RAYMEDY THERAPY

A SCIENTIFIC EVALUATION

BY:

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INTRODUCTION.

The Raymedy Smart Healthcare contains 3 modules,

- *the elektro-dermal-screening module, (Bio-impedance or skin-resistance measurement),*
- *the thermography module,*
- *the low level light therapy and*
- *the pulsating electromagnetic field (PEMF) therapy module.*

In this documentation the most important biophysical and physical-chemical as well as biochemical and anatomical principles of the involved modules and functions are condensed.

ITRONIC EDA MODULE.

A SCIENTIFIC EVALUATION OF ELECTRO DERMAL SCREENING

AN OVERVIEW OF THE PRINCIPLES OF ELECTRO-DERMAL SCREENING AT SPECIFIC SKIN ZONES AND THE VALIDITY OF THESE MEASUREMENTS FOR PREVENTIVE SCREENING AND FOR MONITORING THE EFFECTS OF TREATMENTS, AS DERIVED FROM SCIENTIFIC PUBLICATIONS ARE DESCRIBED.

THE SYSTEM FOR ELECTRO DERMAL SCREENING

INTENDED USE:

System for

- *preventive screening;*
- *detection of pathologies;*
- *monitoring effects of treatments;*

HISTORY

The Itronic EDA-module of Raymedy is a copy of the Russian electro-dermal screening system that has been developed for the purpose of monitoring the health of cosmonauts during long term space travel. This Russian system has been used since 1984 during the Bhuran and MIR-space programs. Sagrjiadski et al (1996) have published a number of studies about the results, that have been endorsed by the Russian Academy of sciences. Similar systems have been developed since for

which accessible clinical studies have been carried out (Lurie, 2007; Zimlichman, 2007).

ANATOMICAL, NEUROLOGICAL AN BIOPHYSICAL PRINCIPLES

Raymedy Itronic EDA methodology is based on known neurophysiologic principles and research into the reflexological pathways between the body's internal organs and the skin. It is based on the following components:

· The skin and all nervous tissue develop during embryonic growth from the identical metaphase plate, the ectoderm.

· Correspondence among the innervations of visceral structures, organs and their representative skin zones (dermatomes, Heads zones, referred pain zones, metameric overlapping zones, Chinese reflexological zones, zones of autonomic innervations, classical connective tissue zones and muscle meridians). See fig.2.

· Physiology of the standard nervous system pathways, including the visceral-visceral, visceral-somatic, somatic-visceral, somatic-somatic and visceral-cutaneous reflexes.

· Pathophysiology of damage to internal organs and corresponding reflex reaction of the nervous system.

· Changes in the electrical potential and impedance of the cells/issues/organs of human body correspond to various disorders of internal organs.

Changes occur to the inter/extra cellular balances of ions, fluids, metabolic substance, neuropeptides and inflammatory mediators due to physiological and pathophysiological processes within the object (cells/tissues/internal organs). These imbalances provoke changes of electrical impedance in the object and transfer the electrical impulses with abnormal potential to the dorsal horn of the spinal cord and the metameres. The differences in impedance and potential from an internal organ may be registered in several representative dermal-visceral zones (DVZs) both inside and outside the same metamere.

A strict intercommunication between impedance values at certain skin zones, i.e. the Headsche Zones and normal/abnormal conditions of corresponding internal organs has been determined (Lurie, 2007). Each internal organ has corresponding zones on the trunk and on the limbs. Lurie and Zimlichman (2007) examined DVZs both on the trunk and on the limbs and established that the information from the limb-zones is an average value of the impedance of all zones of a specific dermal-visceral interconnection.

INTERPRETATION AND GRAPHICAL REPRESENTATION BASED ON NORM-VALUES AND TCM CONVENTIONS.

The norm-values and algorithms that resulted from the Russian studies were made available to Raymedy as well as the collection of raw data. These values have been

applied in the software, together with the conventions of traditional chinese medicine (TCM) and acupuncture for the representation of meridians and the related functions and organs (Schnorrenberger, Hempe, 2001, Taschenbuch der Akupunktur). Secondly the technical specifications with respect to measurement pulse, choice of material, sampling and mechanical pressure of the sensor at the skin, have been used as well. These specifications have been chosen because of the minimal impact on the structure and bio-chemistry of the skin, i.e. acupuncture-points (Sagrjadski et al, 1996. several publications. Treugut, 1999).

In two independent studies the measurements have been validated. (Sponring, 2003; Bosma, 2006). Sponring showed that in a population of healthy athletes the eda-measurements are more reactive and accurate than lactate-values.

The study by Bosma, based on a major animal trial with measurements of several hundred cows, published in the peer-reviewed journal Livestock Science 99, 2006 showed that veterinary health parameters, such as Days in milk, estimated recovery of energy balance after calving, body condition score, natural logarithm of somatic cell count, number of ingestions, costs of veterinary, mortality rate, immunological parameters were closely and inversely related to skin resistance values.

Table 5 Impedance (mΩ) at 6 acupuncture points of lactating dairy cattle in herds with good (n=69) health status or with poor health (n=100); (n for BL 49: 51 and 86, resp.)

Health status	BL15L	BL15R	BL49L	BL49R	BL52L	BL52R
Good	4.0 ± 0.25	3.2 ± 0.16	3.9 ± 0.29	3.5 ± 0.19	3.6 ± 0.26	3.1 ± 0.20
Poor	5.0 ± 0.26	4.2 ± 0.22	5.1 ± 0.38	4.6 ± 0.33	4.4 ± 0.30	4.3 ± 0.22

From the literature norm-values are known that indicate the presence or absence of stress or for depletion of energy. These normative values have been the subject of two research projects (Sponring, 2003, and Bosma, 2006).

Secondly, a parameter-free test has been developed for the characterization of the type of distribution of the measurement-values. The type of distribution is indicative for the nature of the vegetative regulation of the organism (Klimek, W, 2004; Popp, et.al, 2004): normal adaptation (elastic, within a certain bandwith), no adaptation (blocked), or chaotic (Gauss) adaptation.

Norm values:

As norm values and thresholds for hyper, normal energy levels and hypo-energetic levels indicating vegetative stress or depletion, we used the following values, cF Sagrjadski i et al (1996):

Normative range = 1.000 – 2.000 KOhm; with children (depending on age) 400 – 800 KOhm.

below 500 **KOhm**	
	excessive hyper energy: possibly caused by moisture at the skin. Therefore the oints of measurement need to be dried with a tissue after which the measurement can be repeated. When te result is the same, the energy excess is true and signifies a blocked energy regulation for example due to excessive stress, overtraining, pain, or a foci, acidifaction or inflammation. A possible remedy may be to give Calcium-Magnesium tablets, breathing excercise or relaxation, may be even anti-biotics or zappin
600 – 501	
	Strong hyper energy: See above but less strong. It may include a stagnation at the organ-level. dies bedeutet eine Verkrampfung und eine Stauung in diesem Organ. De-acidification is necessary.
700 – 601	
	Intermediate hyper energy: See above. This also indicates a cramped situation with stagnation at the organ-level.
800 – 1000	
	Hyper energy: Same remedies. Relaxation, breathing excercise, glass of water.
1001 – 2000	
	Normal Energy level.
2001 – 3000	
	Lesser hypo energy level: This result shows up very often. It has many causes, from a shortage of sleep and to little exercise, running high on processing food to the beginning of energy depletion due to lack of vitamins or a developing chronic situation.

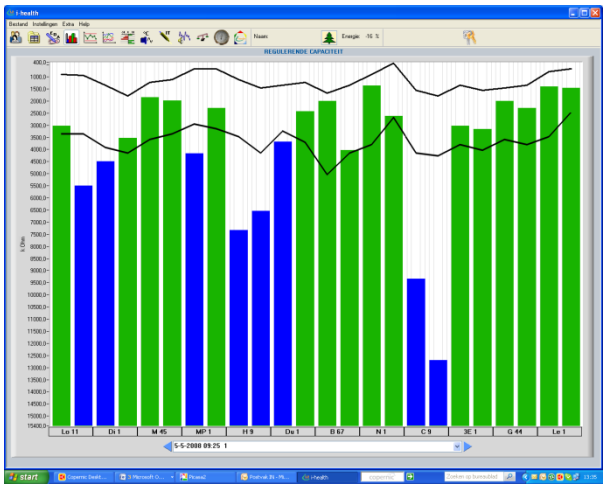


Fig.1. Graphical representation of skin resistance values as compared to norms: Hypo energetic points in blue. Normal energy in green.

ANATOMICAL ASPECTS OF THE POINTS OF MEASUREMENT.

The 24 points of measurement have been chosen because they are the most easy to localize, being located next to the nail bed of the toes and the fingers. This reduces the number of mistakes considerably.

Lu 11:	Nervi digitales palmares proprii des Nervus medianus
Di 1:	Nervi digitales palmares proprii des Nervus medianus
M 45:	Nervus cutaneus dorsalis medialis pedis
MP 1:	Nervus cutaneus dorsalis medialis pedis
H 9:	Nervus digitalis palmaris proprius des Nervus ulnaris
Dü 1:	Nervus digitalis palmaris proprius des Nervus ulnaris
B 67:	Nervus cutaneus doralis lateralis pedis
N 1:	Nervus plantaris medialis
KS 9:	Nervus digitalis palmaris propril des Nervus medianus
3E 1:	Nervus digitalis palmaris proprius des Nervus ulnaris
G 44:	Nervus cutaneus dorsalis intermedius pedis
Le 1:	Nervus fibularis profundus

These points of measurement are not only connected with the vegetative nervous system but they are also defined as belonging to different dermatomes or Heads zones and thus each point is linked, through the spine, to different organs and different parts of the vegetative nervous system as can be learned from every standard anatomy textbook.

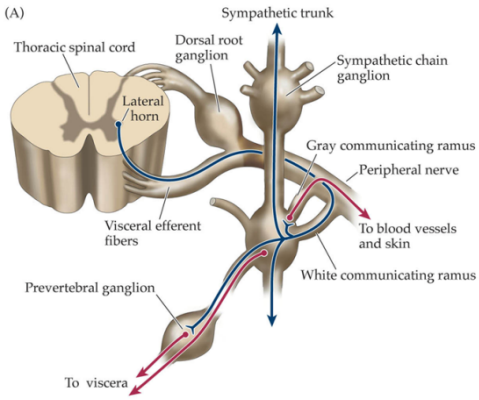
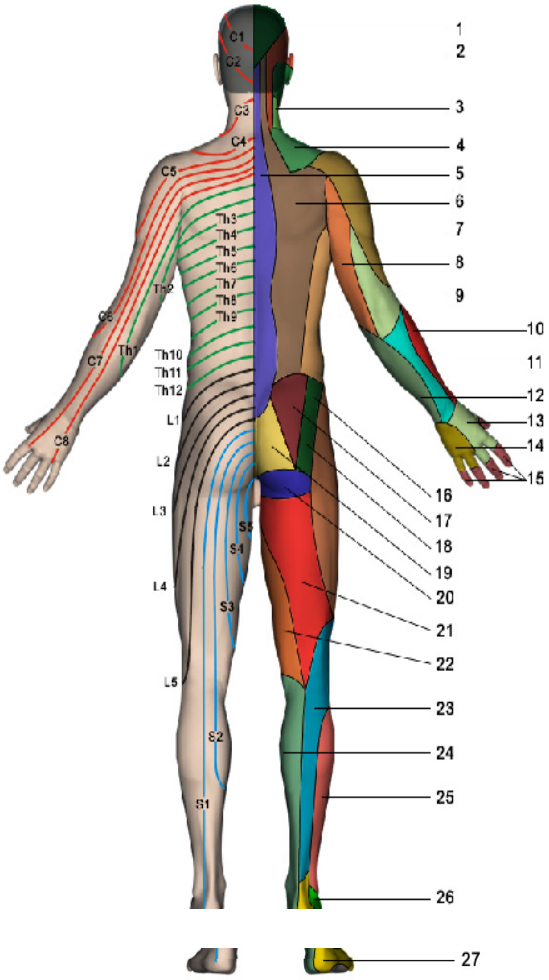


Fig.2. Anatomy of sectional dermal-visceral innervation.



1. Greater occipital nerve
2. Lesser occipital nerve
3. Great auricular nerve
4. Supraclavicular nerves
5. Medial cutaneous branches of dorsal nerves
6. Lateral cutaneous branches of dorsal nerves
7. Upper side skin nerve of a shoulder(arm)
8. Medial cutaneous nerve of a shoulder(arm)
9. Back skin nerve of a shoulder(arm)
10. Superior lateral cutaneous nerve of the shoulder
11. Posterior cutaneous nerve of the forearm

Fig.3. Sectional and skin innervation (dorsal view)

Since these points of measurement at dermal visceral zones are also beginning or end-points of the meridians, the graphs can be interpreted according to the conventions of traditional chinese medicine (TCM). Begin-points are (Large intestine 1, Spleen Pancreas 1, Small intestine 1, Kidney 1, triple heater 1, Liver 1) or end-points (Lung 11, St45, H9, B67, P9, Gb 44) of meridians. See for example Schnorrenberger, 1985; Acupunctureatlas, Seirin; Hempe, 2004: Taschenbuch der Akupunktur. EDT-Verlag).

CHOICE OF APPROPRIATE TECHNICAL CHARACTERISTICS.

Raymedy decided to apply the technical specifications as used for the device by Sagrjadski since

- the technical specifications with respect to the lowest amperage and the lowest specific pressure at the point of measurement

- the best reproducibility and accuracy, as compared to other systems (Treugut, 1994), is the greatest.

- The measurements with devices that use fixed probes can be manipulated and need much training before reliable measurements can be carried out (Larsen on Ryodoraku, Yamamoto, Voll).

Sagrjadski et al(1996) discusses the extensive research and development project in which 22.500 persons were involved to validate the method by comparison of the eda-data with the results of a conventional integral diagnosis. Depending upon the nature of the condition the eda-screening is 75 to 95% accurate. Zimlichman et.al. (2005) reports about similar accuracy with different conditions.

Determining factors for the reliability and reproducibility of the measurements, according to Sagrjiadski, that may irreversibly influence the facies, the connective tissue and the nerves are the measurement current and the mechanical pressure at the point of measurement. It is important:

- to exert a constant pressure at the point of measurement during the sampling.

- An amperage of not more than 4 µA. (The itronic eda pulse is 1 µA).

- A limited duration of the pulse, i.e. of 200 ms.

These values have been taken as design-criteria for the development of the Raymedy itronic EDA device. When higher amperage is used or a higher pressure, the point of measurement will be irreversibly influenced and consecutive measurements become meaningless.

Several studies have shown that with devices that are in conformity with the criteria of Sagrjadskii et al 1996, measurement series are derived that vary only slightly (Treugut,1999, Colbert 2004, Zimlichman, 2007).

Measurements that have been carried out with the Itronic EDA using standard, known resistances, vary less than 1% over the range of measurement 100 – 18000 KΩ. These outcomes cannot be influenced by the operator. These measurements are part of the standard testing procedure for each device.

Colbert et al (2004) found that the reproducibility increases when the measurements are carried out at exactly the same spot. This can be realized by using a felt-pen for marking the points of measurement. Treugut et al.(1999) came to similar conclusions.

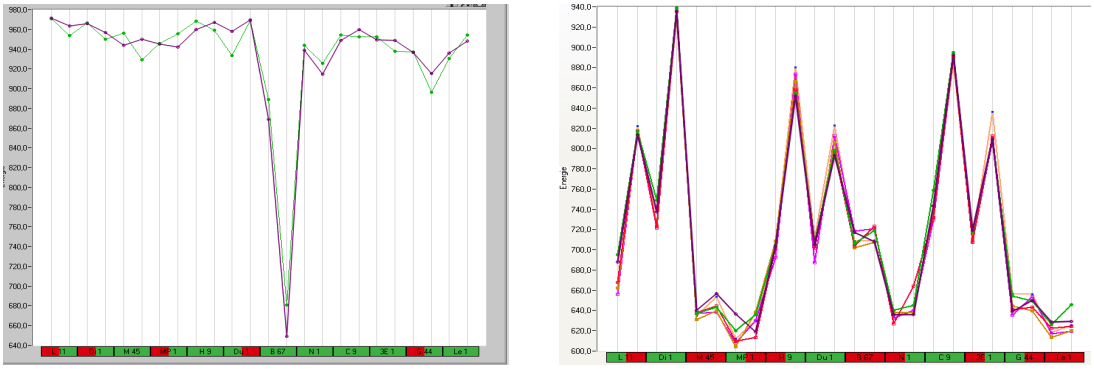


Fig.1. examples of consecutive, reproducible measurements. Left 2 identical measurements, right 5x.

CLINICAL RESULTS OF EDA SCREENINGS.

Sagrjadski (1996) reported the following results on the coincidence of EDA-assesment and conventional diagnostic outcomes:

Reliability of the energy diagnosis and assessment

Pathological conditions	# of patients	reliability of the diagnosis and prognosis of the therapeutical efficiency
healthy sportsmen with varying degrees of exhaustion	9270	0,95
Neurology:		
Lumbosacral radiculitis	900	0,90
Arachnoiditis	1500	0,92
Syndromes caused by Exposure to chemical toxins	3100	0,90
Cardiology:		
Stenocardy, Myocard.infarct, Hypertony, Combination of syndromes	3820	0,96
Pathology of the lungs:		
Bronchial asthma	670	0.90
Pneumosklerosis	380	0,90
Pregnancy related pathology:		
Toxicosis during first 4 months	380	0,94
Toxicosis during 5- 9 months	220	0,92
Surgical pathology:		
Inflammation of the gallbladder With stones, and without stones, Pancreatitis, Peritonitis with exudate Appendicitis	890	0,94
General pathology:		
Ulcerous growth of the Intestines, cirrhotic-liver Diabetis	980	0,98
Traumatological pathology:		
Crash-syndrom Frost Traumatic amputation	69	0.98
(Patients that could not be followed until the end of the studies	718)	
Total # of patients included in the Studies	22.297	

Newer clinical research, with a similar skin-resistance screening device, shows even clearer results (Lurie,2007):

	Field	Country	Total No of patients in study	Group	No. of cases	Sens.%	Spec. %	FN	FP	ppv	npv	Accur	Kappa
1	Gastro-intestinal	Israel	109	Peptic ulcer	20	80%		20%		Aver.	Aver.		overall 0.8
				IBS	30	90%		10%		96%	82%		
				Colon cancer;	29	69%		31%					
				Control	30		90		10%				
2	Internal department	Israel	146	Cardiology	102	85%	52%	15%	48%			69%	0.39
				Respiratory	36	81%	83%	19%	17%			82%	0.57
				Digestive	37	81%	45%	19%	55%			63%	0.18
				Genitourinary	35	72%	70%	28%	30%			71%	0.35
				Endocrine	49	51%	81%	49%	19%			66%	0.34
3	Hepatology	Israel	258	HCV + HBV + NAFDL	113	85%		15%		95%	82%	90%	
				Control	85		94%		6%				
				HCV biopsy	60	78%							
4	Gerontology	Russia	239	Cardiology	49	78%		22%					
				Respiratory	41	75%		25%					
				Digestive	112	90%		10%					
				Urology	35	86%		14%					
				Gynecology	40	74%		26%					
				Immune	70	87%		13%					
				Spine	109	89%		11%					
5	Colon diseases	Israel	68	Colon disease	28	61%		39%		93%	77%	78%	
				Control	40		90%		10%				

	Field	Country	Total No of patients in study	Group	No. of cases	Sens.%	Spec. %	FN	FP	ppv	npv	Accur	Kappa
6	Immunology	Italy	108	Immune disease	38	81%		19%				87%	0.65
				Allergies	40								
				Control	30		92%		8%				
7	Oncology	Israel	97	Breast disease;	44	79%	91%	21%	9%			85%	overall 0.67
				Lung disease;	23	76%	95%	24%	5%			86%	
				Prostate disease	30	93%	90%	7%	10%			92%	
8	Cardiology	Israel	123	IHD	123	86%		14%		94%			
9	Occupational medicine	Holland	373	Urology;	42	83%	93%	17%	7%	60%	98%	88%	
				Gynecology	134	87%	80%	13%	20%	82%	86%	84%	
				Digestive	116	89%	86%	11%	14%	74%	94%	88%	
				Cardiology	104	84%	87%	16%	13%	71%	93%	86%	
				Respiratory	47	81%	96%	19%	4%	75%	97%	89%	
				Endocrine	27	82%	95%	18%	5%	58%	99%	89%	
				Immune	41	71%	98%	29%	2%	83%	96%	85%	
				Bilious	37	89%	95%	11%	5%	66%	99%	92%	
				Spine	156	81%	90%	19%	10%	85%	87%	86%	
10	Gynecology	Israel	150	Functional	59		77%		23%	85%	78%	82%	
				Organic	91	86%		14%					
	Total:		10	studies									
			1671	patients									
			2332	cases									

Therefore it can be concluded that these measurements are suited for screening for a variety of pathological conditions and that their efficacy and accuracy is generally very good.

Changes in the resistance of dermal-visceral zones of the immuno-respiratory system and the large-intestine, coinciding with acupuncture points within these zones, showed a correlation coefficient of 87% between the measured values and the X-ray pictures. This correlation was not present between the X-ray pictures and randomly chosen points in the dermo-visceral zone of the large intestine organ. Interestingly, no false negative results were found. False positive results were derived with a patient that had an inconsistent shadow at the X-ray, but no evidence of a tumor according to the tomogramme or CT-scan (Sullivan et.al in print).

Szopinski (2004) has shown that the pathology of an organ is linked to elevated resistances of the corresponding DVZ, Zones of Head and acupuncture-points.

EDA-measurements are considered to be a reliable, non-invasive, risk free bio-electronic method with a high degree of specificity and sensitivity concerning screening for pathology. The values that are mentioned by Szopinski match those of Sagrjadski (1996), Lurie(2007) and Zimlichman (2005).

Krop (1997) established that with 41 polysymptomatic allergy-patients 96% of the allergens (housemite, histadine) could be discerned from non-allergens (saline, water) on the basis of skin-resistance measurements .

Becker (1976 en 1979) found clear correlations between physiological functions and electro-physiological measurements of meridians, dermatomes and acupuncture-points.

Initiated by Raymedy two studies have been done, by resp. the Department of Animal Sciences, LU-Wageningen and the University of Innsbruck, Faculty for Sportsphysiology.

Sponring, 2003, concluded that the results of the EDA-tests correlated closely with stress-tests of athletes, more closely than the usual lactate-tests.

Bosma et al, (2006) established that the measurements of skin resistances by cows correlated very closely with the condition and health-parameters. The EDA-measurements were carried out at points that are, according to Kothbauer (1999, Veterinary Acupuncture. Basic principles and their Clinical Applications with Ear Acupuncture on cattle and some references to the Horse. ETH-Zuerich. Zweimuehlen Verlag) related with the immune system. These eda- measurements were compared with parameters for milk-quality (somatic Milk-cell count), with the Body Condition Score, and the IA rate (number of inseminations per gestation). Very high correlation-coefficients were found.

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