the field of American oncology.

Take the Test

The following key will help you to understand the photos. Please note that dates on the photos are in the following European format: day-month-year.

Photo	Description
M4	carcinoma below the ear
M5	carcinoma of the ear
M5A	carcinoma of the ear
……	
M6	cancer of the neck treated with ECT 15-12-1994
……	
M7	melanoma
M8	patch with alligator clips covering melanoma
M9	melanoma dying after treatment with ECT via patch
M10	melanoma healing
……	
M11	tumor on the scalp
M12	tumor on the scalp after ECT
M13	tumor on the scalp after more ECT
M14	tumor on the scalp healed by ECT – 12-9-2001
……	
M15	gross skin lesion
M16	gross skin lesion necrosing after ECT
M17	gross skin lesion shrinking after ECT
M18	gross skin lesion healing after ECT
……	
M19	shoulder cancer 12-7-94
M20	shoulder cancer after treatment with ECT
M20A	shoulder cancer after treatment with ECT
M21	shoulder cancer healed after treatment with ECT
M21A	shoulder cancer healed after treatment with ECT
M22	shoulder cancer healed after treatment with ECT 13-06-95
……	
M23	shoulder melanoma 8-3-93
M24	shoulder melanoma 02-04-93
M25	shoulder melanoma getting ECT
M26	shoulder melanoma after getting ECT 26-7-93
M27	shoulder melanoma after getting ECT 19-10-93
M28	shoulder melanoma after getting ECT 10-5-94
……	
M29	breast cancer tumor treated with ECT needles
M30	breast cancer tumor's heat shock proteins after treatment with ECT
M32	breast cancer tumor after treatment with ECT 19-10-95

Take the Test

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M33	Nikol's breast cancer being treated with ECT
M34	Nikol's breast cancer after treatment with ECT 3-1-95
M35	Nikol's breast cancer after treatment with ECT 10-7-95
M36	Nikol's breast cancer after treatment with ECT 22-4-96
M37	Nikol's breast cancer after treatment with ECT 29-1-97

……

M40	post masectomy breast cancer after treatment with ECT 22-12-94
M41	post masectomy breast cancer after treatment with ECT 22-12-94
M42	post masectomy breast cancer after treatment with ECT 2-1-95
M43	post masectomy breast cancer healing after treatment with ECT
M44	post masectomy breast cancer healed after treatment with ECT 1-3-95
M45	post masectomy breast cancer healed after treatment with ECT 10-8-95
M46	post masectomy breast cancer healed after treatment with ECT 22-6-99
M47	Prof. Dr. med. Friedrich Douwes with this breast cancer patient 22-6-99

……

M51	Severe throat cancer being treated by ECT
M52	Severe throat cancer after being treated by ECT 9-9-94
M53	Severe throat cancer after being healed by ECT 26-10-94

……

M54	Severe mouth cancer being treated with ECT 20-02-95
M55	Severe mouth cancer being treated with ECT 20-02-95
M56	Severe mouth cancer after treatment with ECT 30-03-95
M61	Severe mouth cancer after treatment with ECT 03-05-95
M57	Severe mouth cancer patient after being healed with ECT 06-09-95

……

M58	Patient with cancer of the chin before ECT
M59	Patient with cancer of the chin before ECT
M60	Patient with cancer of the chin after ECT

……

M62	Tumor of the scapula being treated with ECT

……

M80	breast cancer before treatment with ECT 13-7-95
M81	breast cancer after treatment with ECT 9-9-96

……

M103	Prof. Dr. med. Friedrich Douwes with patient

……

M83	Ikon of St. Georg slaying the dragon (cancer)

……

M140	Response of pancreatic cancer to treatment with chemotherapy and hyperthermia (American 1 year survival rate is less than 2%)
Patient 1	I interviewed this patient who survived a glioblastoma brain tumor after treatment with hyperthermia. American 1 year survival rate for glioblastoma patients = zero. This patient went on to engineering school.

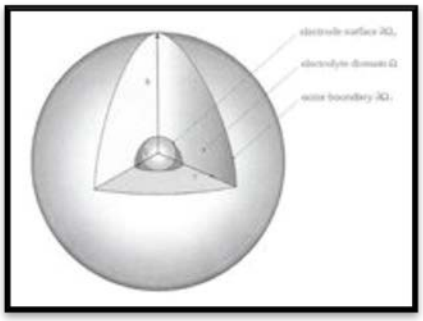
Tabelle 1 American 5 year survival rate for cancer almost unchanged
Tabelle 2 Percentage of American deaths caused by cancer 1900-1990

Despite the enormous success of Electro-Cancer Treatments, this therapy has never been widely explored in the U.S.A. One wonders why? Perhaps American doctors dismiss this new understanding of human biology, which regards the body to be in great part a bio-electric phenomenon as understood in traditional Chinese medical theory, because it doesn't fit into the bio-chemical medical model of medicine they have been taught in school.

Perhaps it is because the pharmaceutical industry, which so generously supports medical education in America, can see no financial profit in exploring this particular path to wellness.
Perhaps it is because oncologists earn such a large percentage of their practice income from the retail sale of chemotherapy agents which they purchase at wholesale cost.

These questions will surely be pondered by a later generation of medical anthropologists who wonder why such a benign and effective therapy as ECT was so long neglected. It would be ironic if the widespread practice of this therapy in the United States were pioneered by practitioners of acupuncture, we doctors who - though schooled in an Eastern medical discipline - still have respect for the advice of Hippocrates, father of Western medicine, to "First, do no harm."

CELLS, TISSUES & EChT



A number of mechanisms have been proposed for tumor regression or remission as a result of EChT treatment. Some of the most popular have been 1) Autolysis processes, at the positively biased tumor site, produce a significant decrease in pH, which helps to promote tumor necrosis. 2) An increase in acidity at the tumor site appears to damage red blood cells, inhibiting delivery of oxygen to the tumor. 3) The low pH at the tumor site is indicative of a positive charge at that location (relative to surrounding normal tissue). Cancer-fighting white blood cells, with a negative charge on their membrane surface, will be attracted to the tumor site. 4) The electric field at the tumor site draws water away from the tumor (electroösmosis). Water starvation stresses the poorly formed tumor vascular system, interfering with the tumor's blood supply, causing the tumor to shrink. 5) Cathodic and anodic gas formation (hydrogen, chlorine and oxygen) elevates the pressure in the cancerous tissue, producing further stress on the tumor structure and tumor blood supply.

Take the Test

A significant amount of research activity has been devoted to the pH gradient between the normal tissue and tumor tissue and the mechanisms associated with the pH changes during tumor formation and during EChT treatment.

Using a spherical platinum electrode (first photo at right), a simplified mathematical model of certain components of the EChT process has been developed by Nilsson. The results implied by the mathematical model were compared with experimental data. Nilsson's results indicate that at the tumor site (anode, or positive region), reactions to the acidification of tissue by chlorine play an important role as generators of hydrogen ions. This has a direct impact on pH. The contribution of these reactions are strongly dependent upon the current density associated with the EChT process. Alkalisation, and the spreading of hydroxyl ions, appear to influence tissue destruction at the cathode.

The changes in pH inhibit cell proliferation and decrease cell viability. Low pH values appear to promote cellular apoptosis and necrosis. High pH values appear to promote only cell necrosis.

In addition to the 5 EChT treatment mechanisms listed above; a number of additional current/charge dependent interactions that have significant influences on cell proliferation, apoptosis, necrosis, differentiation and dedifferentiation; appear to be occurring at the cell membrane level.

Certain features associated with cellular apoptosis were observed in tumor tissue by Ito with murine treatment currents of 1 mA (4 hour treatment duration). O'Clock and Leonard reported the appearance of necrobiotic zones in malignant lymphoma cells at 9 µA (24 hour duration) for their in vitro work (see photo at right).

The process of electrically induced cell dedifferentiation reported by Robert O. Becker resulted in a massive amount of criticism against his work and theories. But Becker's observations and reports were correct. In fact, electrically induced dedifferentiation of immature red blood cells can be observed at currents ranging from the nanoamp to microamp level.

The figure at the right shows electrically induced cell dedifferentiation of human red blood cells obtained from a patient who was scheduled for surgery. The presence of a large number of dedifferentiated immature red blood cells indicates that the patient may have other serious health problems.

Clockwise from upper left: scanning electron microscope (SEM) image (X 2,500 magnification) of a red blood cell with the classic donut shape. This cell has not been electrically stimulated. The next group of red blood cells (X 1,500), at the upper right, shows how initial exposure to 1 µA of direct current has produced an

Take the Test

alteration of the concave region in the middle of the cell, along with the appearance of thin radiating structures (or spokes) that have been shown by both Becker (N.Y. Academy of Sciences paper) and Nordenström (1983 BCEC book). After longer exposure to a 1 µA direct current (lower right), some of the red blood cells revert even further to an elongated elliptical shape (X 1,600). As the cells are exposed to a 1 µA direct current over a longer time period (lower left), they begin to exhibit the flat amoeboid morphology (X 1,500) described by Becker in his book, The Body Electric.

The process of dedifferentiation, or reversion, was evident with some of the lymphoma cells. As they were exposed to direct electric current (approximately 9 µA) for longer periods of time (16 hours or more), the lymphoma cells appeared to lose their aggregation properties. This indicates that the lymphoma cells may be experiencing some kind of electrically induced reversion process, where they lose some of their malignancy properties and begin to acquire some of the contact inhibition exhibited by normal cells.

It is apparent that when electric current passes through diseased and normal tissue, there is a lot more activity than just the five mechanisms listed above. Over the past 33 years, a wide variety of research results concerning direct current and static electric field interactions with living matter strongly indicate that one of the primary interaction and cell growth mechanisms involves receptor mediated activity and ion channel modifications (see Polk and Postow, Handbook of Biological effects of Electromagnetic fields, CRC Press (1986)). Poo, et. al. have reported that the distribution of acetylcholine (ACh) and concanavalin A (Con A) receptors can be changed by the application of electric fields in the 1 V/cm to 10 V/cm range. Electric fields in the 0.1 V/cm to 10 V/cm range can also have significant effects on the growth of neurites obtained from single neurons in culture.

Viega, et. al. (Bioelectromagnetics, Vol. 21, 2000) reported variations in membrane surface carbohydrate expression, distribution of anionic sites and modulation of Con A, sialic acid and specific lectin binding to the cell surface after direct electric current was applied. Cheng et. al. (Clinical Orthopaedics and Related Research, No. 171, 1982) reported significant variations in ATP generation, protein synthesis and membrane transport in murine tissue with the application of direct electric current.

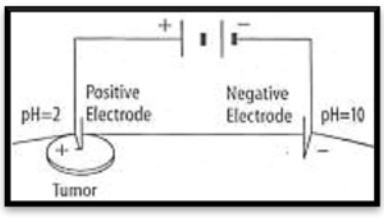
The reverse transcriptase polymerase chain reaction (RT-PCR) technique was utilized to measure the production of certain cytokines from macrophages under the influence of low-level direct currents. No interleukin 1 (IL-1) or tumor necrosis factor (TNF) output was detected. However, IL-8 modulation by direct electric current was detected. In this case, a very light IL-8 band was noticed at a direct current level of 5 µA, while no IL-8 band was observed for the lower direct current of 0.55 µA and the 0 A control. Therefore, it would appear that some immunologically important cell membrane receptors are sensitive to a certain range of low-level direct currents.

There are a variety of other cell membrane structures that can be influenced by an electric field, accumulated charge or electric current. These include: 1) Cyclic AMP receptor - Impacts glycolysis, cell aggregation, cell differentiation, cell proliferation and inhibits tumor growth in mammalian cells, 2) Glucocorticoid receptor - Regulates gene transcription, cell differentiation and proliferation, 3) Na/H antiporter - Regulates cell pH in virtually all cells, 4) Ion channels - Control cell pH, membrane polarity and some membrane transport activity.

Therefore, the therapeutic effects from the application of an EChT current will have significant effects on a wide variety of simultaneous events and mechanisms, including: influences on tumor tissue and structure, tumor pH control (at the tissue and cellular levels), transport of water and nutrients to the tumor site, tumor vascular structure, red blood cell function in the tumor region, tumor cell proliferation, cell differentiation/dedifferentiation and the movement, function and output of various cells in the immune system.

From: R.O.Becker and D.G. Murray, Transactions of the New York Academy of Sciences, Vol. 29, 1967; M.M. Poo, W.J. Poo and J.W. Lam, Journal of Cell Biology, Vol. 76, 1978; N. Cheng, et. al. Clinical Orthopaedics and Related Research, No. 171, 1982; B.E.W. Nordenström, Biologically Closed Electric Circuits, Nordic Medical Publications, Stockholm (1983); R.O. Becker and G. Selden, The Body Electric, William Morrow, New York (1985); G.D. O'Clock, Proceedings of the Fourth International Symposium on Biologically Closed Electric Circuits, October 26-29, 1997; C.K. Chou, et.al., Bioelectromagnetics, Vol. 18, 1997; Y. Yen, et.al., Bioelectromagnetics, Vol. 20, 1999; E. Nilsson, Modelling of the Electrochemical Treatment of Tumours, Doctoral Thesis, Royal Institute of Techlology, Stockholm, 2000; V.F. Viega, et. al., Bioelectromagnetics, vol. 21, 2000; G.D. O'Clock, German Journal of Oncology, Vol. 33, 2001; G.D. O'Clock and T. Leonard, German Journal of Oncology, Vol. 33, 2001; H. von Euler, E. Nilsson, J.M. Olsson and A.S. Lagerstedt, Bioelectrochemistry, vol. 54, 2001; B.E.W Nordenström, Journal of the IABC, Vol. 1, January-December, 2002; Ito, et.al., Journal of the IABC, Vol. 1, January-December, 2002; H. von Euler, H. Soderstedt, A. Thorne, J.M. Olsson and G. Yongquing, Bioelectrochemistry, vol. 58, 2002

CLINICAL STUDIES - EChT

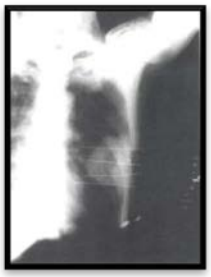


An extension of galvanopuncture has been developed by Dr. Björn Nordenström, using percutaneously applied platinum electrodes and direct electric current, to decrease the size of malignant and non-malignant tumors. Dr. Nordenström's early five year survival rates for advanced stage breast cancer patients was approximately 60%. The figure at the right is a simplified diagram of the source -

electrode configuration for Dr. Nordenström's electrochemical therapy (EChT) technique.

Australian research on this technique has been designated as Electrolytic Ablation of Tumors (EAT), with research trials being conducted at Queen Elizabeth Hospital in Adelaide. The process is described as electrolysis: "creating local changes in the pH of the tissues surrounding the electrodes, and also by creating toxic products such as chlorine and hydrogen ions from chemical reactions in the vicinity of the electrodes." This matches part of the EChT mechanism description in Björn Nordenström's 1983 BCEC text book, and the description of the so-called EAT procedure appears to match EChT exactly. Nordenström is only referenced once in the September 2002 Procedure Brief of the Royal Australasian College of Surgeons. Other than the Nordenström reference, EChT is not mentioned at all.

Electrode configuration and placement for EChT varies with respect to location, type of cancer and size of the tumor. The X-ray radiograph (first photo, at the right) shows four of eight platinum electrodes inserted through the skin and into the tumor mass of a 58 year old Chinese lung cancer patient (courtesy of China-Japan Friendship Hospital, Beijing, China). This particular tumor (adenocarcinoma, diagnosed using bronchoscopy) did not respond to chemotherapy. The size of the tumor was 8.5 cm. by 9.0 cm. The patient was not a candidate for surgical treatment because of hypertension and diabetes. The tumor completely disappeared 10 months after the patient received his final EChT treatment. After insertion of the electrodes, the output voltage was increased to the 4 V - 5 V range, and finally to the 7 V - 9 V range. The electric current increased with voltage, usually from 40 mA to 60 mA (10 mA to 15 mA per electrode pair), and finally from 80 mA to 100 mA (20 mA to 25 mA per electrode pair). EChT therapeutic efficacy was better for the lower current levels, with 20 mA (5 mA per electrode pair) being the lower threshold for therapeutic effectiveness.



The second photo, at the right, is a CT scan for a large (8.5 cm. by 9.0 cm.) primary liver cancer (the tumor is located on left side of the photo) showing two of the eight platinum electrodes inserted into the affected region of a 73 year old Chinese liver cancer patient (courtesy of China- Japan Friendship Hospital, Beijing, China). Initial treatment with invasive tube chemotherapy was not successful, and alpha fetoprotein (AFP) levels increased significantly. After EChT treatment, the tumor size decreased and the patient's AFP levels decreased to 80 ng/ml. Also, after treatment, the necrotic tissue reabsorbed within 4 to 5 months, and the tumor completely disappeared in 9 months. A voltage of aproximately 8 V was applied, with currents of 100 mA to 120 mA (25 mA to 30 mA per electrode pair).

The Journal of the IABC (Vol. 1, January- December, 2002) provides an overview of the results and therapeutic efficacy for EChT, alone, or in combination with other cancer therapies. In his paper, "Clinical Effectiveness Report for Approximately 11,000 cancer

Patients With Various Kinds of Tumors Treated With Electrochemical Therapy (EChT), Dr. Xin, Yu Ling has reported some impressive results. Most of the patients treated had one of the following forms of cancer: esophageal cancer, lung cancer, liver cancer, skin cancer, breast cancer, cancer of the head and face and metastatic lymph node cancer. In one part of the study involving a population of 7642 cases of malignant tumors, less than 10% of the Chinese cancer patients were stage I, approximately 34% were stage II and approximately 57% were in the stage III and IV categories. Almost 70% of the tumors treated were larger than 5 cm.

The five year survival rate for EChT treated cancer patients has been approximately 69% for the combined stage I and stage II categories. If the large numbers of stage III Chinese cancer patients, with very large diameter tumors are included, the five year survival rate is 53%. Complementing EChT with various combinations of herbal therapy, low-dose chemotherapy and low-dose radiation therapy can provide 9% to 14% increases in clinical effectiveness and five year survival rates.

The National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Cancer Statistics Review indicates that the five year survival rate for all cancer patients treated in the U.S. is approximately 62%. However, the U.S. statistics appear to be heavily weighted by a large percentage of state I and stage II cancer patients, and they also appear to be influenced by a large percentage of cancer patients with tumor sizes significantly less than 5 cm.

For U.S. lung and bronchus cancer patients, the NCI SEER Statistics Review reports a five year survival rate of 14.5%, with a 21.9% five year survival rate for patients under the age of 45 and 12.6% five year survival rate for patients 65 and older. The five year survival rate for lung cancer patients treated with EChT alone was 28.4%. The much higher five year survival rates for EChT treated lung cancer patients can be increased even further (apparently, up to an increase of 14%) if herbal therapy, low-dose chemotherapy or low-dose radiation therapy are administered along with EChT.

Australian EChT (or EAT) treatment results, for non-operable liver cancer patients, indicate that 6 of the original 9 patients treated were still alive 3 1/2 years after their initial electrotherapeutic treatment. Seven of the nine patients showed complete ablation of their liver tumor, with no recurrence in the treated area. Five year survival rates for liver cancer patients treated in China are approximately 15%, whereas the five year survival rate for liver cancer patients treated with conventional therapies in the U.S. is approximately 5%. It appears that, in treating liver cancer patients with EChT, the results achieve in Australia will also be superior to those achieved with conventional liver cancer therapies in the U.S.

Between 1998 and 2003, a number of papers have appeared in Chinese medical journals describing the introduction of direct electrical current into various tumors, using percutaneously applied platinum electrodes; as Electro- Acupuncture Therapy (another

EAT designation). No mention of EChT or Nordenström's contributions are made in the abstracts of these papers. An examination of the abstracts from these journals indicates that the techniques and protocols described in the treatment of malignant tumors and hemangiomas are identical to EChT techniques and protocols. Referring to this as “Electro- Acupuncture Therapy” appears to be misleading and inappropriate. Cancer and hemangioma tumors do not conveniently locate themselves on acupuncture points and meridians. Even if the attending physician is incorporating a "needling" protocol during treatment, Electro- Acupuncture Therapy (EAT) would not be the proper term to use to adequately describe the primary mechanisms of treatment and healing that are associated with this process.

With respect to clinical efficacy, the statistics on five year survival rates for cancer patients treated with EChT look very promising when compared with other therapeutic techniques. In the U.S., approximately 540,000 deaths per year are caused by cancer. The up-front costs associated with this disease are in excess of $200 B annually (Statistical Abstract of the United States, 120th Ed., U.S. Department of Commerce, 2000). If we utilize economic acceleration and amplification factors, the federal government's "value of a human life in the work force" (Forbes, Vol. 158, 1996) and the value of older working and retired citizens; cancer deaths represent a productive effort/spending loss for the U.S. economy of approximately $150 B to $200 B annually. Along with the loss of loved ones, pain and emotional trauma; cancer imposes enormous economic costs and losses every year. The previous clinical results indicate that, for the treatment of localized tumors, EChT can help to mitigate those costs and losses.

In their May 29, 1997 New England Journal of Medicine article, "Cancer Undefeated," Dr. John C. Bailar III and Heather L. Gornik state, "Despite decades of basic and clinical research and trials of promising new therapies, cancer remains a major cause of morbidity and mortality. Observed changes in mortality due to cancer primarily reflect changing incidence of early detection. The effect of new treatments for cancer on mortality has been largely disappointing." A July 27, 2003 Associated Press article, "Cancer Cure Seems as Distant as Ever," indicates that the effects of new treatments for cancer are still disappointing. In that article, Dr. John Glaspy, medical director of UCLA's Surgical Oncology Center states, "Right now, in the short run, we can bring an occasional miracle and have an overall small benefit, but there has not been a major improvement in what happens to them (cancer patients) ultimately." Comments like these from people who are actively engaged in oncology demonstrate that the standard allopathic medical approach toward cancer treatment (surgery, chemotherapy, radiation therapy, etc.) has proven to be woefully inadequate. Obviously, a very different therapeutic technique (and attitude) is required in order to enhance cancer patient survivability and quality of life. For more than 20 years, the use of EChT in the treatment of cancer has proven that electrotherapy can provide a major improvement in what ultimately happens to cancer patients.

Costs for EChT treatment vary, but patients returning from China and Germany have reported EChT treatment costs in the range of $6,000 to $7,500 (U.S.). Treatment durations varied from one to two weeks, with some patients requiring a repeat visit. Comparing costs and benefits with chemotherapy, EChT appears to be a bargain. Information from Medscape and various medical journals indicate that the basic costs for a week of chemotherapy can be more than $27,000 per week, involving average treatment durations of 7 to 12 days, with several repeat visits.

EChT in combination with low-dose conventional cancer therapies appears to provide a far superior combination of results from the standpoints of: 1) clinical effectiveness and five year survival rate, 2) cost, 3) quality of life for the patient, 4) reduced stress on the health care practitioners who are administering treatment, 5) ability to administer repeat treatments (no noticeable resistance for multiple EChT treatments), 6) side effects and 7) compatibility with other cancer therapies and 8) a very high benefit/cost ratio for the patient, the patient's insurance carrier and the treatment facility.

From: B.E.W. Nordenström, Biologically Closed Electric Circuits, Nordic Medical Publications, Stockholm (1983); J. C. Bailar and H. L. Gornik, New England Journal of Medicine, Vol. 336, May 29, 1997; G.Z. Liu, Proceedings of the Fourth International Symposium on Biologically Closed Electric Circuits, October 26-29, 1997; G.D. O'Clock, Journal of Orthomolecular Medicine, Vol. 12, Third Quarter, 1997; Y.L. Xin, et.al., Journal of the IABC, Vol. 1, January-December, 2002

CLINICAL STUDIES - pT-MT

Patients suffering from Parkinson's disease and non-trauma induced epilepsy have been treated with pT-MT for more than 20 years. Hundreds of patients have been treated with this unique and safe technique by Dr. Photios Anninos at the University of Thrace, Department of Medicine, Medical Physics Sector, Alexandroupolis, Greece.

In the photo at the right, Dr. Anninos is adjusting a 122 channel liquid helium cooled Superconducting Quantum Interference Device (SQUID) to obtain magnetoencephalogram (MEG) data for a Parkinson's disease patient who has just been treated with pT-MT. This system provides the capability for whole-brain real time monitoring and recording.

A Parkinson's disease patient (photo at the right) is shown wearing the pT-MT helmet, containing magnetic field coils linked to a low current signal source. The patient is treated with pT magnetic flux densities at

frequencies that are close to the patients alpha rhythm frequency (8 Hz to 13 Hz). The alpha rhythm frequency for each patient is determined by MEG measurements with the SQUID using a Fourier statistical analysis of the MEG values. The pT-MT system was developed by Professors P. Anninos and N. Tsagas.

It appears that Parkinson's disease is not just one specific health problem; as it seems to have subdivisions. Some patients can acquire a Parkinson's disease condition following a viral infection, trauma or atherosclerotic complications. Others may have a Parkinson's condition induced by a medication or a neurotoxic heavy metal contaminant (oxidative stress occurs, due to high levels of manganese or iron). There are some genetic predisposition and/or neurotransmitter deficiency factors. Parkinson's disease can also exhibit some similarities with other neurological disorders such as benign essential tremor, Wilson's disease (inherited defect in excretion of copper by liver), Huntington's disease (inherited, single faulty gene in chromosome # 4) or Alzheimer's disease (possible genetic factors, history of head trauma, neurotransmitter/hormonal deficiencies, heavy metal toxins including aluminum and mercury).

MEG data taken for a Parkinson's disease patient are shown in the two photos at the right. The top photo shows MEG data before the patient was treated with pT-MT, indicating very abnormal MEG activity in the right half of the photo. Five hours after the initial pT-MT treatment, the lower photo shows a significant attenuation of abnormal MEG activity in the right half portion, and this was followed by an increase in low frequency brain activity components. The patient's tremors decreased noticeably. Also, the patient reported a reduction in muscular aches along with coordination and visiospatial improvements.

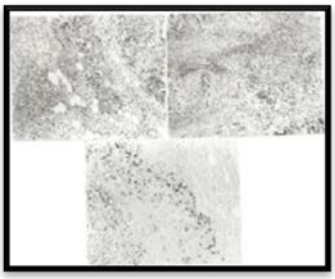
Over the past 20 years, more than 85% of the epilepsy patients responsed to pT-MT treatment. More than 75% of the Parkinson's disease patients responded to pT-MT. For Parkinson's patients, pT-MT treatment results can vary considerably. However, many Parkinson's patients, treated with pT-MT,show a significant improvement (significant reduction of tremors, increased energy, more natural facial expression, significant speech improvements, straight posture, better coordination, no further need for a wheel chair or cane, playing golf again, etc.). Some Parkinson's patients, treated with pT-MT, show moderate improvement (some reduction of tremors, better coordination, some increase in energy, some improvement in speech, resume light exercise work outs, etc.).

Initial indicators of therapeutic efficacy include the patient's ability to draw a spiral on a piece of paper and reduction or elimination of specific tremors. Even after the observed tremors cease, some patients report the sensation of a "phantom" tremor that lasts for a while.

Additional information can be obtained from the following website:
http://physlab.med.duth.gr/

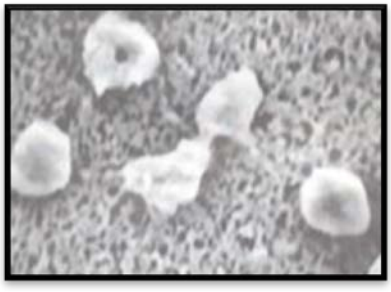
From: P. Anninos, et. al., International Journal of Neuroscience, Vol. 60, 1991; R. Sandyk, P. Anninos, N. Tsagas and K. Derpapas, International Journal of Neuroscience, Vol. 63, 1992; R. Sandyk and P. Anninos, International Journal of Neuroscience, Vol. 66, 1992; P. Anninos, et. al., Brain Topography, Vol. 13, 2000; S. Tofani, et. al., Bioelectromagnetics, Vol. 22, 2001; P. Anninos, et.al., Proceedings of Biological Effects of Electromagnetic Fields, 2nd International Workshop, Rhodes, Greece, 2002; G. D. O'Clock, German Journal of Oncology, Vol. 35, 2003; Anninos, et. al., Brain Topography, Vol. 16, 2003

IN VIVO - IN VITRO STUDIES



Ito's in-vivo and in-vitro studies of cells in tissue (Journal of the IABC, 2002) reveal several important aspects that relate to optimization of the EChT treatment protocol. Electrotherapeutically treated murine tumors exhibited morphological evidence of apoptosis and necrosis. Current levels of 0.5 mA, 1 mA and 3 mA were applied. The best tumor regression results occurred in the group treated with 1 mA currents. With murine tumors of approximately 1.5 cm. in diameter; considering a current level of 1 mA, the resulting current density in an appreciable portion of the tumor would be approximately 667 µA/centimeter squared, if the electrodes inserted in the normal tissue were far enough away from the positive electrode. The after-treatment tumor tissue samples (first photo at right) revealed that the central area of the murine tumor cells showed evidence of damage or regression after treatment.

Using current levels of 0.4 mA to 2 mA, Yen and Chou (Bioelectromagnetics, Vol. 20, 1999) briefly discuss the apoptotic process as it may relate to their in vitro studies. They indicate that changes in intracellular pH and ionic content are significant contributors to apoptosis.



The in-vitro electrical response results for the electrical stimulation of normal and malignant cells, reported by O'Clock and Leonard in the German Journal of Oncology (vol. 33, 2001), show necrobiosis (necrotic centers) occurring for malignant murine cells (lymphoma) treated with direct currents of 9 µA. For the dimensions utilized in this particular in-vitro research effort, the current density would be approximately 800 µA/centimeter squared.

Using very different in vitro and in vivo techniques, the electrotherapeutic current densities contributing to necrobiosis in malignant cells, that Ito observed with tissue, are

the same current densities that O'Clock and Leonard observed (second photo shown at right) with necrobiosis in malignant cells suspended in media.

The data at the right show the typical proliferation responses for cancer cells and normal cells that have been reported by O'Clock; Lyte, Gannon and O'Clock and O'Clock and Leonard since 1991. Of the different cancer cells evaluated so far (EL-4 lymphoma cells, leukemia cells, IL-6 hybridoma melanocytes and retinoblastoma cells), all of these malignant cancer cells exhibit the same "window" of suppression as indicated by the proliferation response characteristics for malignant retinoblastoma cells (top). The normal retinal cells response is shown at the bottom. Malignant cell proliferation is severely repressed by electrical current levels within the "window" of proliferation suppression. Generally, normal cells are not as severely suppressed at these current levels. In fact, as the graph indicates, some normal cell proliferation characteristics show indications of enhancement at the current levels that tend to suppress malignant cells. This is a very important advantage for therapeutic applications.

What is interesting is that, considering all of the malignant cells tested in vitro, the calculated current densities within the "window" of malignant cell proliferation suppression, are in the range of 900 µA/centimeter squared to 1,800 µA/centimeter squared. These are the same levels of current density that produced necrobiosis in the in vivo/in vitro studies of tissues and cells by Ito and O'Clock and Leonard.

One might ask how these results relate to EChT clinical studies. In order to answer this kind of question, Thomasset's work must be considered (see previous pages, Biophysics of BCEC). Data provided by Thomasset indicate that the impedance of malignant tissues is in excess of 2,500 ohms, and may be closer to 5,000 ohms. However, the clinical EChT data provided by Dr. Xin, Yu Ling indicates that, for EChT, applied voltages of 6 V to 10 V yield currents of 40 mA to 120mA (10 mA to 30 mA per electrode pair). With approximately 75% of the applied voltage dropped across the electrode tissue interface, and using Ohm's law, these EChT voltages and currents indicate overall tumor impedances of approximately 22 ohms to 30 ohms with individual tumor impedance levels between each electrode pair (assuming 4 electrode pairs) of 90 ohms to 120 ohms.

The reason that the impedance for the actual tumor structure is much smaller than the measured impedance for tumor tissues appears to be due to the fact that; as electrodes are inserted into the tumor tissue, they come into contact with the tumor's vascular system, fluids and fluid matrix regions. Most of the EChT current appears to be shunted by body fluids and other tissues. Since the tumor structure impedance is approximately 2% to 4% of the 2,500 ohm to 5,000 ohm impedance of the cancer tissue, the tissue is only receiving approximately 2% to 4% of the current delivered. If 10 mA to 30 mA of electrical current per electrode pair is being delivered to the tumor, due to the relatively high impedance level of cancer tissue, the cancer tissue and cancer cells are only being influenced by approximately 2% to 4% of the total EChT current level. In this case, for an

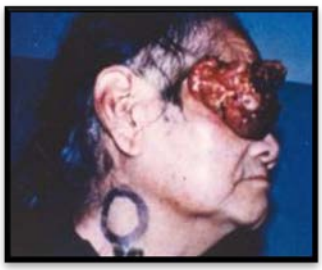
electrode pair, the cancer tissue and cancer cells are actually being influenced by currents in the range of 200 µA to 1,200 µA. For each electrode pair inserted 1 cm. into a tumor, the cross sectional area of the tumor region excited by the thin electrodes could be as high as 0.5 centimeter squared. For cancer patients receiving EChT treatment, this would yield electrotherapeutic current densities in the range of 400 µA/centimeter squared to 2,400 µA/centimeter squared.

Comments by Dr. Xin, Yu Ling indicated more favorable responses at lower EChT currents, or lower EChT current density levels. The current density levels that produced necrobiosis and apoptosis in the Ito and O'Clock and Leonard papers strongly indicate that lower levels of EChT current density may be more effective from the standpoint of attacking the individual cancer cells.

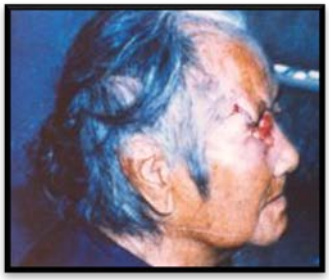
In conclusion, it is remarkable that, from the standpoint of the current densities that are the most effective with respect to promoting tumor regression, tumor structural component damage, apoptosis in malignant cells and malignant cell necrosis; the in vivo, in vitro and EChT clinical studies all point toward the same range of current densities as being optimum, producing the best results with respect to mitigating the cancer condition.

From: M. Lyte, J.E. Gannon and G.D. O'Clock, Journal of the National Cancer Institute, Vol. 83, January 16, 1991; C.K. Chou, et.al., Bioelectromagnetics, Vol. 18, 1997; Y. Yen, et.al., Bioelectromagnetics, Vol. 20, 1999; G.D. O'Clock and T. Leonard, German Journal of Oncology, Vol. 33, 2001; Ito, et.al., Journal of the IABC, Vol. 1, January-December, 2002 and Y.L. Xin, et.al., Journal of the IABC, Vol. 1, January-December, 2002

MEDICAL MISSION



The next three photographs provide a good indication of EChT's therapeutic efficacy, and they also provide an indication of the factors that influence the medical mission of the IABC. A paper co-authored by Dr. Xin Yu Ling (Chief of Thoracic Surgery, China-Japan Friendship Hospital, Beijing, China) and delivered by Dr. C.K. Chou (formerly, City of Hope National Medical Center, Duarte, CA) captivated the audience attending the 1993 15th Annual Bioelectromagnetics Society Meeting in Los Angeles, CA.



Dr. Xin's before-and-after photographs of cancer patients provided ample evidence of how well EChT is able to address stubborn tumors. The first two photographs show the progress of a 73 year old female with a recurrent squamous cell carcinoma (from: European Journal of

Surgery, Supplement 574, 1994 and German Journal of Oncology, Vol. 33, 2001).

The tumor size before treatment was 9.5 cm. by 14 cm. After three EChT sessions, the tumor and remnant carcinoma tissue were removed. The scar tissue surrounding her eye was primarily the result of previous unsuccessful surgeries. Patient follow-up continued for 4 years with no tumor recurrence problems.

The X-ray images (from: Journal of the IABC, Vol. 1, January-December, 2002), for a 52 year old lung cancer patient show a 9.5 cm. by 11.0 cm. carcinoma (left photo), diagnosed by needle biopsy. The patient was not a candidate for surgery, chemotherapy or radiation therapy because of a chronic obstruction, pulmonary disease and coronary heart disease. Six platinum EChT electrodes were inserted into the skin and into the tumor mass using X-ray monitoring. After the patient received six months of EChT treatment, the tumor completely disappeared (right photo). The patient's progress has been very good. He has had a checkup every year. Follow-up has been on-going for 10 years.

One of the primary medical missions of the IABC is to advise and assist scientists, medical doctors and investors in their efforts to develop and promote lower cost, patient friendly and less harmful therapeutic alternatives for a variety of health problems. One of our biggest concerns involves the unquestioned approval and proliferation of harmful therapeutic modalities that have been promoted for so many years, and have been proven to be dangerous or deadly for the patients who have trusted the advice of their doctors. Recent revelations concerning the misuse and dangers of hormone replacement therapy, bypass surgery and a host of dangerous drugs for the treatment of depression are strong indicators that allopathic medicine needs to review the words and meaning of the Hippocratic Oath and the Declaration of Helsinki.

A number of different opinions and interpretations of the Hippocratic Oath can be found at the following website: www.pbs.org/wgbh/nova/doctors/oath_classical.html The Declaration of Helsinki can be found at the following website: www.cirp.org/library/ethics/helsinki/.

Another component of the IABC medical mission is to assist those who are working to improve the models and dogma of physiology and medicine, and to promote research activities in complementary therapeutic techniques. We hope that our efforts will contribute to a better understanding of how the body heals and regulates itself, to promote and develop better therapeutic alternatives that are more compatible with the natural physical processes that occur in the human body, to promote and provide more effective complementary therapeutic alternatives and to assist in the development of therapeutic alternatives that are more reasonable and realistic with respect to cost and treatment protocol.

Take the Test

The history of the research efforts in electrotherapy and the bioelectric properties of living systems, leading up to EChT, is very interesting. The application of direct current to needle electrodes (galvanopuncture) has been used to treat aneurysms as early as 1849. Techniques to destroy malignant tumors with localized high frequency alternating current spark techniques were under investigation in the early 1900's. The precursors to Dr. Nordentström's EChT technique have a 150 year history. The application of electrotherapy to various health problems has a significant amount of scientific credibility, with over 150 years of experimental validation, published in various medical journals, hospital reports and books.

EChT techniques have been used to treat over 12,000 cancer patients, with localized tumors, in a number of countries (including Australia, China, Cuba, Germany, Sweden and a "very limited" group of studies in the U.S.) for more than 25 years. Compared with conventional cancer therapies, EChT's therapeutic efficacy is impressive (see Clinical Trials), especially when one considers that most of the cancer patients treated with EChT are in the stage II and stage III categories.

A very limited number of U.S. cancer patients were given permission to be treated with EChT in several FDA monitored clinical trials (including Washington University Medical School, St. Louis, MO and City of Hope, Duarte, CA). However, only patients who had exhausted all conventional alternatives were allowed to be treated with EChT in these clinical trials. Many of the cancer patients showed positive responses to EChT treatment. However, with the type of constraints imposed by the FDA study rules, the patients' cardiovascular health and immune systems were so seriously compromised by conventional approaches, that they died of complications from previous therapy not long after starting the EChT treatment protocol.

If the welfare of cancer patients is of some concern, and if the Hippocratic Oath is to be taken seriously, the questions must be asked; "Why does a U.S. cancer patient, with a localized tumor, have to travel outside the U.S. to receive EChT treatment? Why is EChT not available in the U.S.?"

From: J.E. Petrequin, Bull. Gen. de Therap., October, 1849; E. Doyen, Arch. Med. et de Physiol., Vol. 17, 1909; S. Ingvar, Soc. Exper. Biol. Med. Proc., Vol. 17, 1919-1920; D. Ingvar, Acta. Physiol. Scandinav., Vol. 13, 1947; A. Szent-Györgyi, Bioenergetics, Academic Press, New York (1957); G.D. O'Clock, Proceedings of the Fourth International Symposium on Biologically Closed Electric Circuits, October 26-29, 1997; Y.L. Xin, The European Journal of Surgery, Supplement 574, 1994, Y.L Xin, Bioelectromagnetics, Vol. 18, 1997, G.D. O'Clock, German Journal of Oncology, Vol. 33, 2001, Y.L. Xin, Journal of the IABC, Vol. 1, January-December, 2002 and G.D. O'Clock, Journal of the IABC, Vol. 1, January-December, 2002.

BIOPHYSICS OF BCEC

Understanding BCEC requires the use of some high school math and physics, along with an appreciation for history. Over 140 years of research in wound healing has shown that an injury site has a positive electric potential with respect to the surrounding uninjured tissue. Björn Nordenström has also determined that the electric potential at the center of most tumors is positive with respect to the normal tissue surrounding the tumor. He realized that a wound, or tumor, had a considerable amount of cell degradation (lysis) occurring at its center, making this region positively charged and highly acidic. Therefore, in relation to the surrounding normal tissue, the wound or tumor site had the properties of a wet cell battery, producing a positive potential between the center and periphery of the wound or tumor.

The positive electric potential at the center of the wound or tumor can produce a current in an electrically conductive medium. As the conductivity of the medium increases, the electrical resistance, that tends to "impede" or restrict current flow (impedance), decreases.

Thomasset provides a picture (first figure, from: Journal of the IABC, Vol. 1, January-December, 2002) showing high frequency electrical currents flowing through cells, and the lower frequency electrical currents flowing within the interstitial fluid around various cells. If the source of the electrical potential is an injury site or tumor, the resulting current will be more of a direct current. In this case, most of the current will flow around the cells within the interstitial fluid medium, and the impedance will be relatively high. Also, if the electric current consists primarily of ions in motion, the size of the ion would also be an impedance consideration with respect to its capabilities of traveling through cell membranes, or its limitations if it is restricted to conductive pathways within the interstitial fluid medium.

While current is flowing due to the presence of the injury site or tumor site potential, other electrically dependent functions are being influenced by the electrical potential. Like most cells, white blood cells possess a negative surface charge. From the standpoint of immune function, the positive potential at the center of the injury or tumor tends to assist immunological response by attracting white blood cells to that location. The electric field produced by the positive potential of the central region of the injury site or tumor also has an effect on capillary porosity (contraction, which closes the pores of the capillary), as indicated by the second figure.

With cancer, as long as the tumor exists, lytic reactions at the center of the tumor site will promote the continued existence of the positive potential and electric field in the region of the tumor. As indicated by the second figure, with the tumor acting as a wet cell battery; a conductive path for the flow of a variety of ions (including hydrogen and phosphate ions) exists in various electrically conductive pathways near the tumor site,

through interstitial fluids between cells, to porous capillaries, to veins and arteries and back to contracted capillaries near the tumor.

The primary electrical conduction mechanism is ionic in a large part of the electrically conductive pathway. Electron transfer occurs in the membranes of the capillaries that are under the influence of electric field induced contraction. Under the influence of the positively charged center of the tumor, the transport of charged ions and white blood cells continues, promoting various activities in the healing process.

As shown in the second figure (from German Journal of Oncology, Vol. 33, 2001), a closed-loop circulating current and energy flow is accomplished by the transport of charged particles (ions and electrons), producing slowly varying electric currents in the human body, utilizing various conductive pathways (interstitial fluid, blood vessels, nerve fiber, muscle, etc.). The healing currents are slowly varying with respect to time (essentially, they are direct currents). This fact verifies that a Biologically Closed Electric Circuit is involved. A biologically open circuit cannot support direct current.

In many of his published papers and books, Dr. Nordenström points out that BCEC activities have a profound influence on structure and function. The influence of BCEC on function is relatively easy to describe. Once the injury site or tumor site produces an electric field, immune system function is influenced by the attraction of white blood cells. Capillary function (porosity reduction due to electric field induced contraction) is influenced by the presence of the electric field produced by the lytic activity near the center of the site. Function is also influenced by the movement of ions to and from the injury or tumor site.

Structure can also be influenced by BCEC activity. The photo marked "a" (from: Exploring BCEC-Systems, Nordic Medical Publications, Stockholm (1998)) shows soft tissue radiograph of mammary fat tissue before a 10 V source is applied. Over a 10 day period, with 10 V and 1.75 mA of current, some endogenously developed fibrosis has disappeared (arrows in "a"), while large amounts of new fibrous tissue have developed (photo "b"). In this case, the application of an electric potential, electric field and electric current have contributed to a change in the internal structure of the soft tissue.

The transport of water by electroosmosis, at the tumor site, can influence structure and function. The movement of water around various lung tumors contributed to the structural changes Dr. Nordenström first noticed in his X-ray radiographs, which resulted in his development of BCEC theory (see Home page, third photo). As water is drawn away from the tumor by electroosmosis, the tumor is deprived of nutrients and liquid, and the tumor cells and vascular structure of the water starved region begin to deteriorate.

Significant changes in cellular structure can also occur with the application of voltages and currents that can occur in BCEC systems. Dr. Nordenström shows significant

changes in mammalian red blood cell morphology with the application of currents at the 1 mA level. Becker reported evidence of electrically induced dedifferentiation of immature red blood cells at current levels that were in the fraction of a nA range. O'Clock shows photos of immature red blood cell dedifferentiation at 1 µA, where, over a period of time, the red blood cells make the transition from concave and spoked, to elliptical in shape and finally to a flat amoeboid morphology. O'Clock and Leonard also show evidence of necrobiosis and loss of cell aggregation properties for lymphoma cells at current levels of 9 µA.

One of the reasons why BCEC theory is so important is that it predicts the fast transport times observed with immune system response. Conventional chemotaxis models, based on diffusion, are much too slow. For example, an estimate of the diffusion time (T) that is required for white blood cells to travel 0.2 cm. from a capillary to an injury site can be obtained from the following diffusion equation:

$$v = dL/dT = (D/L),$$

where v represents an instantaneous velocity (that is a function of distance) for the white blood cell, L is the distance traveled and D is the diffusion constant. This relationship was taken from Mombach and Glazier, "Single Cell Motion in Aggregates of Embryonic Cells," Physics Review Letters, Vol. 76, 15 April, 1996. Using a diffusion constant of 1/100,000 cm.cm./sec. and a distance of 0.2 cm, the estimated velocity of 0.0001 cm/sec., from the equation shown above, would result in a transport time of 2000 seconds (or, approximately 33 minutes) for a cell traveling 0.2 cm. to an injury site. Using the cell velocity relationship involving chemotaxis coefficient, and attractant gradient, from Farrell, et. al. (Cell Motility and the Cytoskeleton, Vol. 16, 1990); the cell's chemotactic velocity is even slower. We know the immune system response is much faster than the velocities and resulting transport times predicted by these particular mathematical relationships involving standard diffusion and chemotaxis. Therefore, another physiological/immunological model for cell motion in healing and regulation is needed, to predict more realistic cell transport velocities and transport times.
Dr. Björn Nordenström's BCEC theory provides the right mix of physiological structure and function to yield a mathematical expression that predicts more realistic cell velocities and response times for the immune system. Referring to the second figure, the lytic activity at the tumor site can produce an electric potential of 30 mV over a distance of 1 mm. We can assume that the surface charge density of a 20 µm diameter white blood cell is approximately - 2 Coulombs per meter squared. Combining elecric field theory with fluid mechanics, the following BCEC cellular transport relationship can be derived:

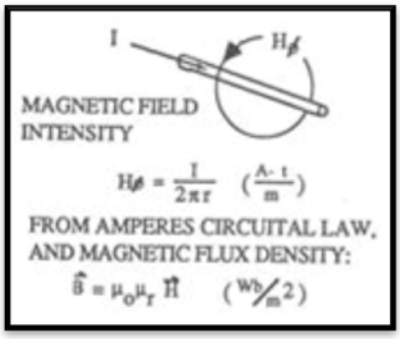
$$F = (Q)(E) = n(v/d)(A),$$

Where F is the force on the charged cell due to the injury site electric field, Q is the product of cell surface charge and cell surface area, n is viscosity (approximately 1/1,000 kg./m-sec. for a body fluid medium), A is the cross sectional area of the cell

perpendicular to the direction of travel, v is the cell velocity and d is the boundary layer thickness for the 20 µm diameter cell traveling in a fluid medium (in this case, approximately 0.3 µm for laminar flow fluid dynamics). Applying these numbers to the BCEC cellular transport equation, the resulting velocity (v) of 0.1 cm./sec. allows the white blood cell to reach the injury site in approximately 2 sec. This transport time is within the range of observed immune system response times for tissues and organs, and is much faster (by a factor of approximately 1,000) than the transport times predicted by chemotaxis models that rely on diffusion and physiological/immunological concepts that are more than 150 years old.

From: A.L. Thomasset, Lyon Médical, Vol. 21, 1962; R.O.Becker and D.G. Murray, Transactions of the New York Academy of Sciences, Vol. 29, 1967; B.E.W. Nordenström, Biologically Closed Electric Circuits, Nordic Medical Publications, Stockholm (1983); G.D. O'Clock, Proceedings of the Fourth International Symposium on Biologically Closed Electric Circuits, October 26-29, 1997; B.E.W. Nordenström, Exploring BCEC-Systems, Nordic Medical Publications, Stockholm (1998); G.D. O'Clock, German Journal of Oncology, Vol. 33, 2001; G.D. O'Clock and T. Leonard, German Journal of Oncology, Vol. 33, 2001; B.E.W Nordenström, Journal of the IABC, Vol. 1, January-December, 2002 and A.L. Thomasset, Journal of the IABC, Vol. 1, January-December, 2002

BIOPHYSICS OF pT-MT



Electric, magnetic and electromagnetic fields can interact with charged components in physiological, cellular and molecular structures; producing various effects on biological systems.

Considering magnetotherapy, both static and time-varying magnetic fields can provide short-term or long-term, therapeutic benefits. However, if a magnetic field is to have an effect on the trajectory or position of a charged particle, the charged particle either has to be in motion (moving linearly, orbiting, spinning, oscillating, etc.), or the magnetic field must vary with respect to time. A static magnetic field cannot change the position (or energy state) of a completely motionless charged particle.

Considering the volume and area of a 20 µm mammalian cell, the range of energies associated with 20 mT to 400 mT magnetic field flux densities would be approximately 1.0 pJ to 1.0 nJ. These results can be obtained from the following magnetic field energy relationship:

Magnetic Energy (Instantaneous or Static) =
(1/2) B H (Volume) / (magnetic permeability)

Energy levels within the range calculated above can have an effect on weak chemical bonds, ligand-receptor interfaces, transport mechanisms and biochemical responses in the areas and volumes associated with mammalian cells. Experimental evidence provides support for this supposition. Time varying magnetic fields with magnetic flux densities of 1 mT to 400 mT have shown evidence of influencing proliferation of cells in culture, malignant tumor growth inhibition and apoptosis. Lower magnetic flux densities, from 0.05 mT to 1 mT, appear to have an effect on gene expression of cytokine receptors, expression of oncoproteins and DNA synthesis.

In many cases, the blind application of instantaneous energy relationships (and other energetic arguments) often fail to support the biological applicabity of low-level field strengths (electric or magnetic). However, in these situations, other fundamental mathematical relationships often do indicate the possibility of biological impacts at field intensity values when specific energy relationships do not provide support. An example of this kind of situation follows.

The figure at the right shows a magnetoencephalogram (MEG) representing the left temporal region for a patient with epilepsy (Courtesy of Dr. Photios Anninos, Medical Physics, Department of Medicine, University of Thrace and courtesy of the German Journal of Oncology). The The MEG data was taken before the patient was treated with pT magnetotherapy (pT-MT). Treatment with pT-MT involves magnetic flux densities that are more than ten million times lower than the magnetic flux density of the earth's magnetic field (the earth's magnetic flux density is approximately 0.5 G or 0.05 mT).
The color red represents an abnormal condition. As the color changes from red to yellow-green-blue, the color transition indicates progress toward a normal condition. The instrument used to obtain these images is a Superconductive Quantum Interference Device (SQUID) biomagnetometer, operating at a liquid helium temperature. The SQUID is capable of detecting magnetic flux densities down to the 0.01 pT level.

The next picture, at the right, is the MEG data of the left temporal region for the same patient, taken after several treatments with pT magnetotherapy. The application of pT magnetic fields to the left temporal region of this patient appears to have produced a significant therapeutic effect for the patient's epileptic condition. With additional treatments, the patient's seizure activity decreased in severity and frequency.

How can we achieve a therapeutic effect from pT magnetotherapy? Some skeptics claim that magnetic flux densies at the pT level are much too low to have any effect at all. Many physics models and energy concepts have been used to prove that pT fields are much too weak to have any significant impact on biological systems. However, the basic problem with all of this skepticism is that therapeutic applications of pT magnetic fields

have proven to be very effective in the treatment for certain non-trauma induced epilepsy and Parkinson's disease patients. At this point, the scientific mission can no longer remain in the state of denial, using various analytical efforts trying to prove that pT-MT does not work. We now must recognize that, in many cases, pT-MT DOES WORK. Our scientific mission now has to concentrate on finding out why pT-MT works and determining the mechanisms involved.

From the standpoint of electromagnetic wave fundamentals, there are no relationships in field theory (such as Maxwell's equations, or the components of Maxwell's equations) that would refute or deny the claim that picoTesla magnetic fields could have an impact on biological systems, or a significant therapeutic effect for certain neurological disorders. In fact, Maxwell's equations and recent data on electrical currents in the nervous system, indicate the possibility that therapeutic benefits can be achieved with pT magnetic fields.

One of Maxwell's differential equations states that a change of magnetic field intensity (H(x)) in one direction, can produce a current density (J(y)) that is perpendicular to the direction of the magnetic field intensity vectors:

$$dH(x)/dz = J(y).$$

If a magnetic flux density on the cranial area of 80 pT is assumed, the magnetic flux density equation, shown in the first figure above, indicates that the corresponding magnetic field intensity will be approximately 64 µA-turns/m. Using the relationship between magnetic flux density (B), magnetic field intensity (H) and current (I), in the first figure shown above, we find that the magnetic field could be produced by a 2 µA current in thin wire coils that are located a few centimeters away from the cranium. We can also assume that, in a certain region of the brain, the magnetic field intensity produced by the current in the wire coils varies from a maximum of 64 µA-turns/m to a value of 43 µA-turns/m over a distance of 1 cm. In this case, one of Maxwell's differential equations (shown above) indicates that the current density would be approximately 2.1 mA per meter squared. The resulting current in a 100 µm diameter nerve fiber would be approximately 16.5 pA.

Therefore, an applied 80 pT spatially varying magnetic field can produce currents that are reasonably close to the 50 pA to 75 pA current levels associated with miniature excitatory postsynaptic currents (mEPSC) in hippocampal synapses, as reported by Beattie, et. al. in Science. It has been determined that, with the application of relatively high magnetic fields in repetitive transcranial magnetic stimulation (rTMS), the interaction between the magnetic field and the nerve fiber involves nerve polarization changes and a subsequent impact on action potentials. For pT magnetic fields, the interaction between the magnetic field and nerve fiber could possibly involve modulation of mEPSC current levels in certain synapses and neural pathways. Maxwells equations along with basic field equations in physics tend to support this possibility, and

this could be part of the reason why pT magnetic fields are able to provide a therapeutic effect for certain neurological disorders.

From: P. Anninos, et. al., International Journal of Neuroscience, Vol. 60, 1991; E. Hirakawa, et. al., Bioelectromagnetics, Vol. 17, 1996; J. Schimmelpfeng and H. Dertinger, Bioelectromagnetics, Vol. 18, 1997; P. Anninos, et. al., Brain Topography, Vol. 13, 2000; S. Tofani, et. al., Bioelectromagnetics, Vol. 22, 2001; E.C. Beattie, et. al., Science, Vol. 295, 2002; G. D. O'Clock, German Journal of Oncology, Vol. 35, 2003

IABC ORGANIZATION

ANNOUNCEMENTS:

1. 9th International Congress of the IABC - Brazil 2006 to be held in Sao Paulo, Brazil, April 20 - 21, 2006
2. First Call for Papers. Deadline is March 1, 2006.

Announcing
The Ninth International Congress of the IABC
International Association for
Biologically Closed Electric Circuits in Biomedicine

Dates: April 20-21, 2006

Venue: Bienal of Sao Paulo - "Parque do Ibirapuera"
Sao Paulo, Brazil http://bienalsaopaulo.globo.com/informa_pav.asp

Sponsorship: The IABC in cooperation with FRANCAL FEIRAS

Local Organizer: FRANCAL FEIRAS

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Dr. Finn Scott Anderson, (Denmark)
Professor Photios Anninos, (Greece)
Professor LIU Gan-Zhong, (China)
Professor CHEN Ming-Feng (Taipei, China)

Congress President: Professor Paulo Farber
(President, Brazilian Academy of Complementary Medicine)
IABC Coordinator: Mr. Carl Firley (IABC Vice President and Secretary General)

Principal Topics of the Congress:

1. New advances in the theoretical research of Biologically Closed Electric Circuits
2. Basic Research on the application of EchT (electrochemical therapy) to malignant tumors.

3. Clinical effectiveness of EchT applied to malignant tumors;
5. Clinical effectiveness of EchT applied to benign tumors;
6. New advances in treatment of tumors with thermotherapy;
7. Treatment of tumors with integrative (or alternative) medicine;
8. Treatment of neurological disorders with pico Tesla magnetic therapy, (pTMT);
9. Others

http://www.iabc.readywebsites.com/

First Call for Papers

Ninth International Congress of the IABC
http://www.iabc.readywebsites.com/

Requirements for Submitting Papers:

1. Please submit the full text of the paper preceded by an abstract limited to no more than 500 words.

2. Format: Papers should include; Object, Method, Results, and Conclusion

3. Please include with your submission the following information::

Name(s) of author(s)
Institution
Postal Address and code
Phone and/or Fax Numbers
E-mail address

4. Deadline for Submitting Papers: March 1, 2006

5. Please submit papers using MS WORD, and e-mail to: iabc@adelphia.net
or send soft disc to:

Mr. Carl F. Firley

4976 SW Bimini Circle S.
Palm City, Florida, 34997 USA

_____Abstract Submission Form_____

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For Additional Information Please Contact one of the following persons:
Mr. Carl Firley, Phone +772 283 2180; Fax: 772 283 9943; e-mail iabc@adelphia.net
Lucia Cristina de Buone, International Business Manager, FRANCAL FEIRAS, Phone: (5511) 4689 3100; FAX: (5511) 4191 0200; e-mail cristina@francal.com.br

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IABC People and Places

Dr. Xin Yu-Ling, Head of Thoracic Surgery at Friendship Hospital in Beijing, China (first two photos) and his staff have administered many EChT treatments. The Cancer Center of P.L.A., Nanjing Ba-Yi Hospital, Nanjing, China (third and fourth photos) also treats cancer patients using EChT. EChT is also available at Guangxi Cancer Institute and Hospital, Guangxi, China (fifth photo). These are just three of the more than 1,000 Chinese hospitals that have administered EChT, to more than 11,000 cancer patients.

Many European cancer patients have been treated with EChT in various European hospitals and clinics including the Klinik St. Georg, Bad Aibling, Germany (photos 6 and 7) and Karolinska Hospital, Stockholm, Sweden (photo 9).

In April of 1986, an excellent article by Gary Taubes (with very clear illustrations) appeared in Discovery magazine (Vol. 7) on Dr. Nordenström's efforts that resulted in the development of his BCEC theory and the application of EChT. The article showed a photograph (photo 9) of a breast cancer patient receiving Dr. Nordentsröm's "unorthodox treatment."

In 1987, Dr. Björn Nordenström introduced BCEC and EChT to the Chinese medical profession. Since that time, considerable progress has been made. Numerous EChT courses and training sessions have been conducted for Chinese medical practitioners. Clincial studies and research have provided new insight and improvements into the EChT protocol and therapeutic techniques that are complementary with EChT. EChT has

been widely publicized in the mass media of China. More than 12 EChT centers and research laboratories have been established. The first BCEC Symposium was held in Stockholm in September of 1993. Dr. Björn Nordenström and Dr. Xin, Yu-Ling presented their initial results at that Symposium (photo 8).

During the October 1992 Symposium in China, the International Association for Biologically Closed Electric Circuits in Medicine and Biology (IABC) was formed. Dr. Nordenström was elected IABC President and Dr. Xin, Yu-Ling was elected IABC Vice President.

In October, 1997, the Fourth International Symposium on Biologically Closed Electric Circuits was held in Minneapolis, MN. Symposium hosts were Dr. George O'Clock and his wife, Clara O'Clock. Partial support for the Symposium was provided by Minnesota State University, Mankato (MN). A 295 page Proceedings was printed for this Symposium. In July of 1998, Dr. O'Clock was appointed IABC President, Dr. Nordenström became IABC President Emeritus and Carl Firley was appointed IABC Vice President and Secretary General (photo 10).

In September of 1998, the Third Congress of the IABC and Second International Symposium on Electrochemical Treatment of Cancer was held in Beijing, China. The Congress hosts included Quian, Xinz Hong, Chen, Shao Wu and Xin, Yu Ling. In July, 2001, the Seventh International Symposium on Biologically Closed Electric Circuits was held in Helsingør, Denmark. The Symposium host was Dr. Finn Scøtt Andersen, Chief M.D. for Humlegaarden Cancer Clinic. An excellent summary of some of the papers presented at the Denmark Symposium was written by Dr. Ralph W. Moss in the Townsend Letter for Doctors and Patients (October, 2001), entitled "The War on Cancer" (http://www.cancerdecisions.com/Townsend/Oct2001.html). During these two IABC meetings, an IABC Board of Directors was established.

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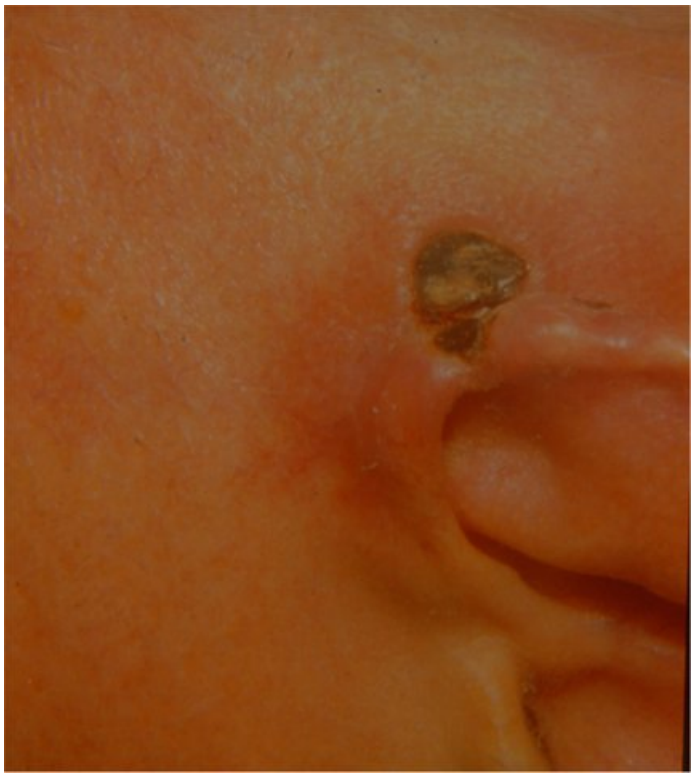
In 1999, the Third Congress on Electro Cancer Treatment and the Fourth Congress on Biologically Closed Electric Circuits was hosted by Dr. Friederich Douwes, M.D., Klinik St Georg (http://www.klinik-st-georg.de/englisch/Frameset.html) in Bad Aibling, Germany. Papers covering a wide range of topics were presented; including electrochemical therapy, chemotherapy, radiation therapy, orthomolecular medicine, thermotherapy and oxidative stress. Dr. Douwes also served as host of the 1994 IABC Symposium that was also held in Bad Aibling, Germany.

In September of 2004, the 8th International Congress of the IABC International Association for Biologically Closed Electric Circuits in Biomedicine was held at Guangxi University of Medical Sciences, Nanning, China. The Congress President was Dr. Tang Bu-Jian, of Guangxi University.

In 2001, Dr. Björn E.W. Nordenström received the International Scientific and Technological Cooperation Award from the People's Republic of China. Inaugurated in 1994 by the State Council, the International Scientific and Technological Cooperation Award is granted to foreigners or foreign organizations that have made important contributions to China's scientific and technological advancement. Dr. Nordenström is the first Swedish scientist to receive this award. For more information, see the following: (http://www.chinaembassy.se/eng/26481.html).

From: G. Taubes, Discover, Vol. 7, April, 1986; Y.L. Xin, Proceedings of the Fourth International Symposium on Biologically Closed Electric Circuits, October 26-29, 1997; G.D. O'Clock, Journal of the IABC, Vol. 1, January-December, 2002



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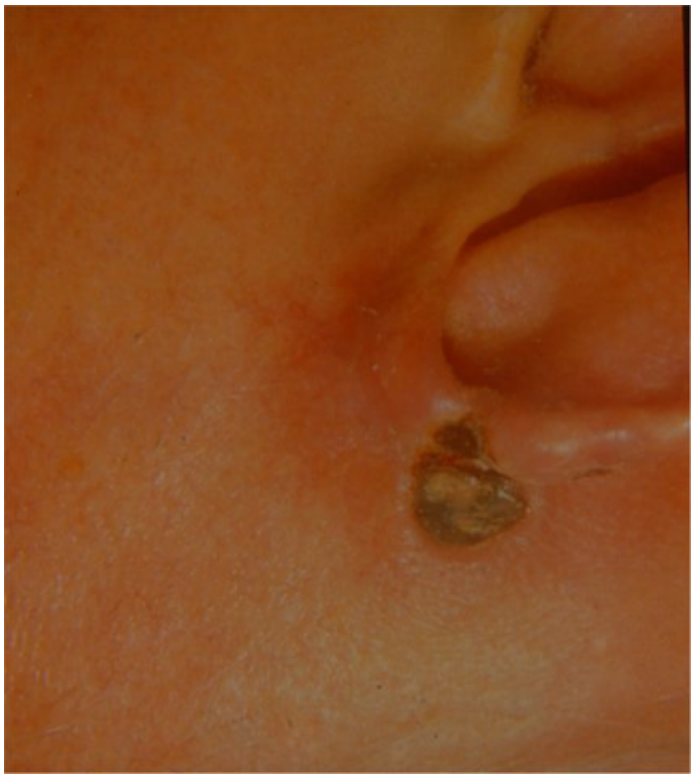

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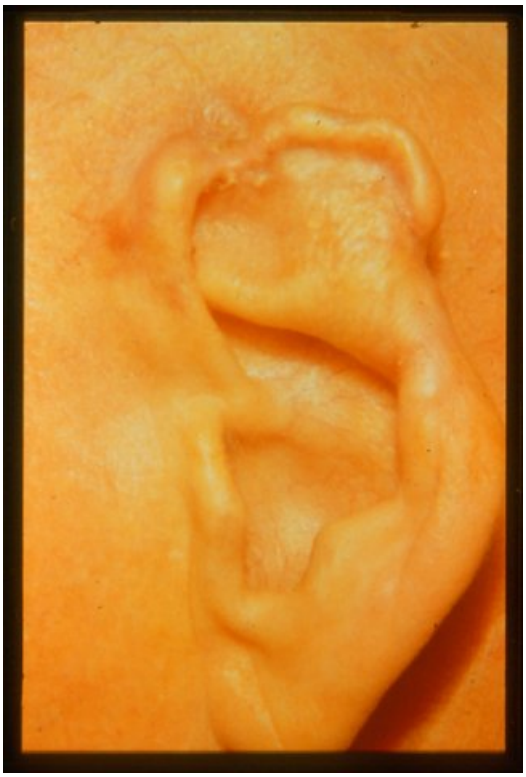

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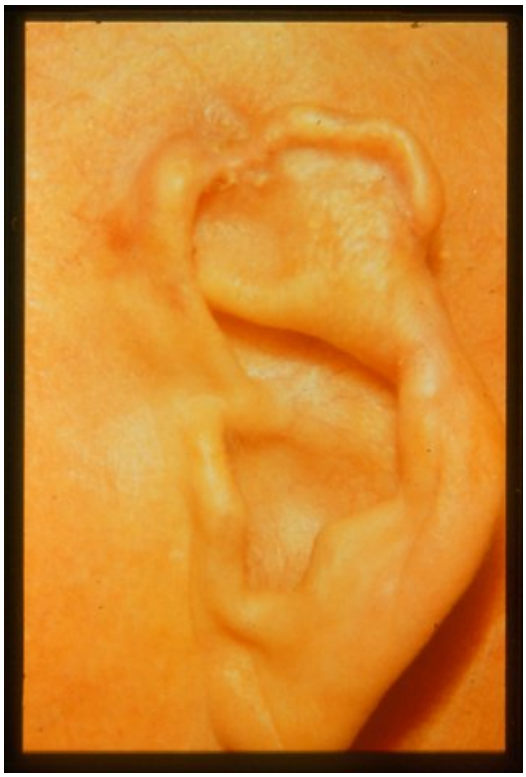

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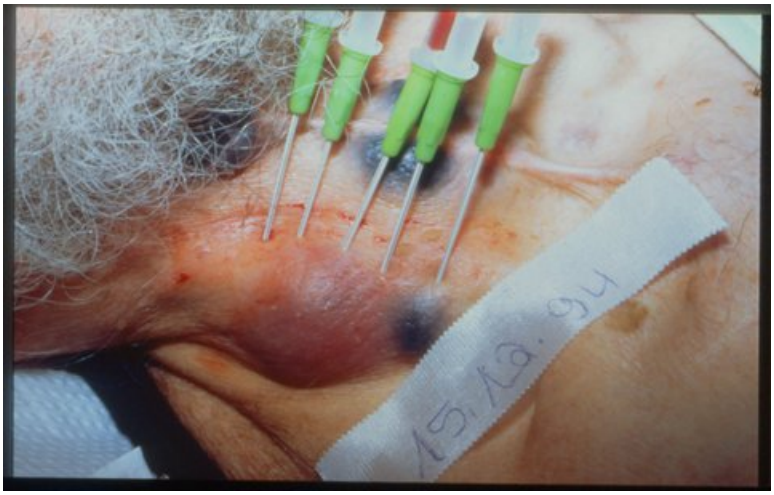

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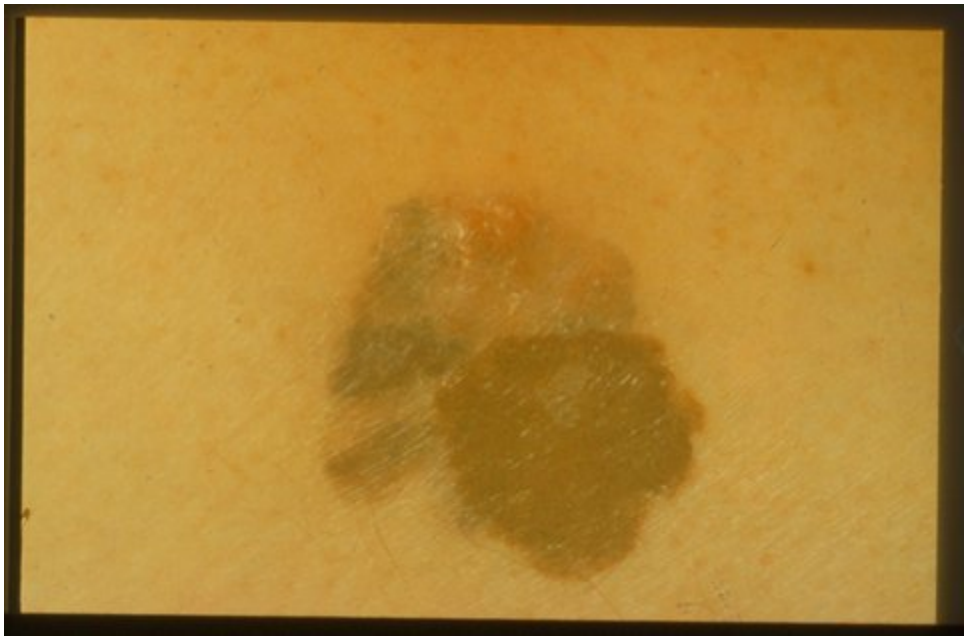

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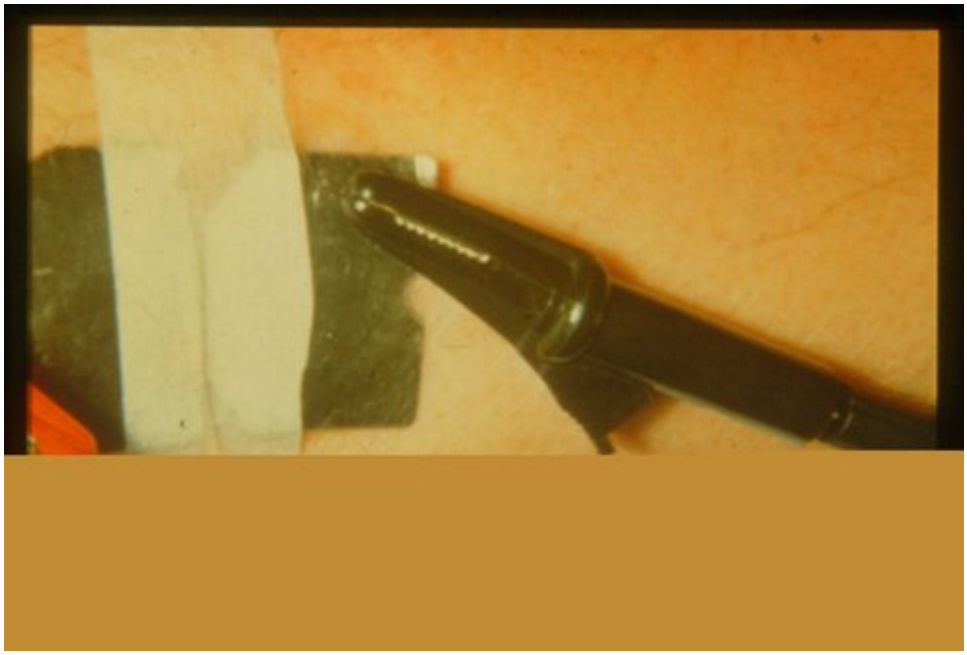

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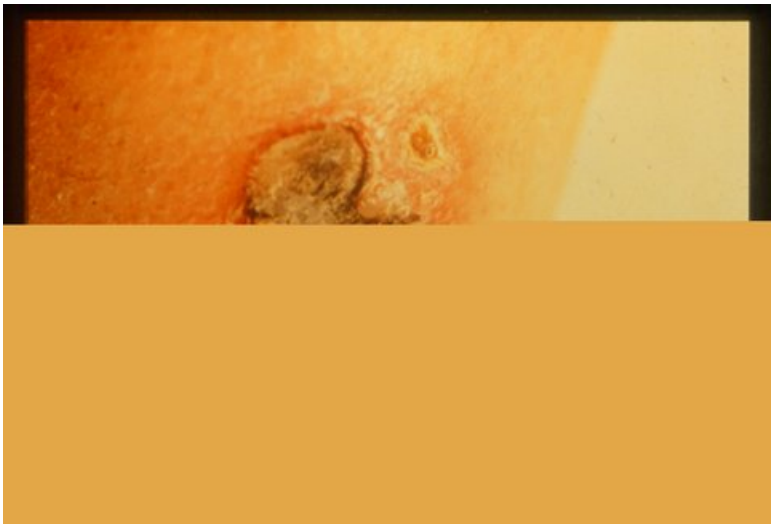

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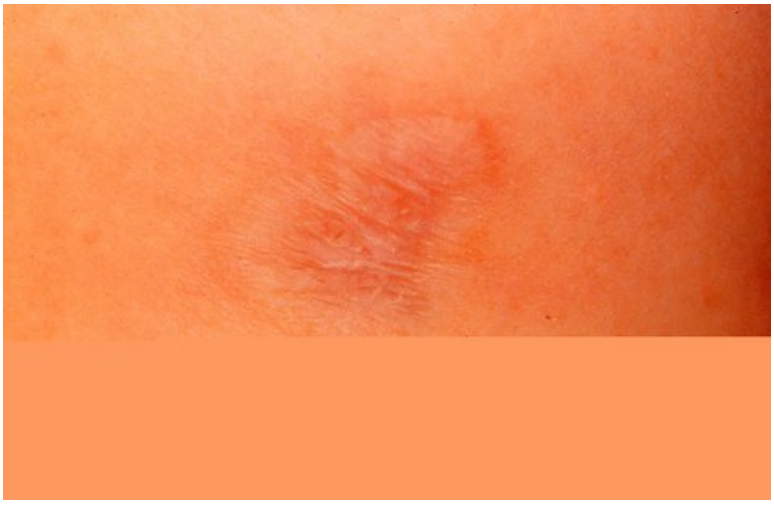

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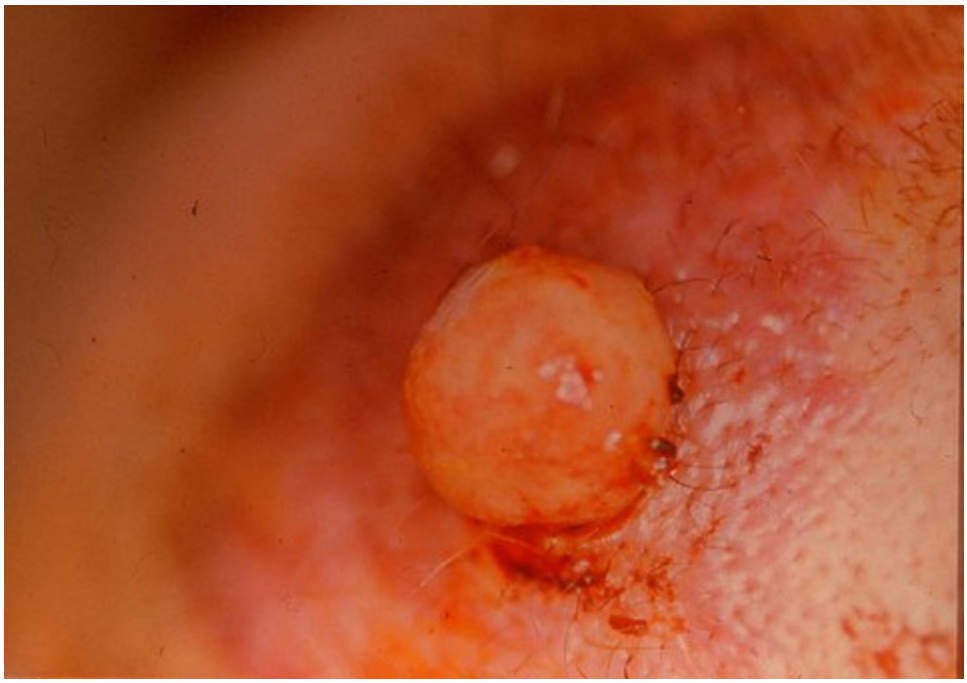

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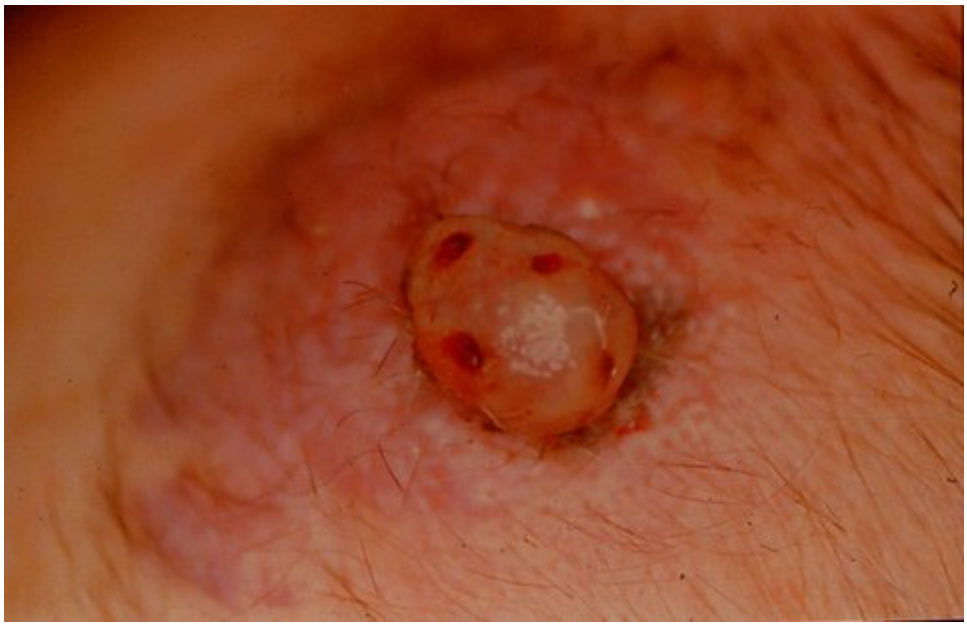

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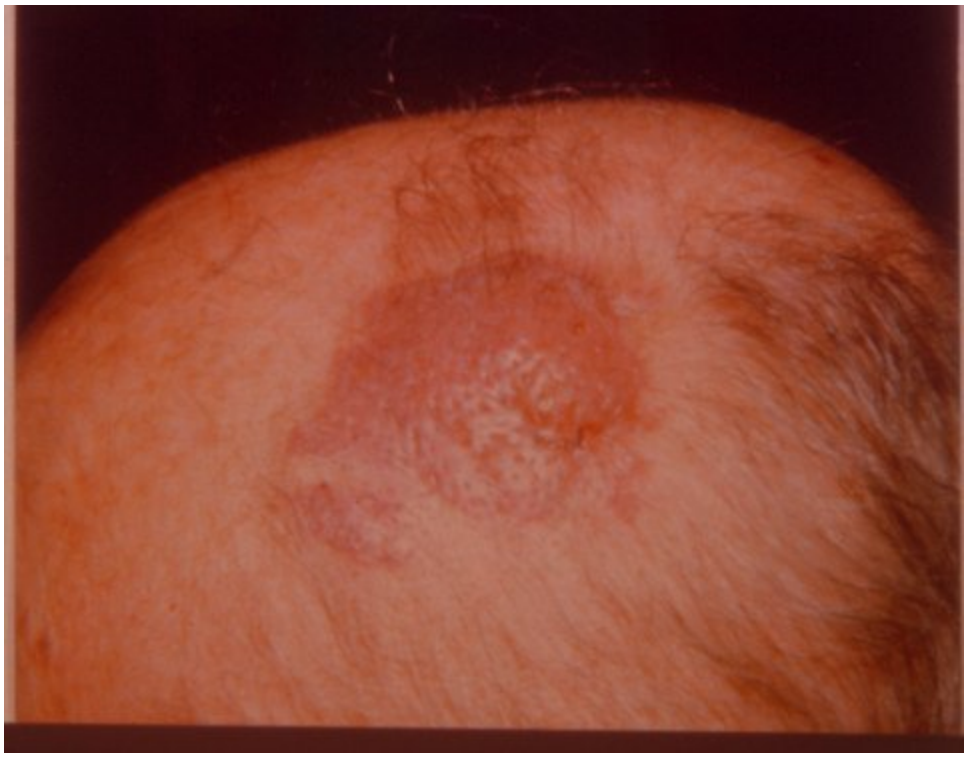

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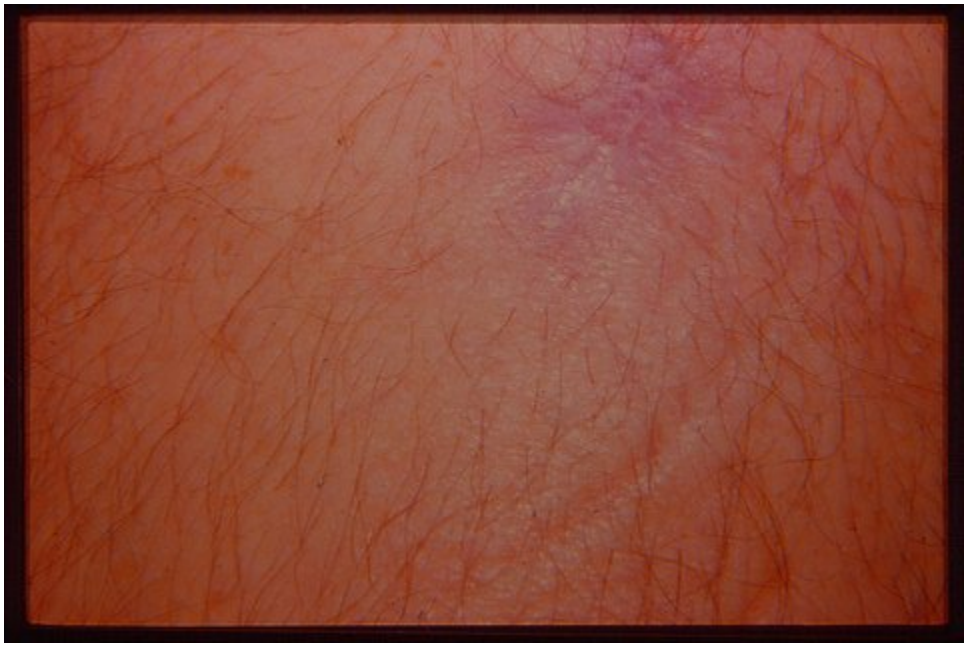

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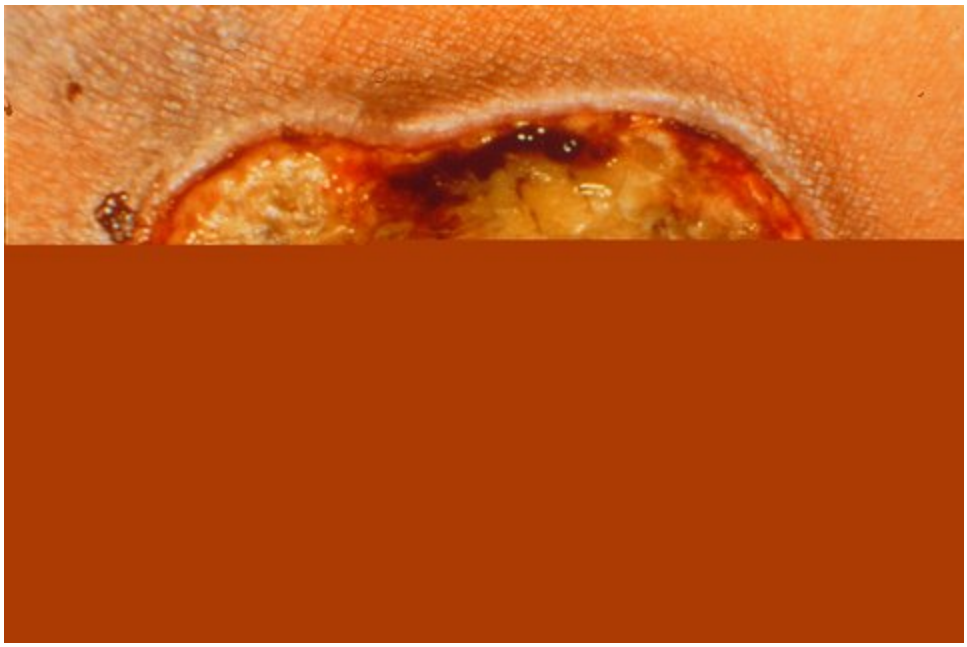

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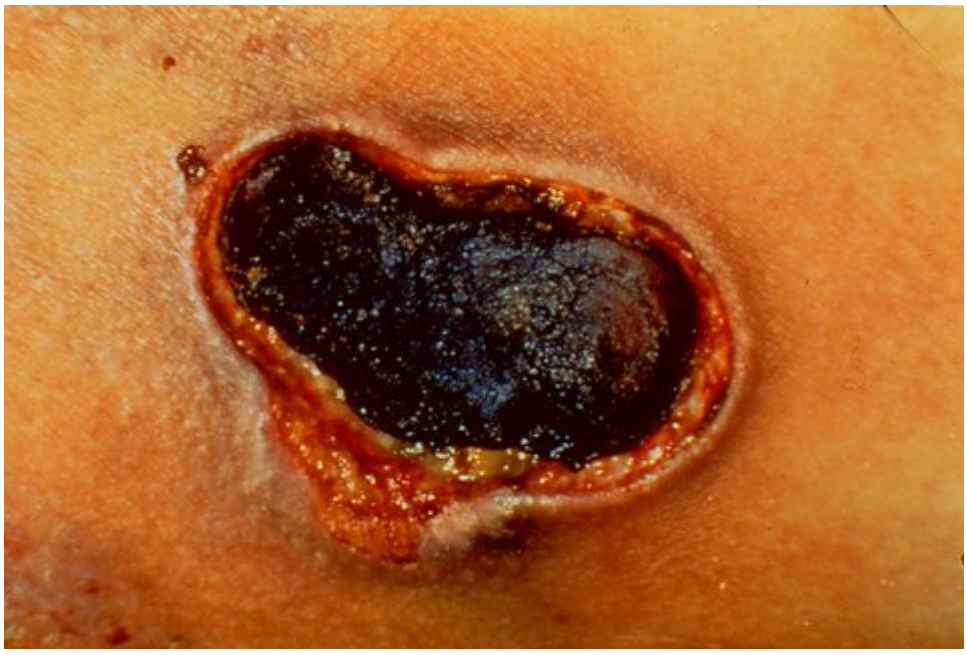

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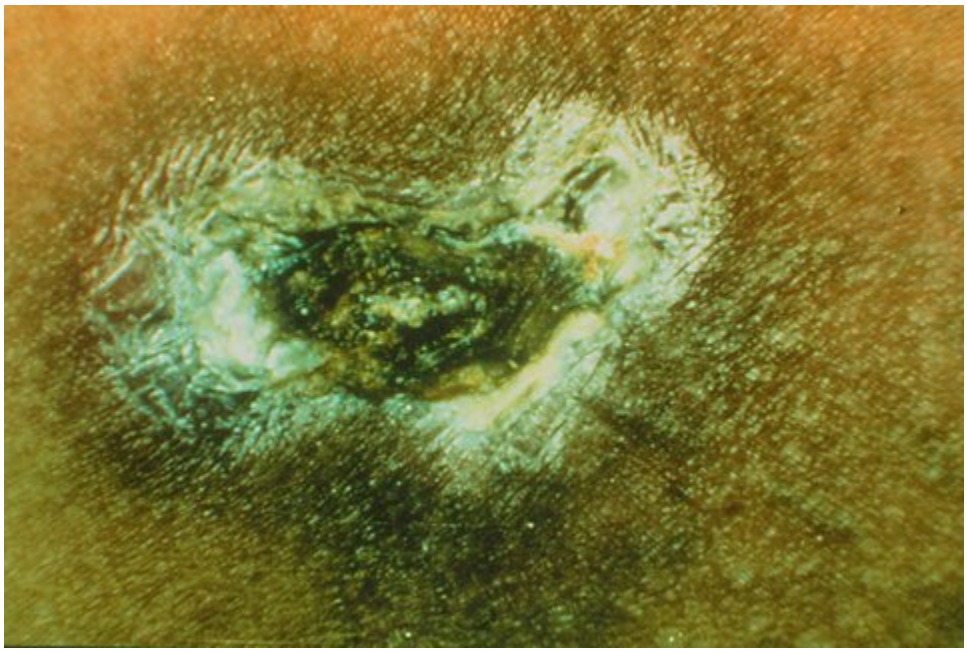

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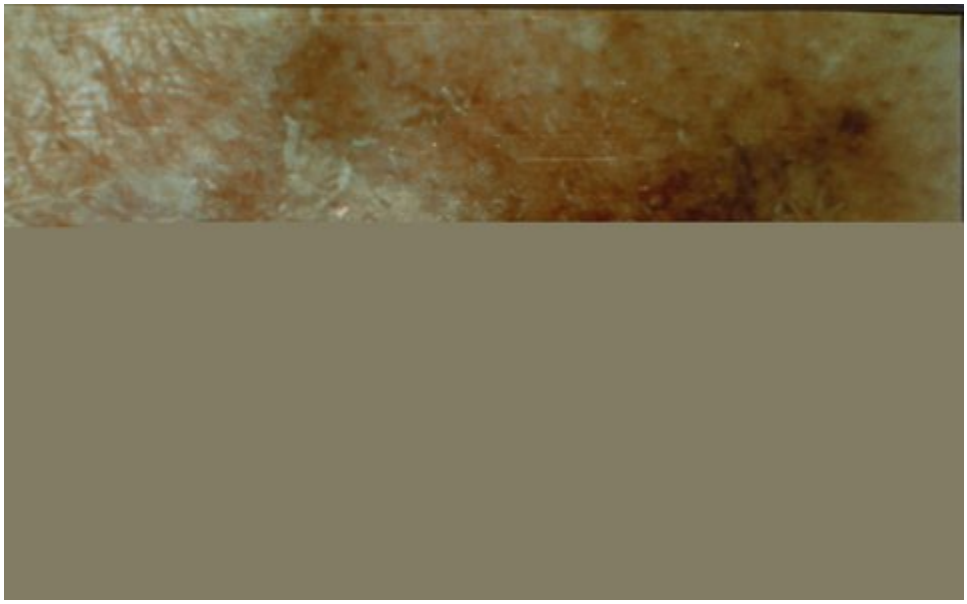

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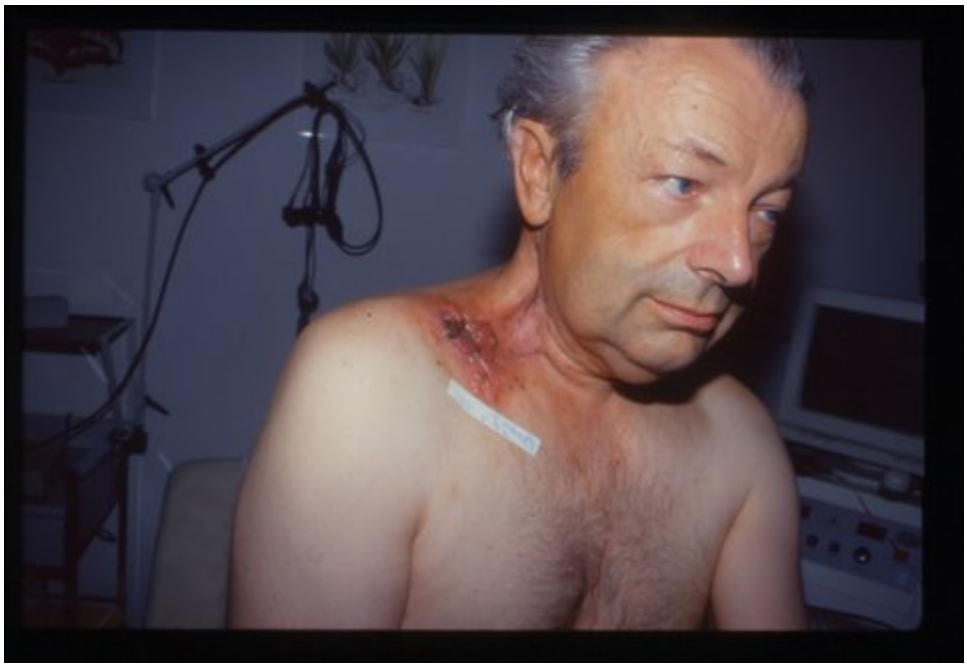

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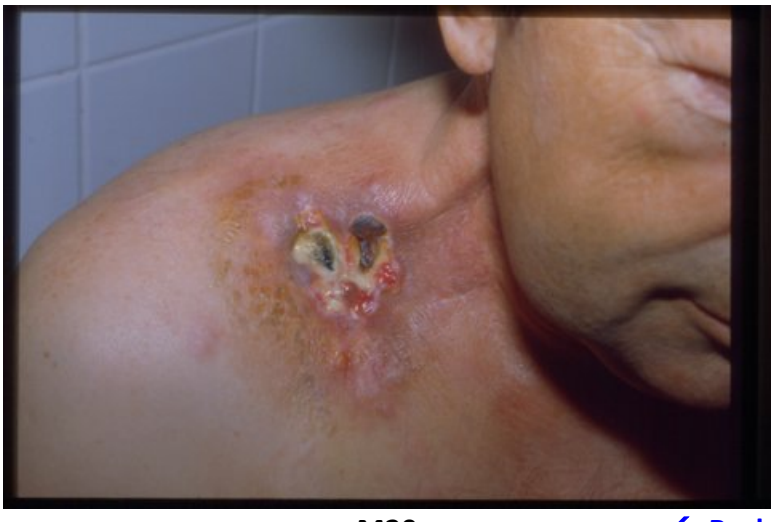

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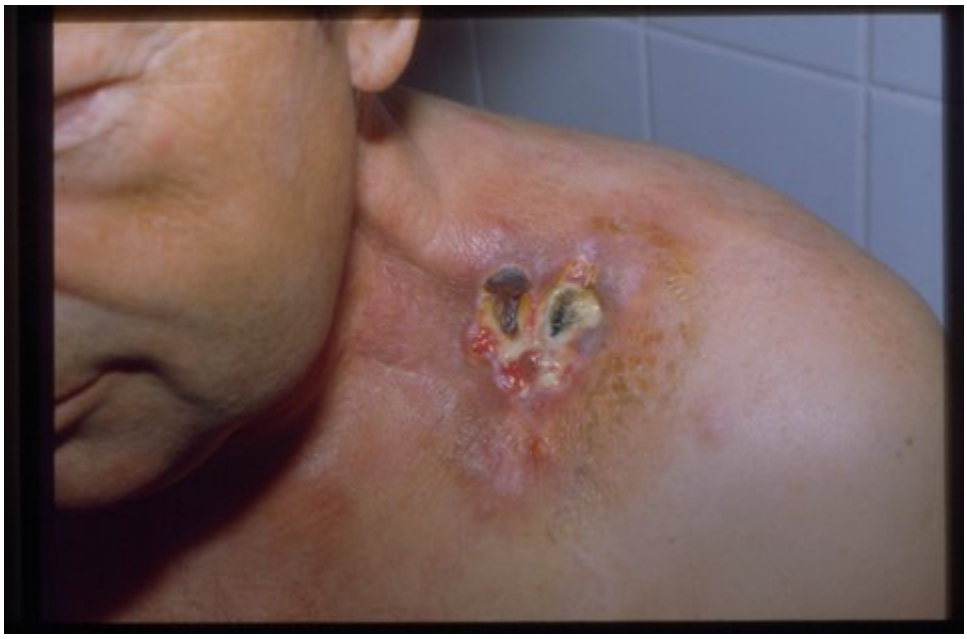

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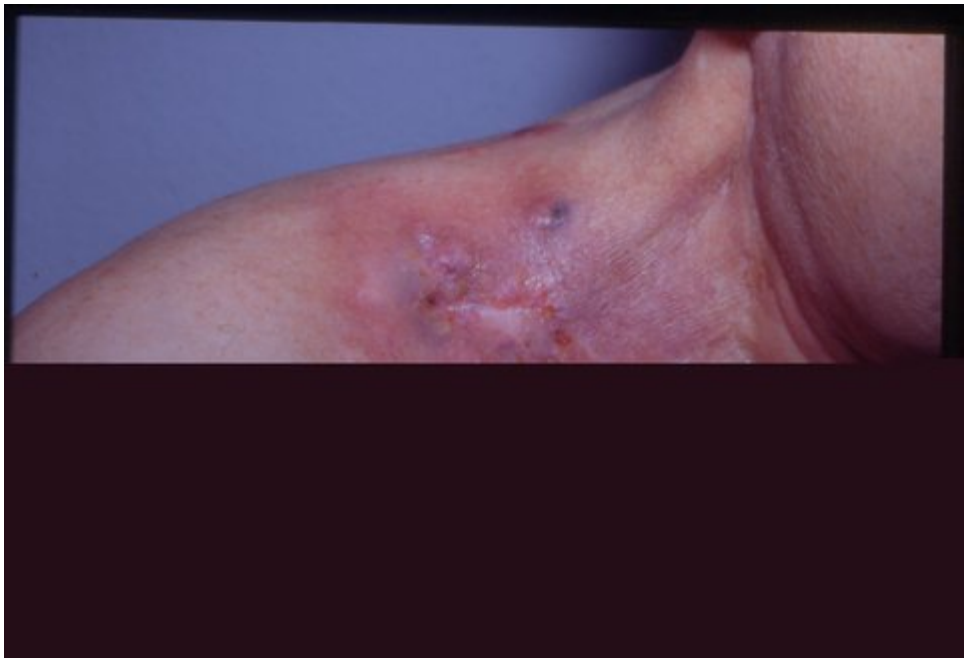

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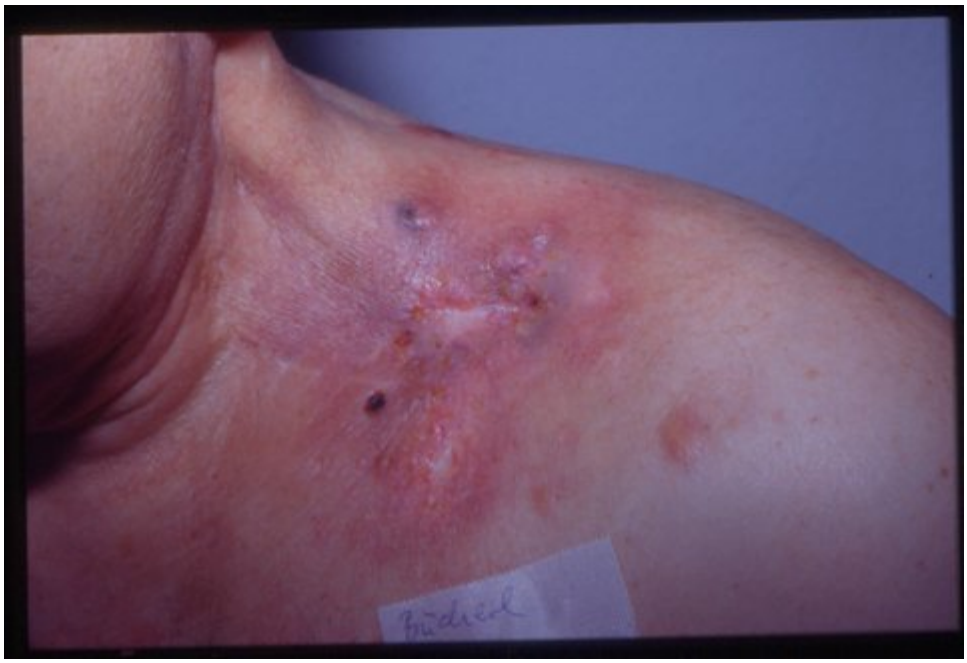

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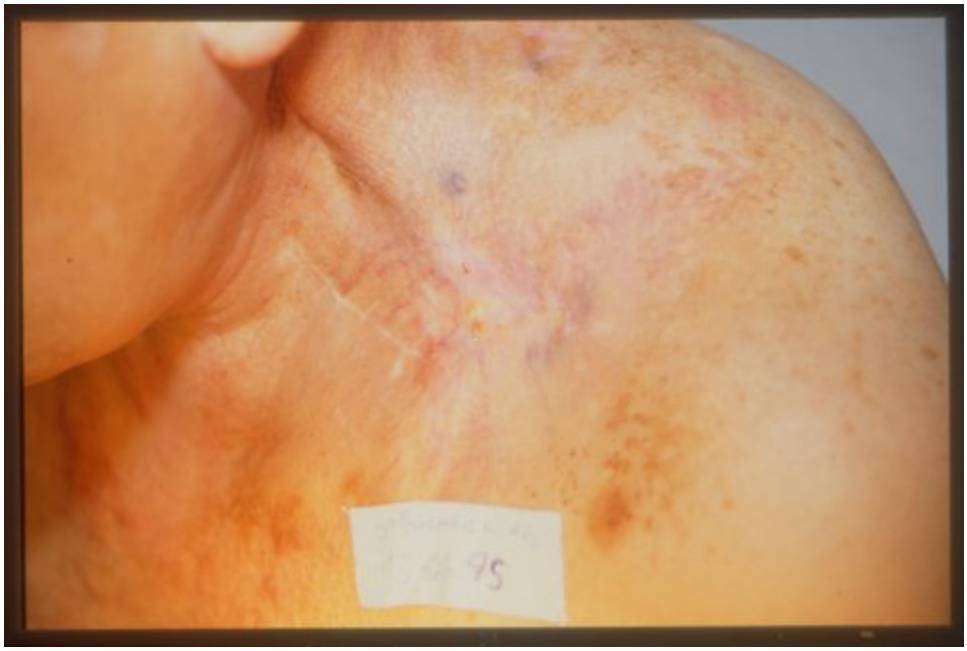

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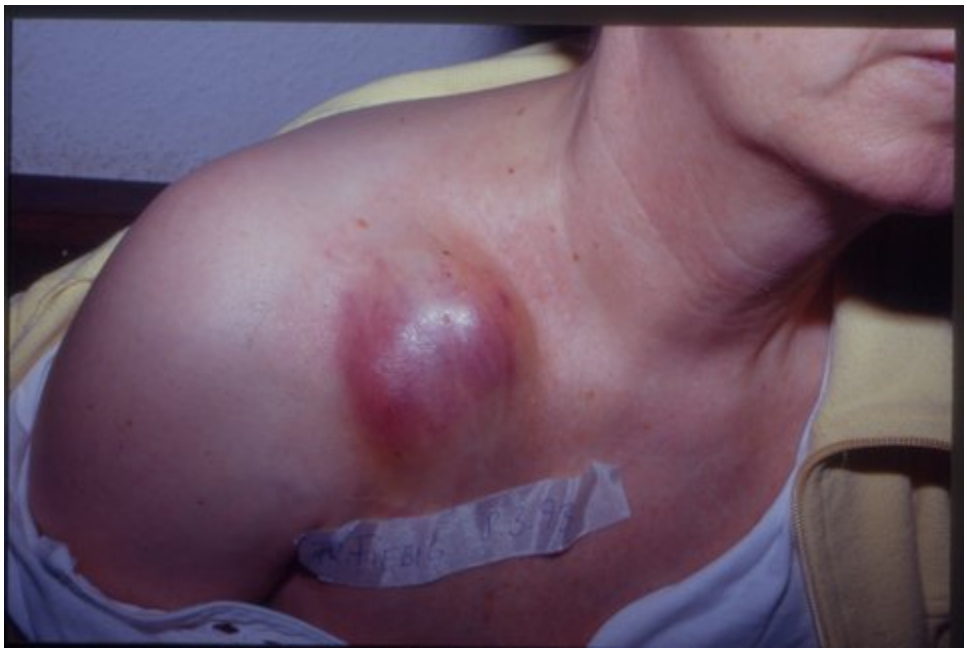

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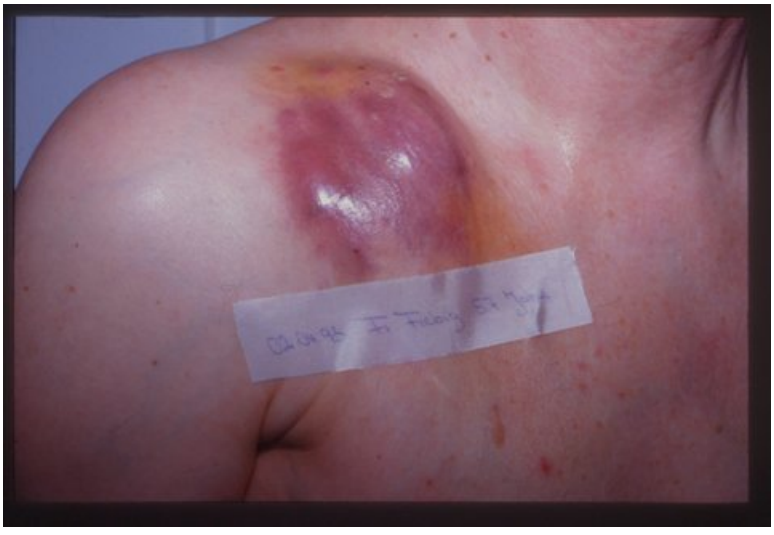

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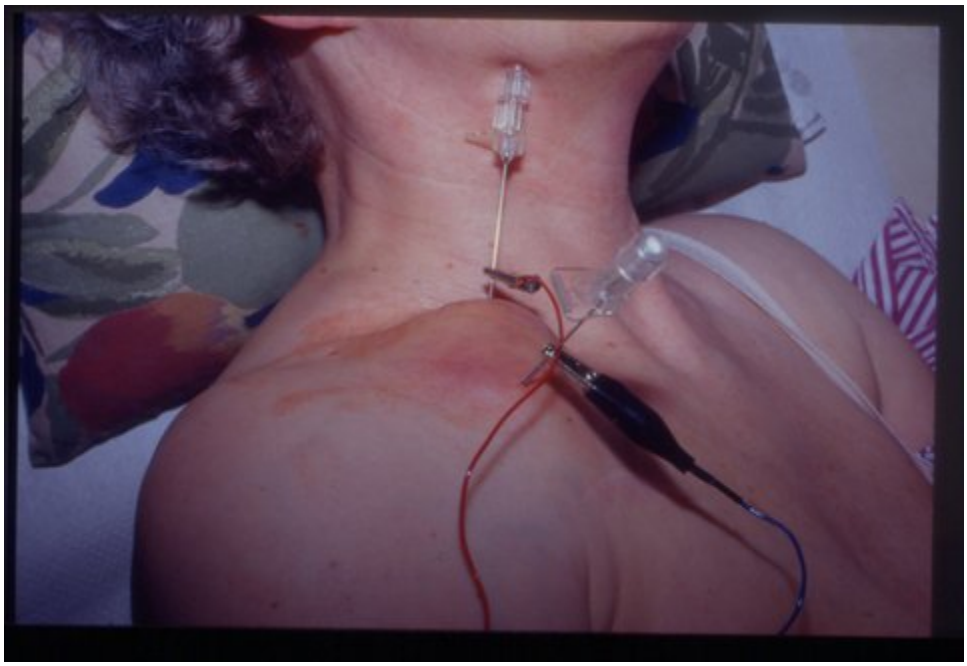

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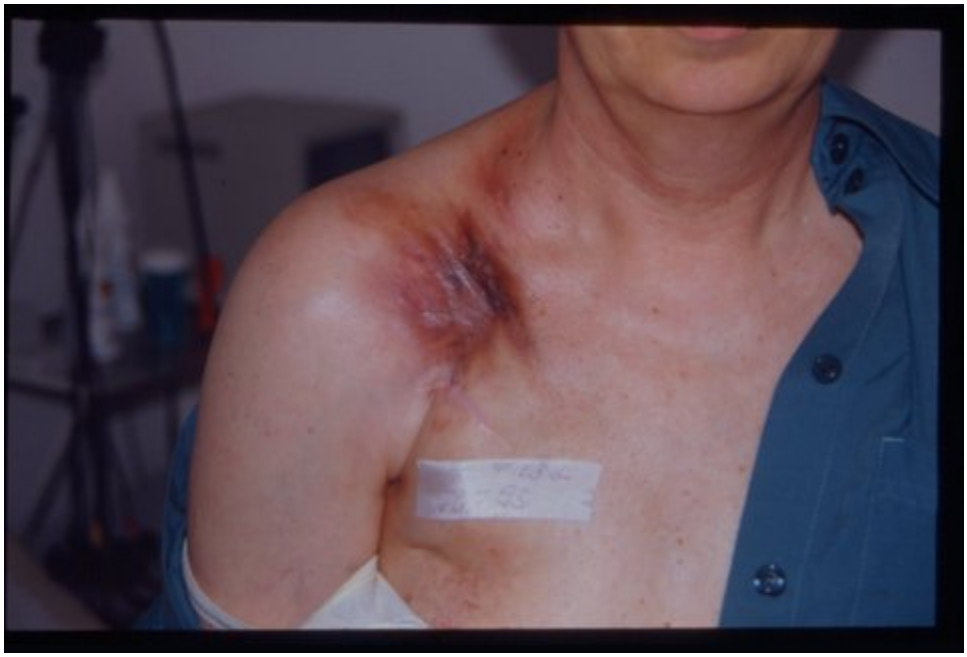

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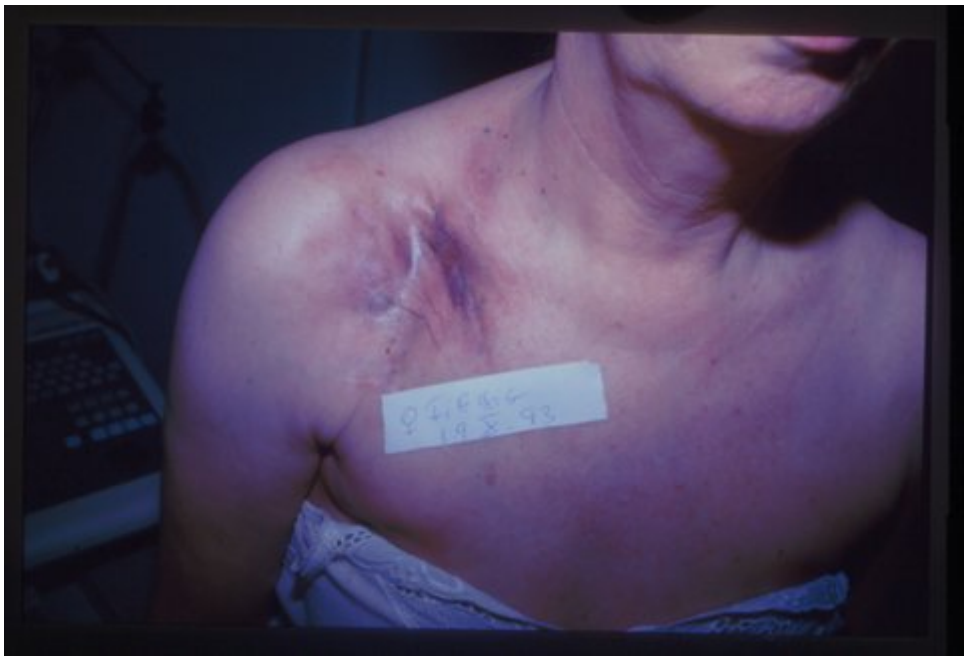

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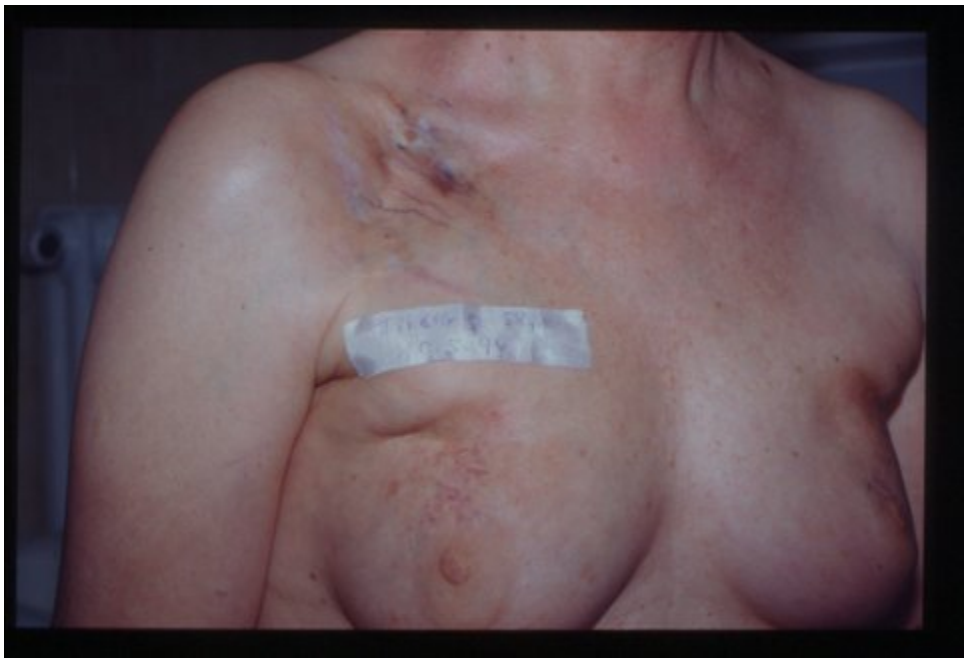
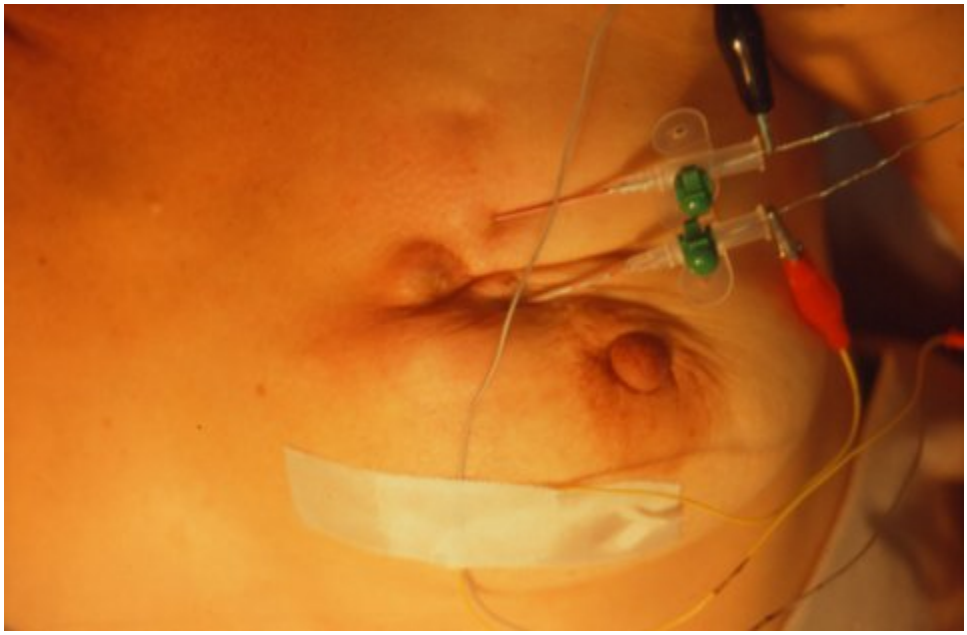
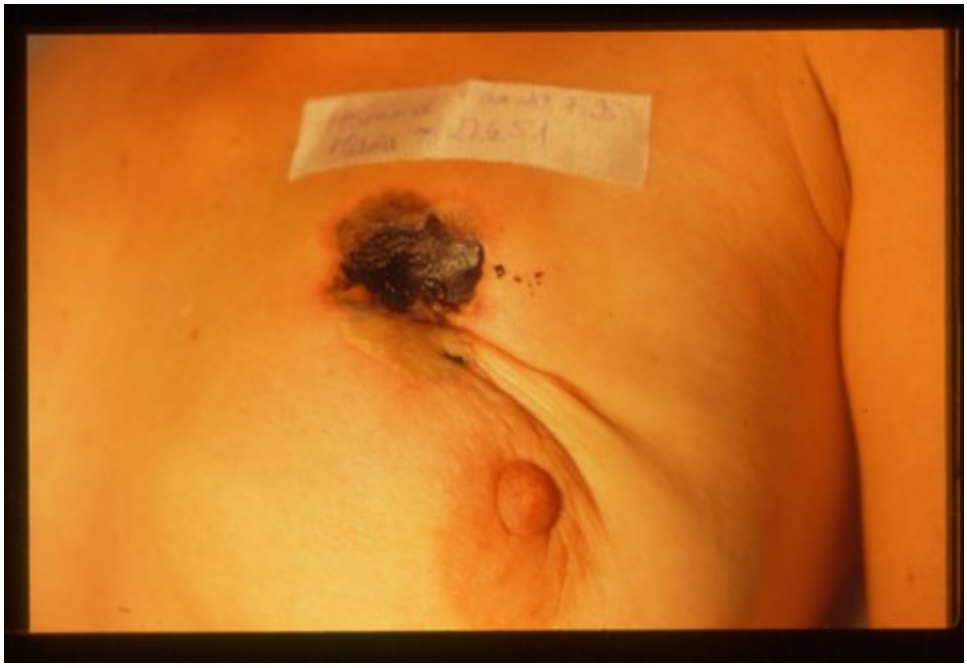


M28 [← Back]

Take the Test

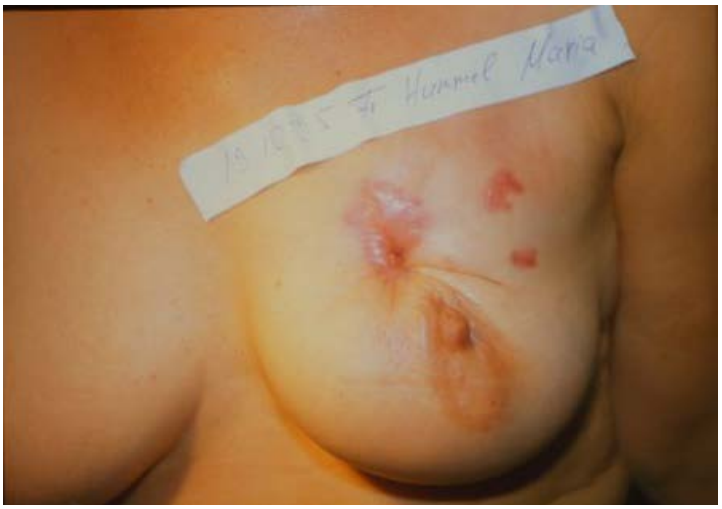


M29A [← Back]

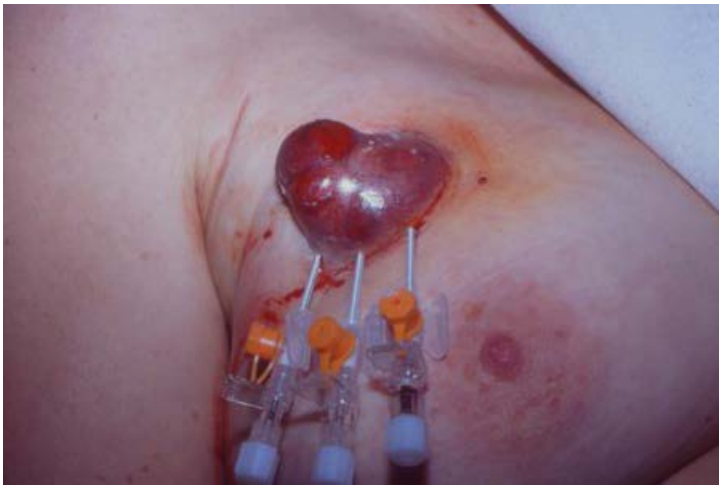


M30 [← Back]

Take the Test

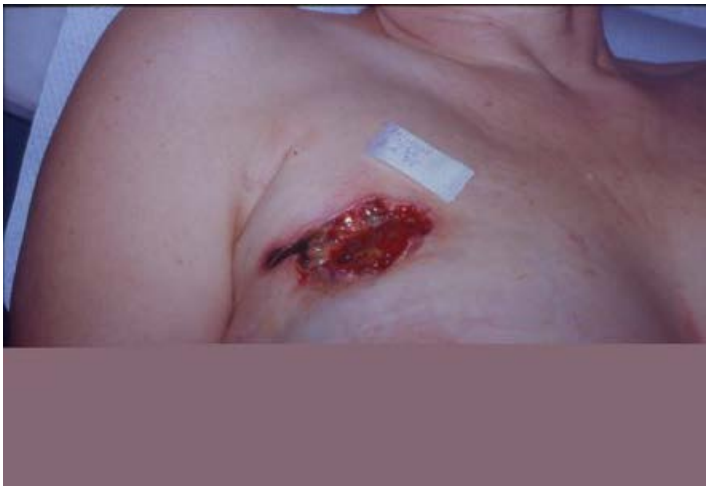


M32 [← Back](#)

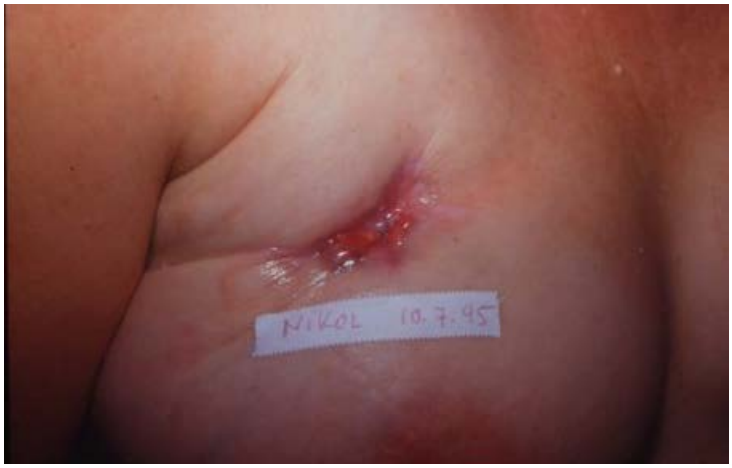


M33 [← Back](#)

Take the Test

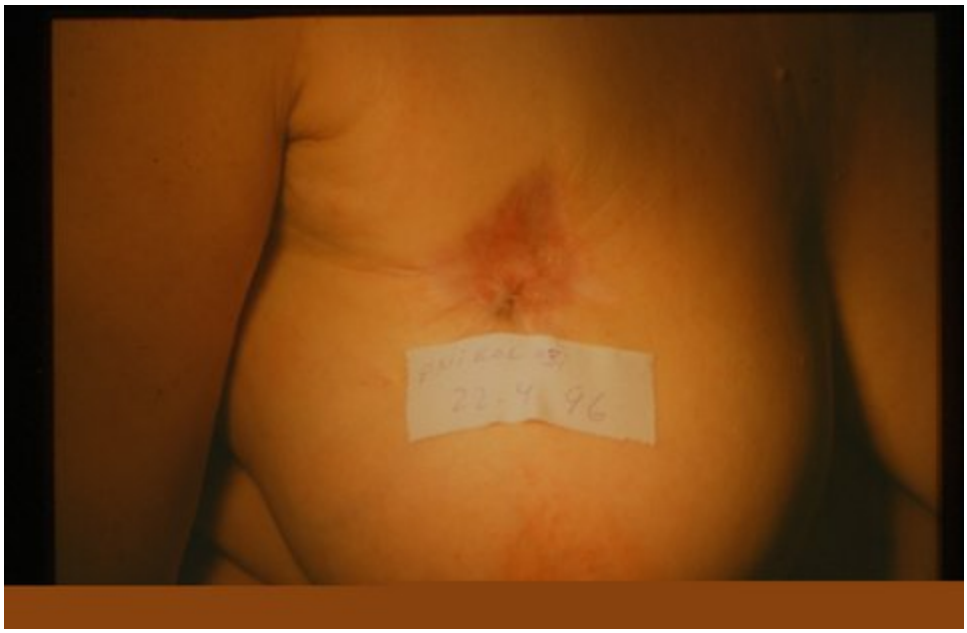


M34 [← Back]

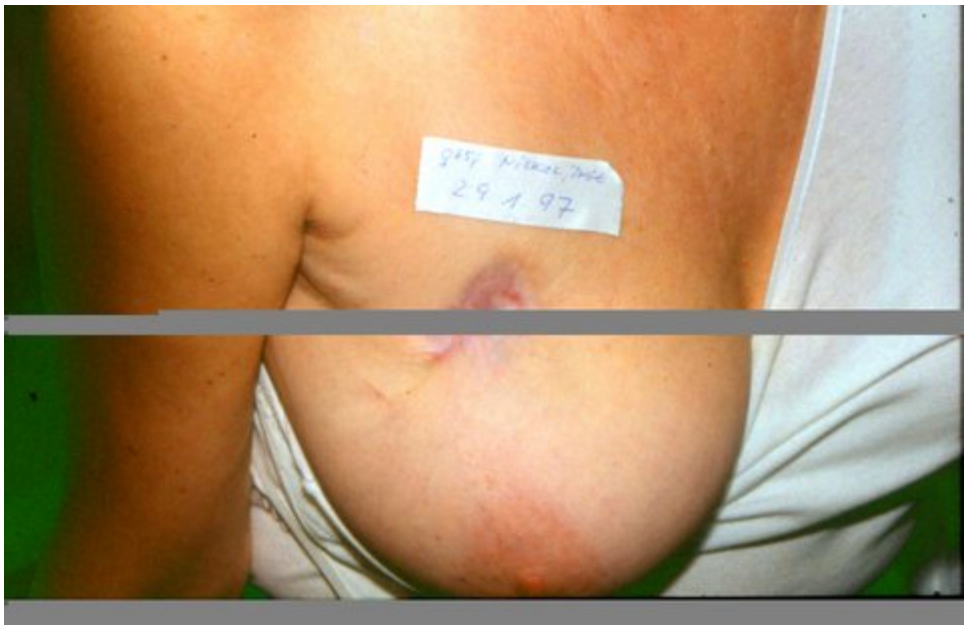


M35 [← Back]

Take the Test

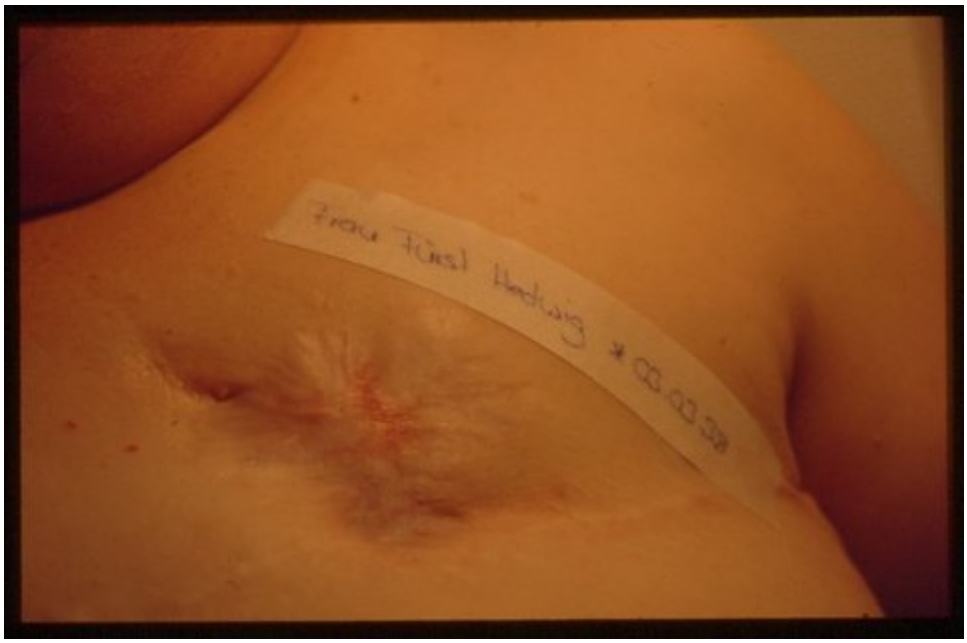


M36 ← Back

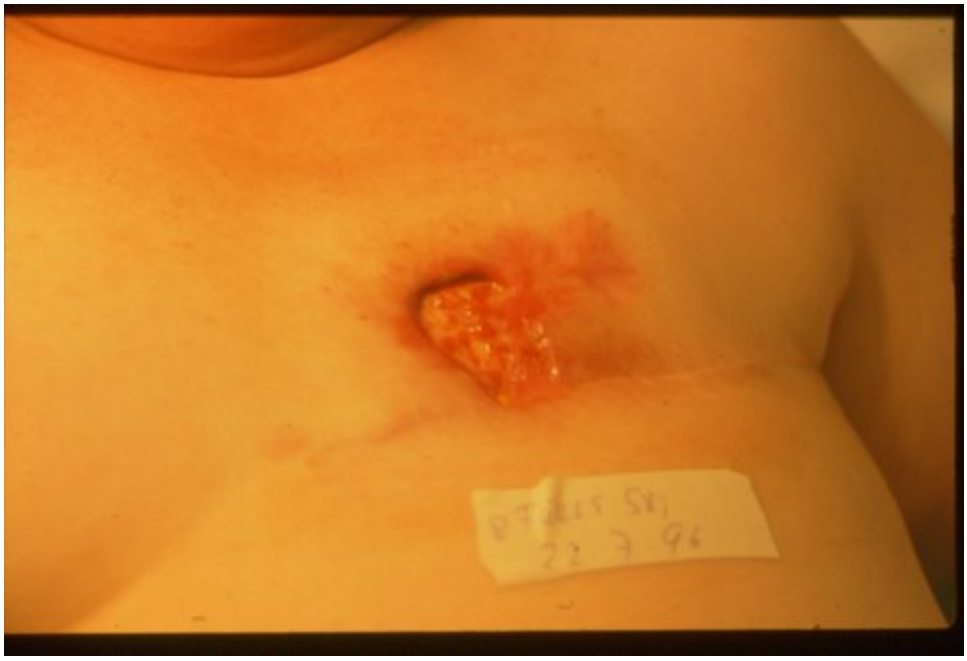


M37A ← Back

Take the Test

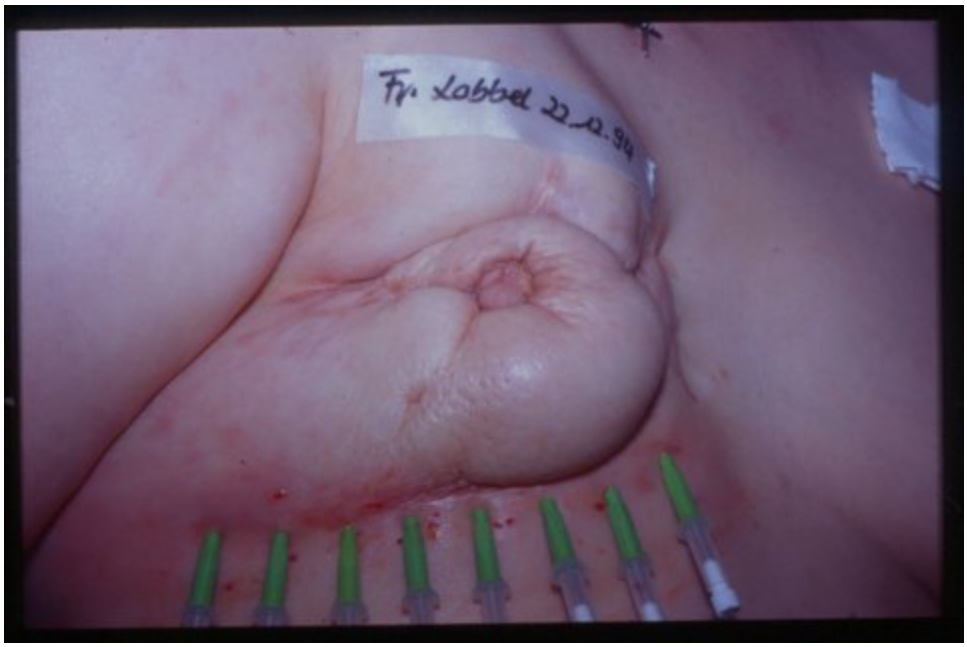


M38 ← Back

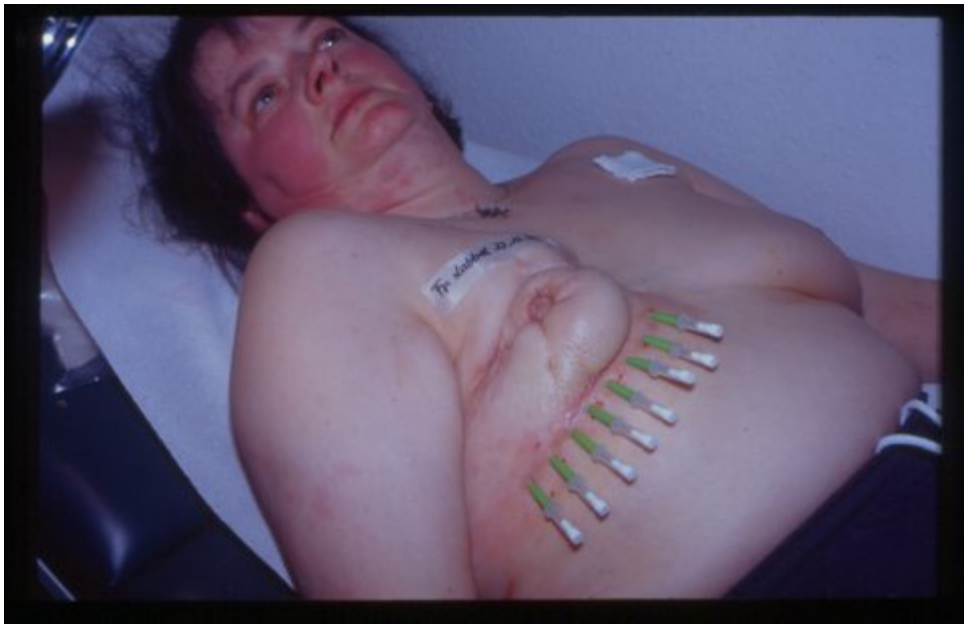


M39 ← Back

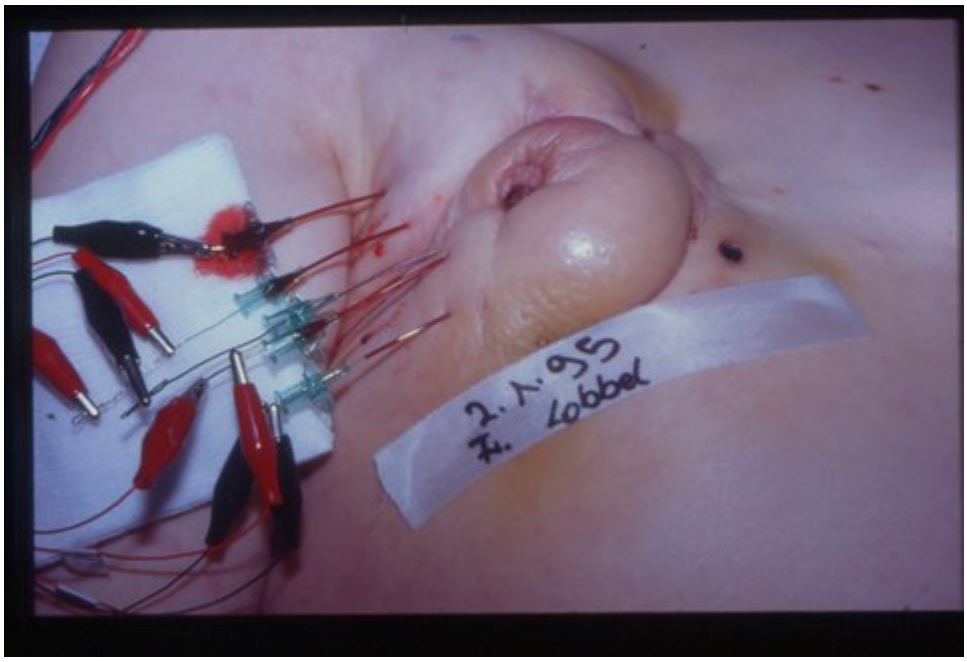
Take the Test



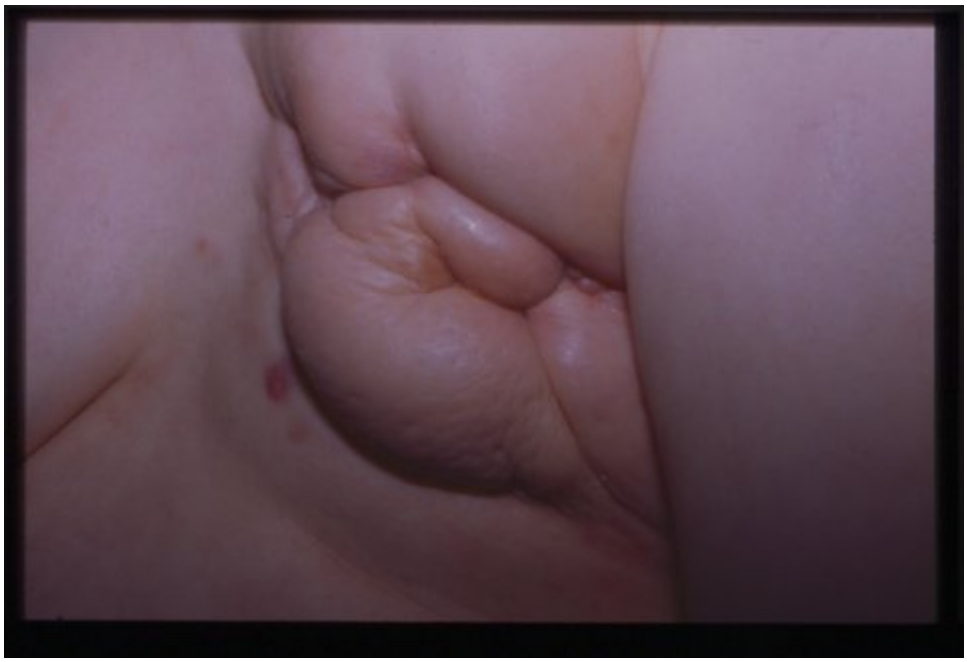
M40 ← Back



M41 ← Back

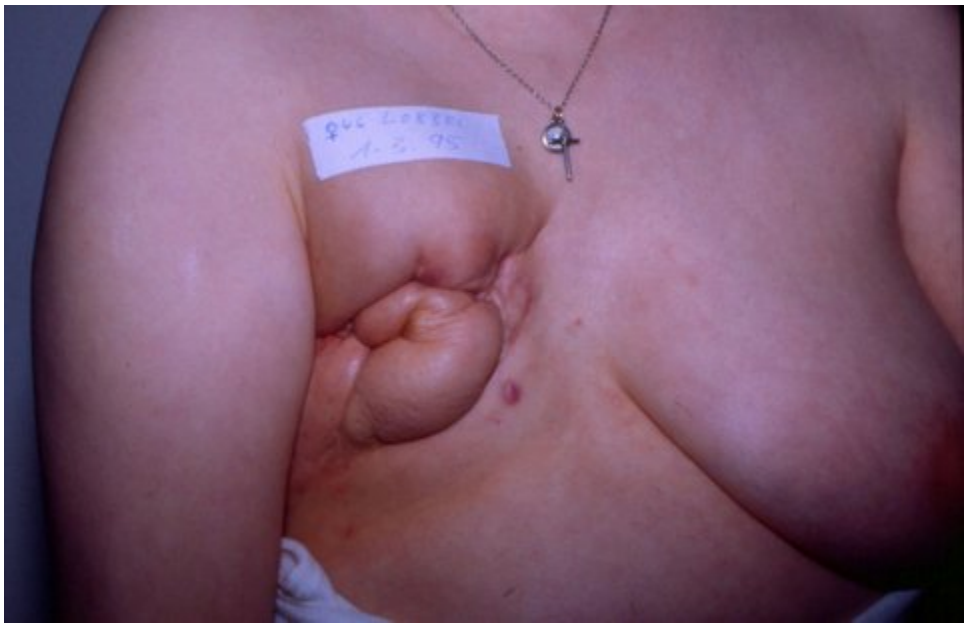


M42 [← Back]



M43 [← Back]

Take the Test



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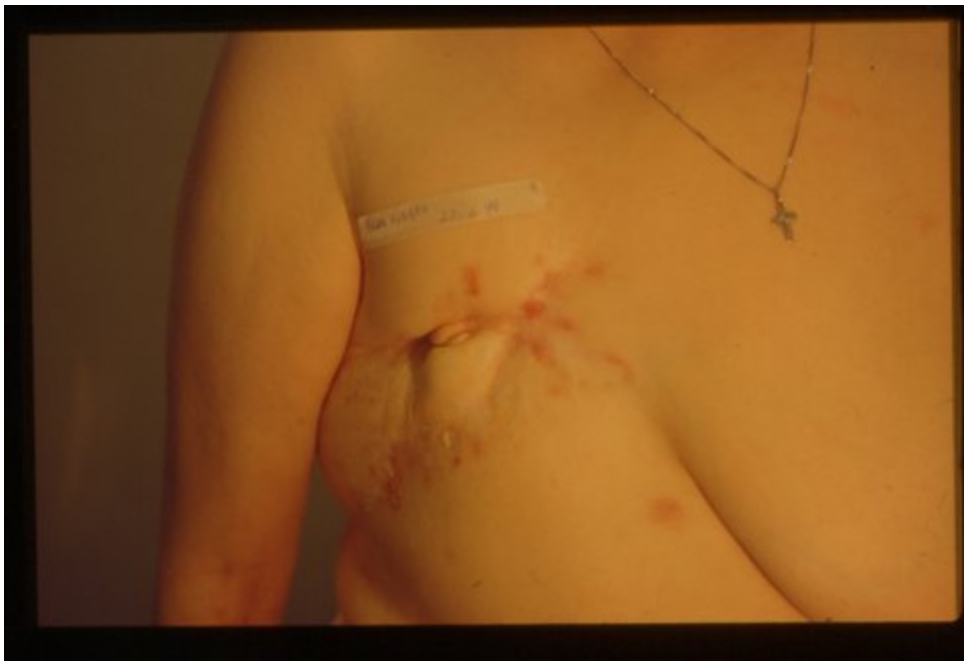
M45 [← Back](#)

Take the Test



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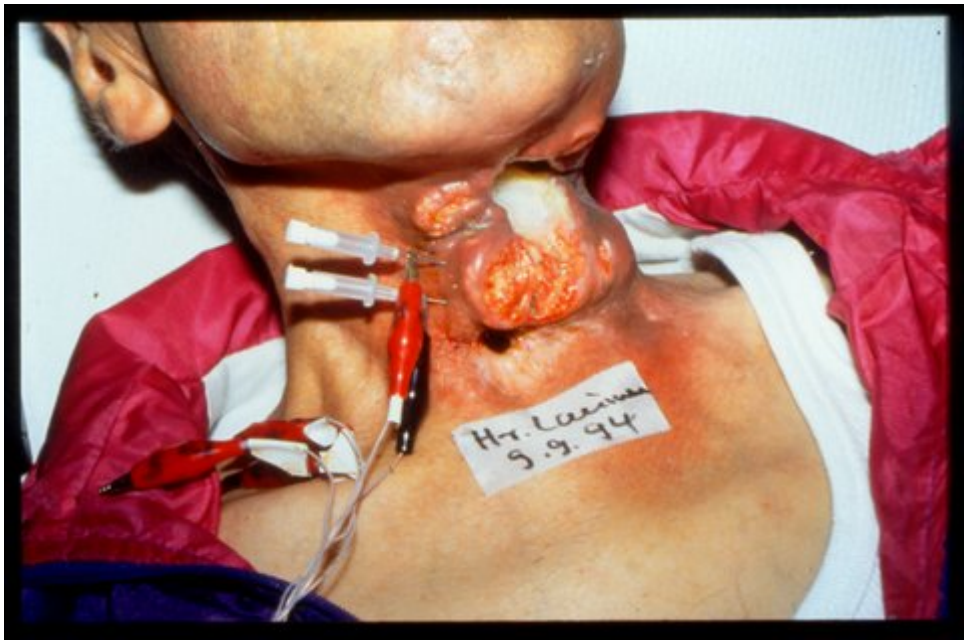
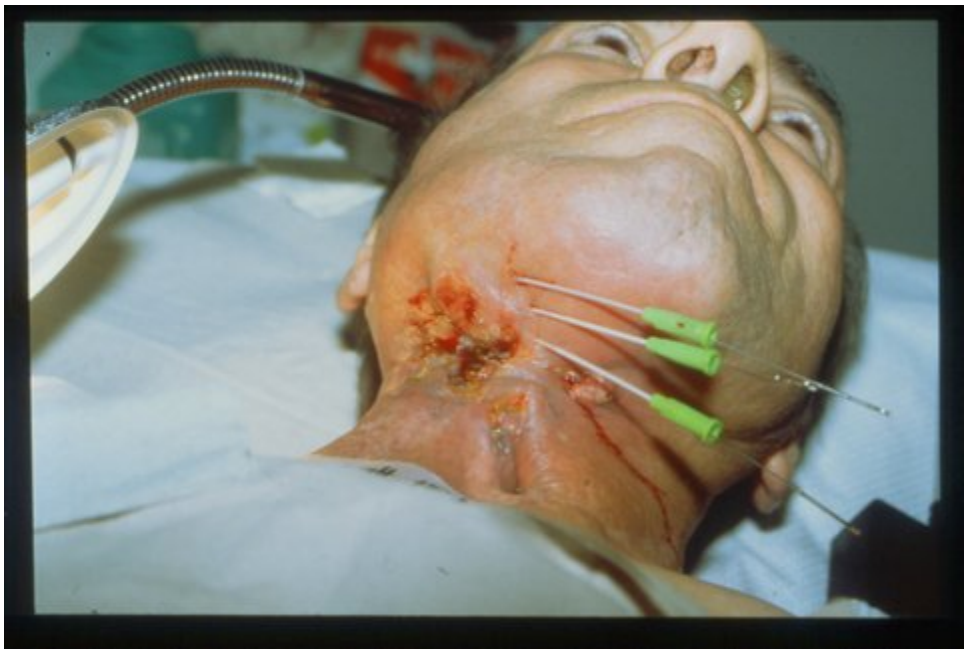


M51 [← Back](#)

Take the Test



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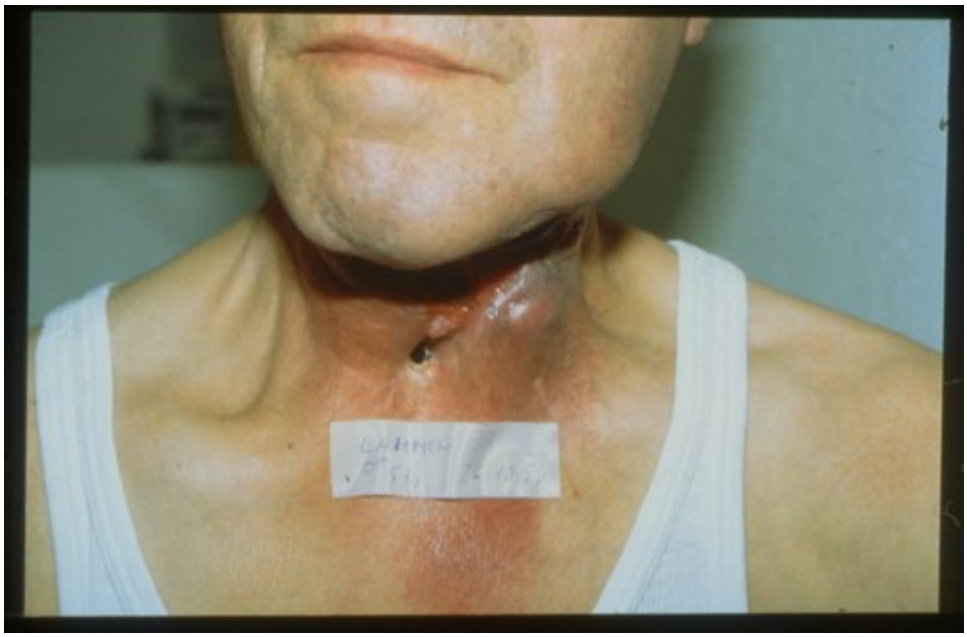
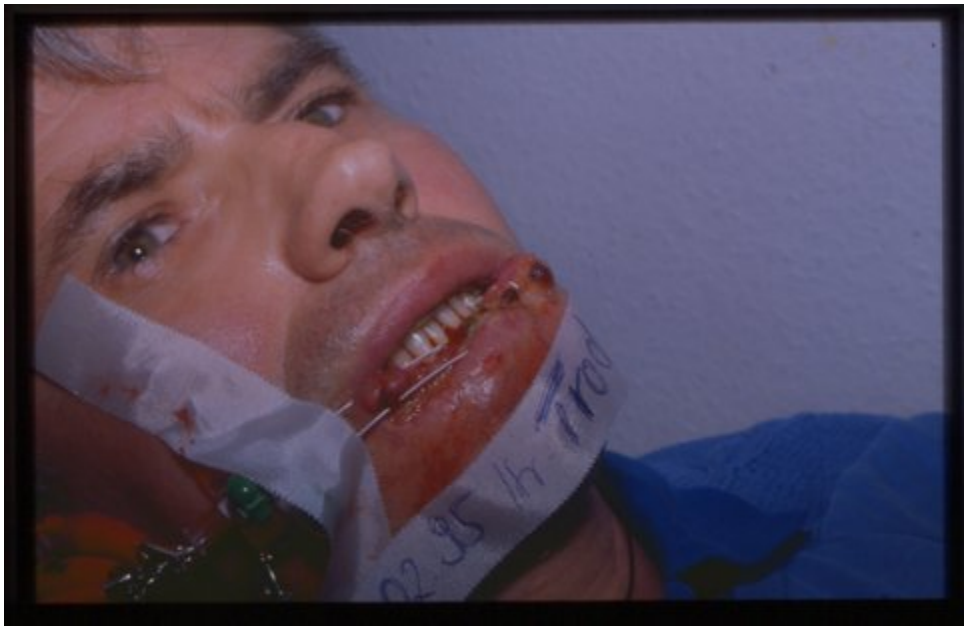
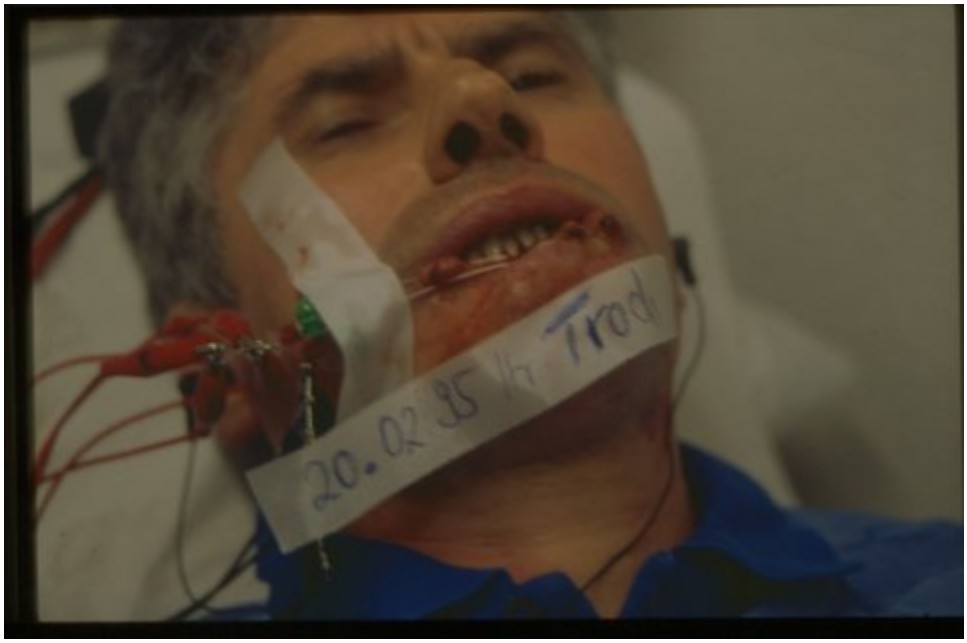


M53 ← Back

Take the Test



M54 [← Back]



M55 [← Back]

Take the Test

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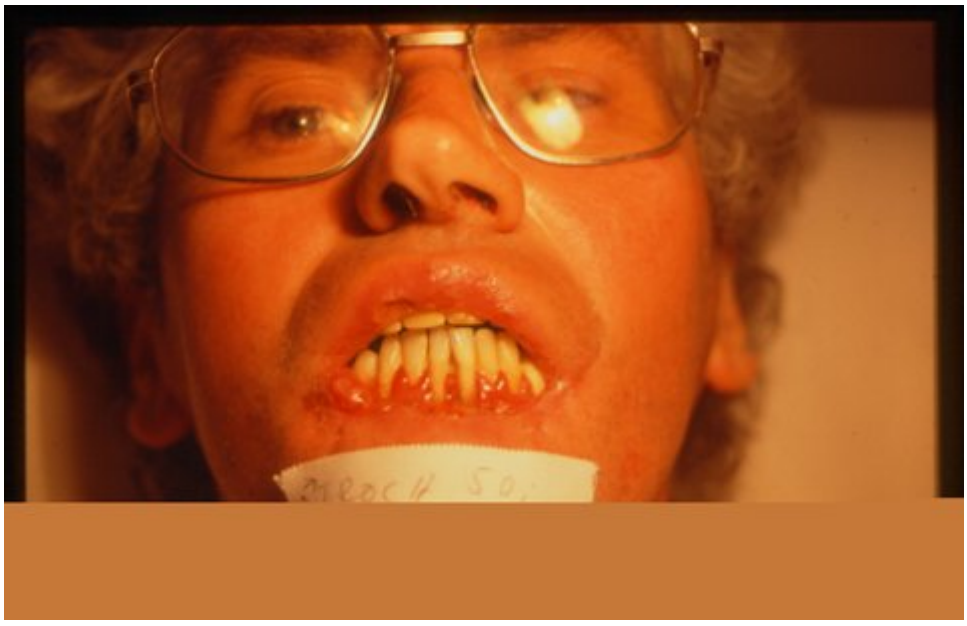
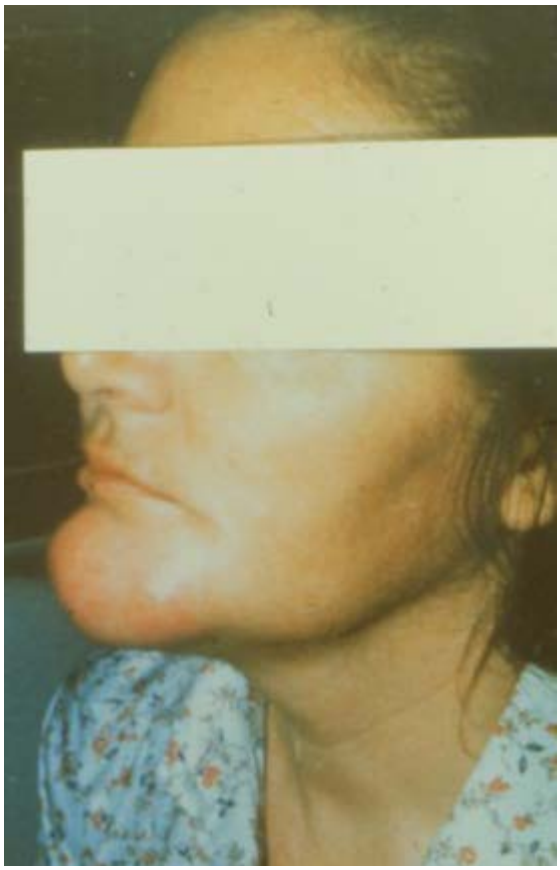
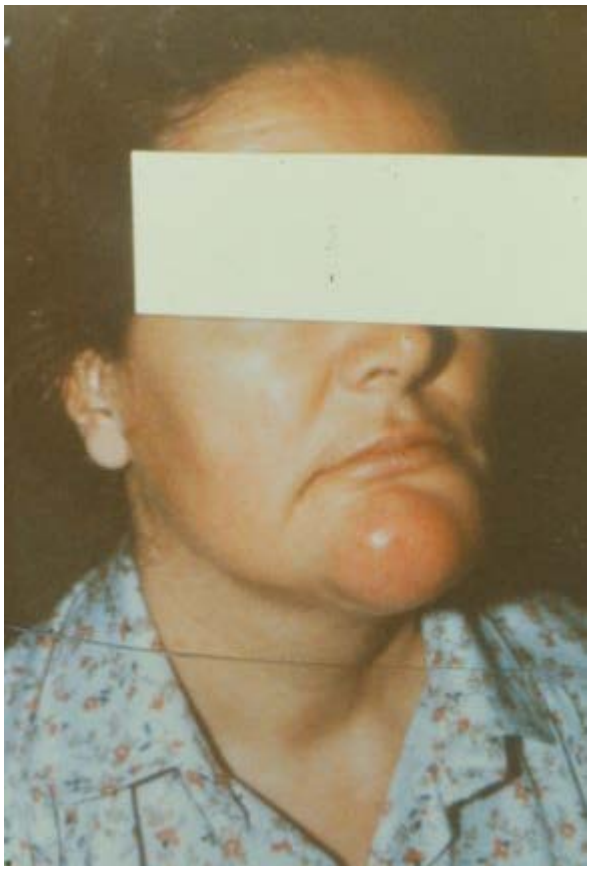


M57 [← Back](#)

Take the Test



M58 [← Back](#)



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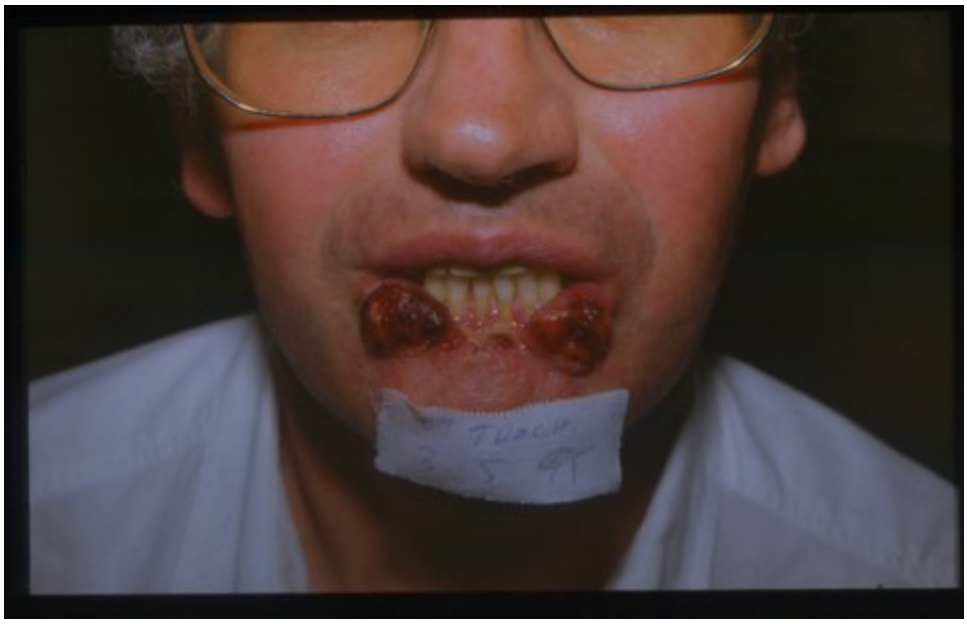
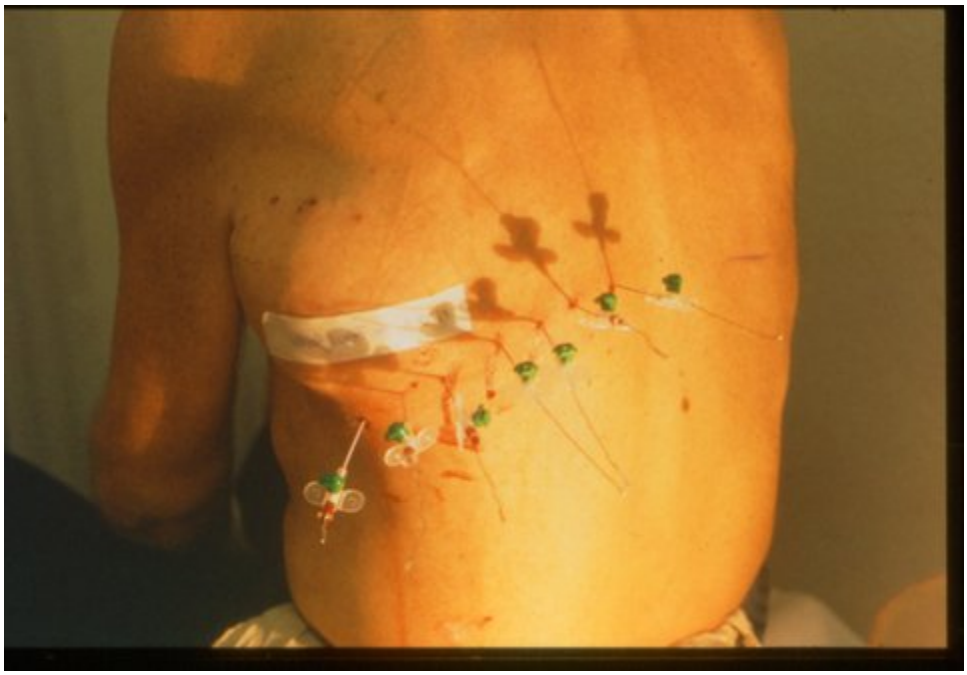
Take the Test

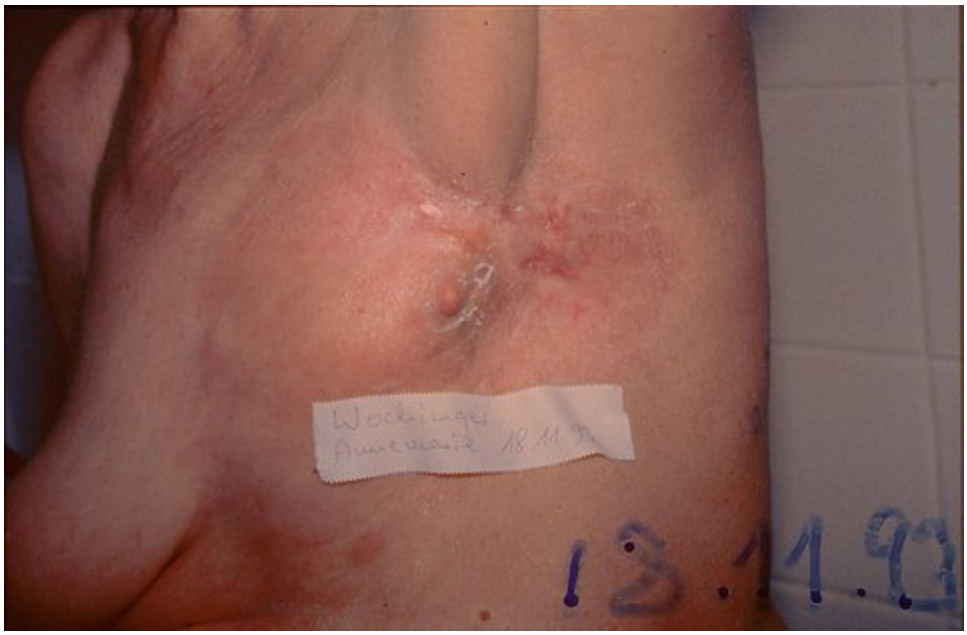


M61 [← Back]



M62 [← Back]

Take the Test



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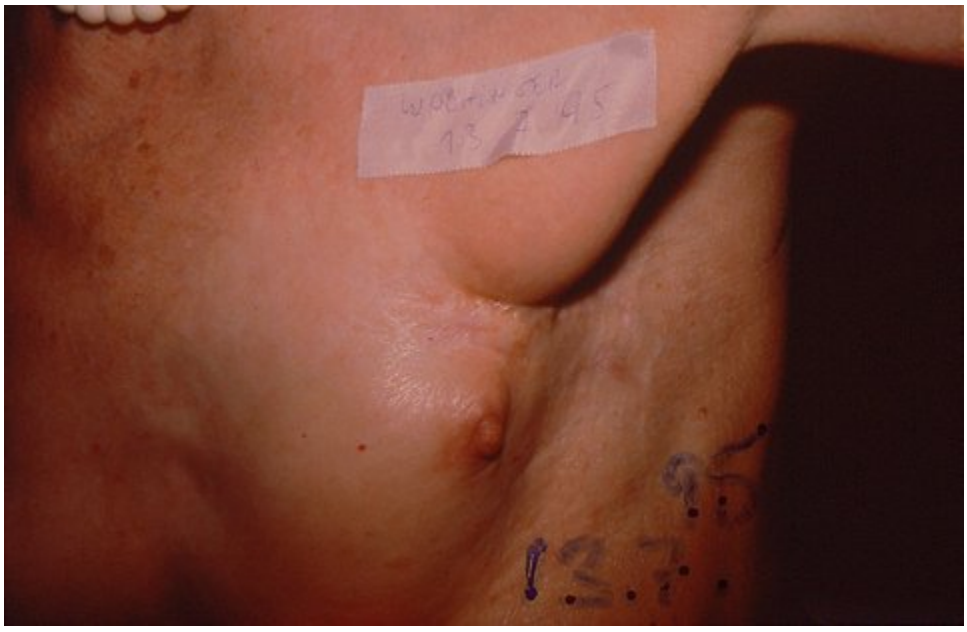

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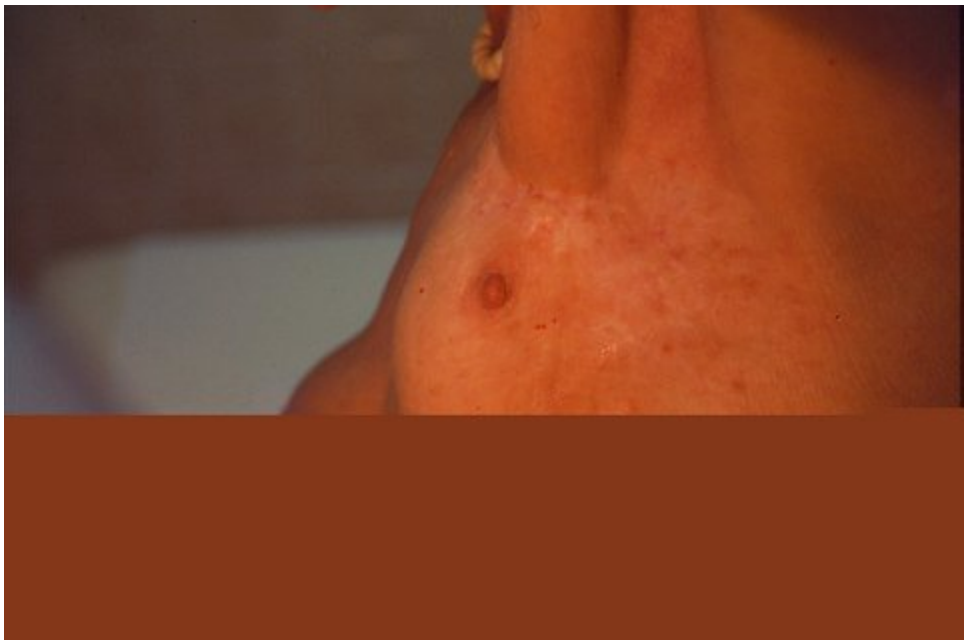
Take the Test



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Take the Test

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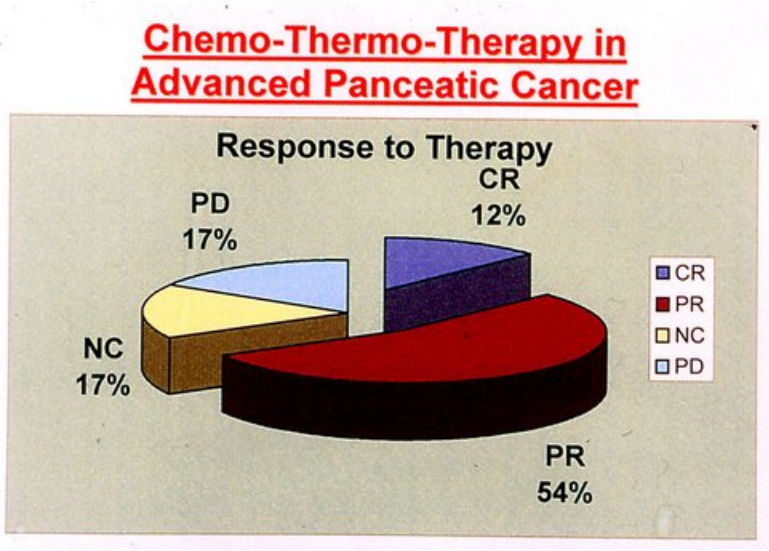
Take the Test



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Take the Test