

Volume: 2014

Number: 4



ACUPUNCTURE and NATURAL MEDICINE



**MEDICAL SOCIETY OF
NATURAL MEDICINE**

ISSN 1339-4703



Acupuncture and Natural Medicine



Editorial

Dear readers

In times of fragmentation of basic and applied bio-medicinal sciences we can find unity through nature.

After all, the Creator arranged nature together with human living in unity and continuity during the following days (Genesis 1.2).

The magazine Acupuncture and Natural Medicine has already found its place in the “world of press”. It found its place among those journals that are oriented on health problems of clients, methods of working with them, their explanation and risks. Examples of good practice not only from Slovakia but also from abroad are always important. It is a journal that places the greatest emphasis on linking theory and practice in the spirit of *“Practice is blind without theory and theory is only an intellectual game without practice”*.

Also the issue that comes to you, readers, brings new and interesting information and stimuli for discussion. I have always valued the effort of authors writing papers about unique effects of natural substances and procedures on human health. This view is included also in latest contributions. The article by M. Khun presents an inspiring view on the topic of cardiovascular diseases and geochemistry. It follows on from the pioneering work of Prof. V. Bada and collective. The article by doctor Mochnáč *“Systemic states and quantum mechanics in acupuncture?”* continues in the tradition of unconventional views on acupuncture. Into this category of contributions belongs also the article by Korean authors *“The research on Kim Hong-Kyung’s view of eight extraordinary meridians by focusing on the correlation between Yin Yang*

Wei Qiao Mai and Four Trigram Constitution theory”. The article *“Energy-informative networks and TST (Tactile Solar’s test)”* by Solar and Solarova is a pilot study, which presents real clinical possibilities of evaluating the outcomes of acupuncture examination through energy-informative networks based on triplets.

Larval therapy I. – modern method of treatment of long term non-healing wounds and its use in clinical practice by authors M. Čambal and collective is a continuation of a topic from

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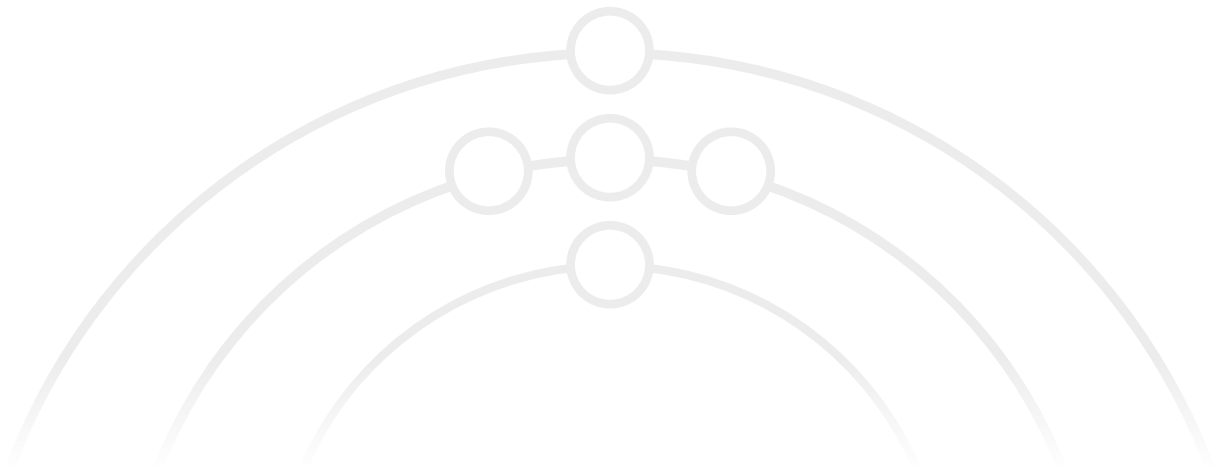
issue No 2. We can find a deep philosophical view on natural medicine in the article by J. Košturiak *“Natural therapy of economy”*.

Dear friends, let's remember in this amazing tension from learning the unknown on one side to accept the borders of knowledge, the place where we admit (maybe temporarily) our capitulation with an explorer's words: *“Lord, where I finish, You start...”*. On the other side... let's not be satisfied with superficial

knowledge, with so called *“seeming borders”* and let's have the courage and faith to go... even further for the benefit of mankind. Research results of non-standard methods, which also this new issue delivers, are a clear response to the current question about diseases associated with human suffering.

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Energy-informational Networks and TST

Gustáv Solár, M.D., PhD., Zlatica Solárová, M.P., PhD.

Summary

The authors are presenting a pilot study, evaluating the real clinical possibilities of the assessment of findings in an acupuncture examination of the energy-informational networks based on triplets. The study is based on common findings in patients of The First Clinic of Acupuncture and Natural Medicine of G. Solar s.r.o. (henceforward only clinic). The patients, whose findings were assessed, were not selected according to any preference, but were included in the order they were examined. The three last examinations in every patient were assessed. The authors evaluated altogether 75 examinations in 25 patients. For the purposes of this study, some particular examinations of TST systems (Tactile Solar Test) were selected. These are used routinely in the examination of every patient. In every examination with the occurrence of a triplet, it was proved that in the findings the information is coded through triplets at various levels. Above all, this knowledge is of great diagnostic importance, which opens up new possibilities for diagnostics in acupuncture as well as diagnostics in general for future. In the presented study the possibilities as well as pitfalls of such diagnostics are discussed.

Keywords

acupuncture, TST (Tactile Solar Test), energy-informational networks of acupuncture, acupuncture diagnostics, the system of acupuncture, triplets

Introduction

Diagnostics in acupuncture has always had its particularities. In the traditional medicine, diagnostics is based on observation, the overall appearance, behavior, pulse, breath, skin color, olfactory perception etc. These methods are sufficiently familiar, and will therefore not be discussed more closely here. New technical instruments have appeared recently, with the EAV being the most dominant one. This form of diagnostics has its limits and pitfalls and its information value is relatively low. Another problem is its compatibility with the examinations in acupuncture and other medical fields.

The understanding of the philosophy of acupuncture is of crucial importance. If we understand the acupuncture as the traditional medicine that is built upon some sort of empiricism and the art of old masters, then we are limiting its possibilities and application. Naturally, the historical relations and connections are evident and cannot be denied, nor mythologized. The basic question is where does the traditional information that acupuncture builds upon come from – and not only from the medical point of view, but also in general. The timelessness of this information is indisputable, but so are its schematization and a certain level of incompetence. On the other hand, applying the criteria of pharmacological research in acupuncture looks rather unsystematic and often depreciates and complicates research in this field. Nowadays the absolutely dominant methods of pharmacological research in medicine are neither generally applicable, nor usable and





sometimes they even obstruct the development of medical research. This knowledge, however, does not change a thing concerning the situation of acupuncture in contemporary medicine. In general, the division of medical thinking to “traditional” and “scientific” is also very counterproductive.

The theory of acupuncture has been referring to the universality and timelessness of its principles for centuries. Unfortunately, there is little generally acceptable and relevant data to prove these assertions, which the supporters of acupuncture accept intuitively as unquestionable. It also needs to be said that not much attention is paid to this problem in the acupuncture research and much more space is given to clinical studies of forced application of pharmacological methods such as the supposed “placebo” acupuncture. The only reasonable way out of this situation is a consistent focus on the philosophical basis of acupuncture, i.e. that on which acupuncture is built upon. At this juncture we may see that the current fragmentary and barely understandable knowledge needs to be completed with the application of the interdisciplinary approach.

If we are to understand the basis of acupuncture as the core of the natural medicine, i.e. we accept its energy-informational principles, then it is necessary to both formulate the presumptions and present relevant and generally acceptable evidence. The formulation of the theory of the energy-informational networks in acupuncture sets acupuncture in a new position. Above all, it concerns its universal and interdisciplinary character, which may be presented also mathematically. According to this theory, the acupuncture system functions as a carrier, donator, keeper as well as a receiver of a practically infinite amount of information, while using the system of triplets for coding,

e.g. the analogy of codons in molecular biology and genetics. The basic problem that needs to be solved is the proof that these triplets are real and that they are to be found in the clinical acupuncture findings. The mathematician N. N. Moisejev said: *“In the millennia of its existence mathematics has created a remarkable culture of thought and an abstract language, which enabled a unified description of even some very different processes.”* In this category belong the processes that are also typical for the acupuncture system. At this point I would like to remind that the term “acupuncture system” is not very precise when it comes to its factuality, form and content, but in the light of the contemporary terminology it is probably the most acceptable one. This problem, however, does not concern only acupuncture.

Material and Methodology

Tactile Methods Used in Examination

Altogether 75 examinations in 25 patients of the clinic were included in the study. Within the routine examinations, we used and evaluated the examinations carried out by the TST method in the pa-kua systems according to Wen, Fu-Shi, S1, and S2. In every one of them triplets according to the given diagrams were arranged in the magic square (MS), or occurred in circular arrangement of a microsystem (KU), or Yin and Yang concatenations (ZYJ) in the rotational microsystems. A **triplet** consists of three consecutive meridians. We used the Latin, i.e. Greek nomenclature of meridians: CO (**cor**), IT (**I**ntestinum **T**enue), VU (**V**esica **U**rinaria), RE (**RE**n), PE (**PE**ricard), TC (**Tri** **C**alorium), VF (**V**esica **F**ellea), HE (**HE**par), PU (**PUL**mo), IC (**I**ntestinum **C**rassum), VE (**VE**ntriculus) and LP (**Lien** **P**ancreas).





We based our research on the following theoretical knowledge

Arrangement of triplets into a quartet (the Wen, Fu-Shi, S1, and S2 diagram) is a sequence of letters (abc, bcd, ... etc.), forming a triplet and numbers assigned to them, denoting a meridian (123...), in which the order of meridians is determined according to the arrangement of the Wen, Fu-Shi, S1 and S2 diagram. Numerical indication 1 = PU, 2 = RE, 3 = IT, 4 = LP, 5 = VU, 6 = PE, 7 = TC, 8 = VF.

Magic Square is an arrangement of natural numbers 1, 2, ... n² in a square network n × n, while each number occurs exactly once and the sum of numbers in a row, column and diagonal equals the same result. (Fuchs, 2004)

d	i	b
c	(e)	g
h	a	f

Obr. 1. Magic Square

8352 d	1647 i	2835 b
7416 c	(e)	3528 g
6174 h	5283 a	4761 f

Obr. 2. Magic Square – sequence of triplets according to the Wen, S2, S1, Fu-Shi diagram

Legend: abc ... atp. – sequence of triplets, 1234 ... – meridians.
1 = PU, 2 = RE, 3 = IT, 4 = LP, 5 = VU, 6 = PE, 7 = TC, 8 = VF

Circular arrangement of triplets is an arrangement along the perimeter of the square in a sequence of letters (abc, bcd ... etc.).

h	a	b
g		c
f	e	d

Obr. 3. Circular arrangement of triplets

Legend: abc ... etc. – sequence of triplets

Arrangement of triplets according to Yin and Yang concatenations

b'	a	a'
d		d'
c	c'	b

Obr. 4. Yin Yang concatenation – sequence of triplets

Legend: a b c, b c d – Yin sequence of triplets,
a' b' c', b' c' d' – Yang sequence of triplets

Pilot study

Hypothesis

Individual findings (disbalances) in the system of acupuncture are arranged in triplets.

Results

Statistical evaluation of the results according to Ward's clustering method, frequency tables, mean value, and standard error.

9.3 % of findings (7) cannot be evaluated as the overall number of found disbalances was less than three, thus a triplet could not be formed.

These findings may be interpreted as follows:

- the level of the system's disbalance is too low to affect a whole triplet.
- the number of evaluated TST systems in the concrete study is too low to encompass all possibilities of findings in a triplet. Considering the other findings, the authors prefer this interpretation.

In 90.7 % (63) of all findings gained by the used methods, three and more disbalances were





found and in all cases the existence of triplets was proved. The majority of triplets were arranged according to the Wen system – circular arrangement of triplets (46.1 %) (Table 1).

Tab. 1. Evaluation of the Wen diagram in circular arrangement

W/KU				
		Frequen- cy	Percent	Cumu- lative Percent
Valid	.00	41	53.9	53.9
	1.00	35	46.1	100.0
	Total	76	100.0	100.0

Legend: W – Wen diagram, KU – triplet in circular arrangement

In the S2 system – arrangement of triplets in the magic square 39,5 % (Table 2)

Tab. 2. Evaluation of the S2 system – triplets arranged in the magic square

S2/MS				
		Frequen- cy	Percent	Cumu- lative Percent
Valid	.00	46	60.5	60.5
	1.00	30	39.5	100.0
	Total	76	100.0	100.0

Legend: S2 – diagram, MS – triplet according to the sequence in the magic square

Fu-Shi arrangement of triplets in the magic square (35.5 %). (Table 3)

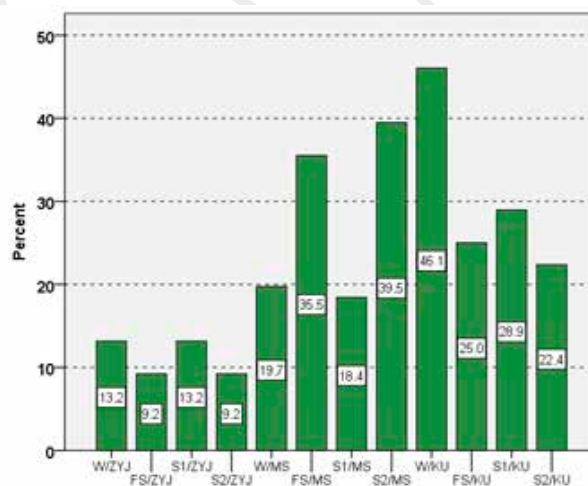
Tab. 3. Evaluation of the Fu-Shi system – triplets according to the sequence in the magic square

W/KU				
		Frequen- cy	Percent	Cumu- lative Percent
Valid	.00	49	64.5	64.5
	1.00	27	35.5	100.0
	Total	76	100.0	100.0

Legend: FS – Fu-Shi diagram, KU – triplet in circular arrangement

The most frequently occurring triplets in our selection were triplets according to Wen's circular interpretation. Note the high incidence of triplets arranged in the magic square according to the S2 and Fu-Shi systems. (Table 4, 5)

Tab. 4. Evaluation of diagrams according to the Wen, Fu-Shi, S1, and S2 systems, triplets in circular arrangement, Yin Yang concatenations and the magic circle



Legend: W = Wen, FS = Fu-Shi, S1 – indication of the diagram type, S2 – indication of the diagram type, ZYJ – the Yin Yang concatenation, KU – circular arrangement, MS – magic square





Tab. 5. Assessment of the validity and the mean value, the standard error of diagrams according to Wen, Fu-Shi, S1, and S2 in circular arrangement, Yin Yang concatenations and the magic square.

	N		Mean	Std. Error of Mean
	Valid	Missing		
W/ZYJ	76	0	13.16 %	3.90 %
FS/ZYJ	76	0	9.21 %	3.34 %
S1/ZYJ	76	0	13.16 %	3.90 %
S2/ZYJ	76	0	9.21 %	3.34 %
W/MS	76	0	19.74 %	4.60 %
FS/MS	76	0	35.53 %	5.53 %
S1/MS	76	0	18.42 %	4.48 %
S2/MS	76	0	39.47 %	5.64 %
W/KU	76	0	46.05 %	5.76 %
FS/KU	76	0	25.00 %	5.00 %
S1/KU	76	0	28.95 %	5.24 %
S2/KU	76	0	22.37 %	4.81 %

This finding proves the importance of the triplet arrangement in the magic square in the Fu-Shi and S2, but for the time being we are unable to comment on these results.

A low incidence of triplets was found in the arrangement according to the yin and yang concatenations, which we assume is due to the fact that the yin and yang concatenations are a considerably more complex phenomenon. These interpretations are only tentative and whatever further interpretation considering the limited scope of our research would be too early.

The incidence of triplets in the group of assessed patients

In 10 % of cases 2 triplets were found among the evaluated options.

In 8 % of cases 3 and more triplets were found among the evaluated options.

In 2 patients the highest incidence of possible triplets in the findings was 9.

Discussion

The study was based on a limited number of TST systems that are routinely used in a standard acupuncture examination in patients of our clinic. Yet, the existence of triplets was proved in all cases with more than three findings. If we are to understand a triplet as a precisely defined sequence of meridians, then this assumption may be considered relevant. For the purposes of this study we assessed only triplets without further diagnostic criteria (e.g. diagnostics by pulse, auricular or su-jok diagnostics). Since we have not found any theoretical sources concerning the relations to triplets in acupuncture, the results may not be compared with other studies. Therefore, this study may be considered a pilot study. In a very simplified way the term *triplet* describes a process consisting of three phases. It is formed in the initiation phase, it culminates in the peak phase and in the transitory phase it passes into another dynamic process. Despite the limited number of TST systems that were included in the study, more triplets were found in a quite high number of cases. Hence, it may be assumed that in a higher number of TST systems, more triplets would be found in the same sample group. At this stage we are unable to predict the definite number of triplets. It means that every triplet stands for a certain vector and certain information about its structure and dynamism at one level. Thus, the existence of several triplets of one and the same meridian in the same patient represents information about an analogical system from several levels. The evaluation of triplets is therefore complex and offers information from several levels or layers. Analogies with other fields, e.g. molecular biology are evident.

The triplet has quite a rich history and its modeling is based on philosophical principles and their mathematical expression. But the goal of this study is not to analyze the mathematical





relations. For our purposes, we observed triplets that are built upon the circular pa-kua models, concatenated pa-kua models, the so-called magic squares, circadian rhythms etc. In short, these are mathematical models depicting the dynamics of processes running at individual levels of the energy-informational system. The goal of this study was to prove the existence of triplets in the complex information about the organism. The creation of triplets and their dynamism is determined by the energy-informational field/fields.

In the same way we may analyze also those findings that cannot form a triplet since only two findings occurred in the evaluated systems. These formed just a small part of the sample group, but their interpretation is essential notwithstanding. Our latest interpretations may be found in the results part of the study. However, we may not dismiss the possibility that in a considerably higher number of evaluated TST systems the incidence of findings (i.e. disbalances in the TST systems) would be lower than three. In the case of a higher number of evaluated systems this possibility is very low, nonetheless, it needs to be taken into account. In such a case the level of disbalance is insufficient to damage a whole triplet as the basic energy-informational structure. The analysis of possibilities of supplementing the known triplets point to the possibilities of further development of possible disbalances in relation to the current disbalance.

In our study we focused only on eight of the twelve organ meridians. These eight meridians form pa-kua according to different interpretations. Therefore, in the creation of triplets we interpreted only this horizontal structure in a pyramid model. The pyramid model consists of vertical structures too, which are directly interconnected and allow many other possibilities. The presented study focuses only

on pa-kua. We shall pay attention to the theme of vertical structures and the pyramid models in the subsequent issues of this journal.

The structure of triplets may be modeled and evaluated. Its universality and complexity open up new fields of activity in acupuncture, natural medicine and medicine as such. These would enable a considerably more complex evaluation of results of the TST diagnostics. On the other hand their study in acupuncture without the complex TST diagnostics is unimaginable. We are still at the beginning of this process, which will necessitate right in the first phase much deeper studies and more complex assessment. The proof of the existence of triplets in this sense is just the first step. The study of these phenomena will also require interdisciplinary cooperation.

Conclusion

All components of the system of acupuncture, including the “theory of similitude” or the complex activity of acupuncture may be demonstrated on the theory of structured fields, including the primary gnostic field, which are gaining acceptance also outside biological sciences. Thus, it follows that the material symptoms are only secondary, namely they arise as the result of these fields’ activity. Among these phenomena belong also triplets that are the basic energy-informational components. Such arrangement and dynamism are known not only in acupuncture, but also in molecular biology and other natural sciences. Naturally, further research and interdisciplinary cooperation are necessary for their study. The presented study has proved the hypothesis about their existence. The analysis of triplets and thus also the energy-informational relations in acupuncture is not possible without the use of the TST diagnostics. It is primarily based on the tactile skin sensitivity and its mutual





relations on various places in the organism. The TST method that has been in use for over 11 years now could be instrumental in the study of triplets. The proven existence of triplets in the acupuncture system opens up a large range of possibilities for the contribution of acupuncture to medicine and the interdisciplinary study of the energy-informational processes.

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The research on Kim Hong-Kyung's view of eight extraordinary meridians

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Abstract

Kum-oh Kim Hong-Kyung has not only deeply studied Saam acupuncture but also studied the functions and characteristics of the extraordinary meridians at the same time. He defined the meridians as pathways of consciousness and emotions, and he concentrated on studying of connection between Yin Wei Mai, Yang Wei Mai, Yin Qiao Mai and Yang Qiao Mai (so called Yin Yang Wei Qiao Mai) with the Four Trigram Constitution theory created by Lee Je-Ma, especially in the view of spiritualism. Since it was the first time that the extraordinary meridians were interpreted in the view of spiritualism, it is significantly important in the history of acupuncture. I felt the need to publicise the theory and I started research on the theory. The information in the research is based on the verbal explanations by Kum-oh Kim Hong-Kyung in his classes and the Eastern medical classical literatures.

Ren Mai is the meridian which represents the positivity of the person's mind. In comparison, Du Mai is the meridian that represents the negativity of the person's mind. This two meridians distinctively show the opposing properties of Yin and Yang. Chong Mai is derived from the Foot Shao Yin Kidney meridian

and it is an impulsive meridian with the male characteristics. On the contrary Dai Mai is derived from the Foot Shao Yang Gall Bladder meridian and it represents the characteristics of the females.

The Four Trigrams (四象) which is divided from Yin Yang are the innate forms (先天象), and it is Kum-oh Kim Hong-Kyung's beliefs that Yang Wei Mai, Yin Wei Mai, Yang Qiao Mai and Yin Qiao Mai are correlated to Tai Yang person, Tai Yin person, Shao Yin person from the Four Trigram theory respectively.

Yang Wei Mai is related to the Tai Yang constitutional person who does not like to be restrained and controlled by others and tends to criticise others. Yin Wei Mai is related to the Tai Yin constitutional person who tends to form a group by restraining or intervening others. Yang Qiao Mai is more active in Shao Yin constitutional person who passively communicates with others. Yin Qiao Mai is more active in Shao Yang constitutional person who actively communicates with others and is well socialised. These correlationship between the Yin Yang Wei Qiao Mai and the Four Trigrams can be proved by applying Zhou Yu Gua Xiang (周易卦象).





Introduction

Kum-oh Kim Hong-Kyung is a renowned doctor of Korean oriental medicine who rediscovered a unique Korean acupuncture style called Saam acupuncture. He made profound influence on establishing Saam acupuncture as a representative acupuncture technique among Korean oriental medicine degrees, and publicised Saam acupuncture throughout South Korean and foreign oriental medicine practitioners.

The '40-day lectures on principles of ascetic Saam's acupuncture' conducted by Kum-oh Kim Hong-Kyung was a trigger for Saam acupuncture to be widely recognised. Kum-oh Kim Hong-Kyung opened his oriental medicine clinic called Shen Nong Bai Cao (神農百草) near Gwanghwamun, Seoul, South Korea in 1984. Since the opening of his clinic, he has conducted the lectures for Korean and foreign oriental medicine students over 30 times during university's summer and winter holidays. Through his lectures, he passed on his knowledge on Saam acupuncture and initiated the nation-wide volunteer acupuncture services. To this day, his theories on Saam acupuncture still have great academic recognition and influence and have become the foundation for modern research on Saam acupuncture. It can be said that most Saam acupuncture practitioners are influenced by Kum-oh Kim Hong-Kyung's books and lectures and as such his theories and knowledge in Saam acupuncture are unequalled.

Kum-oh Kim Hong-Kyung defined meridians as pathways for consciousness and emotions. He also interpreted the twelve principle meridians and the eight extraordinary meridians with the view of spiritualism. The 8 extraordinary meridians are Du Mai, Ren Mai, Chong Mai, Dai Mai, Yang Wei Mai, Yin Wei Mai, Yang Qiao Mai and Yin Qiao Mai. These meridians were first referred to in each

chapters of the 'Nei Jing (內經)' and the term 'eight extraordinary meridians' were first mentioned in the 'Classic of Difficulties (難經)'. Chapter 27 of the 'Classic of Difficulties (難經)' discussed the fundamental concepts and names of the extraordinary meridians, and chapter 28 explained the origins, flows, functions, and symptoms of diseases of the extraordinary meridians. However the information is relatively brief. Further researches on functions of the extraordinary meridians are therefore expected.

Kum-oh Kim Hong-Kyung has his beliefs in that Ren Mai and Du Mai represent the positivity and negativity of our mind respectively. Chong Mai represents the masculinity where the courage rises, and Dai Mai represents the femininity such as the pregnancy. He also explained that Yin Wei Mai, Yang Wei Mai, Yin Qiao Mai and Yang Qiao Mai belong to each of the meridians representing the Four Trigram Constitution (四象體質). However, these distinctive views of Kum-oh Kim Hong-Kyung about the extraordinary meridians have not been published in any of the reports. Therefore I research and report on his views of the extraordinary meridians, particularly by focusing on the relationship between Yin Yang Wei Qiao Mai and Four Trigram Constitution theory.

Kum-oh Kim Hong-Kyung's view on Extraordinary Meridians

1) Extraordinary Meridians

The meridian is a network which connects the Zang-Fu organs, limbs and the five sensory organs. It is typically divided into the twelve Jing/Principle meridians (十二經脈), 15 Luo meridians (十五絡脈), Sun-Luo (孫絡) and Fu-Luo (浮絡). The extraordinary meridians have its own importance in the human body compare to the twelve principle meridians. The extraordinary meridians





circulate crisscrossed with the twelve principle meridians, and perform the functions such as mixing, leading, connecting and controlling. They also control Qi and Blood of twelve principle meridians by reserving the surplus Qi and Blood of the twelve principle meridians and replenishing the Qi and Blood when there is deficiency of Qi and Blood. In other words, the extraordinary meridians except Ren Mai and Du Mai function as an emergency use but otherwise they do not function. Because of these distinctive functions, the extraordinary meridians own its name (奇經) and the twelve principle meridians are called principle meridians (正經).

Kum-oh Kim Hong-Kyung defined meridians as pathways for consciousness and emotions, and interpreted the nature of the twelve principle meridians and the eight extraordinary meridians with the view of spiritualism. It was the first time that those meridians were understood in terms of spiritualism, and thus this acquires a special meaning in the history of acupuncture.

History and Literary Characteristics of Extraordinary Theory

The 'Yellow Emperor's Classic of Medicine (黃帝內經)' explained about each of the eight extraordinary meridians but it is the 'Classic of Difficulties (難經)' which first defined those eight meridians as a group and named as 'eight extraordinary meridians (奇經八脈)'. Since then, the theory of extraordinary meridians were continuously mentioned and developed in the other classic literatures including the 'Pulse Classic (脈經)', 'Discussion of the causes of different diseases (諸病源候論)', 'Grand Basis of Yellow Emperor's Classic of Medicine (黃帝內經太素)', 'The Holy Benevolent Prescriptions (太平聖惠方)', 'Complete Record of Holy Benevolence (聖濟總錄)', 'An Elucidation of the Fourteen Meridians (十四經發揮)', 'Exposition on the Eight Extraordinary

Meridians (奇經八脈考)', 'A Guide to Clinical Practice with Medical Records (臨證指南醫案)', and 'Conventional Korean Medicine Principle Theory (通俗韓醫學原論)'.

The classic literatures including 'An Elucidation of the Fourteen Meridians (十四經發揮)' and 'Exposition on the Eight Extraordinary Meridians (奇經八脈考)' discussed a lot about pathways of the extraordinary meridians, acupuncture point locations, nature of diseases and pulsation. In explaining the status of the extraordinary meridians in human body, the phrase in Chapter 27 of the 'Classic of Difficulties (難經)' is always referred, that is "Meridian system includes the eight extraordinary meridians and they are not restrained by the twenty meridians (脈有奇經八脈者, 不拘於十二經)". However, there are still insufficient information of the extraordinary meridians in the classic literatures, and the phrase in Chapter 27 of the 'Classic of Difficulties (難經)' is nearly the only information which explained the characteristics of the extraordinary meridians in comparison to the twelve principle meridians.

Physiological Characteristics of the Extraordinary Meridians

The chapters 27 and 28 of the 'Classic of Difficulties (難經)' stated that the eight extraordinary meridians have their own pathways which are not restrained by the up-and-down pathways of the twelve principle meridians. It is like how overflowing stream during the flood does not return to the stream once it flowed down to the deep lake.

[How come the extraordinary meridians within the meridian network do not get restrained by the principle twelve meridians?

It is correct. There are Yang Wei, Yin Wei, Yang Qiao, Yin Qiao, Chong, Du, Ren and Dai Mais (i.e. meridians), and all these meridians





do not get restrained by the twelve principle meridians, and this is the reason for the name 'extraordinary meridians'.

Total twenty-seven Qi (氣), including twelve principle meridians and fifteen Luo meridians follow up-and-down each other. How come it only does not get restrained by the principle meridians?

That is correct. The purpose of planning and installing the irrigation ditch by the Saint is to prepare for the times when the water does not flow. The heaven brings the rain and fills the irrigation ditch in full. When the rainfall is heavy and of large amounts, water flows over the irrigation ditch and even the Saint cannot return the water back. This is like when the meridians become overflowing.]

[Although the Saint had planned and installed the irrigation ditch, he cannot hold the water within the ditch once the water overflows to the lake. In comparison, when the person's pulse is flourished, it enters into the eight extraordinary meridians and does not further circulate, and thus the twelve principle meridians cannot hold them.]

The above phrases in the 'Classic of Difficulties (難經)' is the first phrase that explained about the reason for the name 'extraordinary meridians (奇經)'. The twelve principle meridians (正經) were referred as the 'irrigation ditch', and the eight extraordinary meridians were as the 'overflowing meridians and the deep lake'. The 'overflowing meridian' indicates the function of extraordinary meridians that it connects the meridian to meridian and it is able to travel different meridians without restraints by the principle meridians. The 'deep lake' indicates that the extraordinary meridians are different to the Luo meridians in that they have their own fields where they can reserve the meridian Qi (脈氣). The book 'Complete Records of the Life Securing (聖濟總錄)'

described that a person's Qi and Blood flows upward and through the twelve meridians, and it travels into the extraordinary meridians when the principle meridians are full (人之氣血 上行于十二經脈其諸經滿溢則流入奇經焉).

The book 'A Guide to Clinical Practice with Medical Records (臨證指南醫案)' written by Shi Tian Shi (葉天士) from Qing dynasty described that the 'eight meridians serve kidneys and liver'. The eight extraordinary meridians have a close relationship physiologically and pathologically with Zang organs (臟) such as liver and kidneys, and extra Fu organs (奇恒之府) such as uterus, brain, and bone marrow. Also Du Mai enters the brain, and Du Mai, Ren Mai and Chong Mai all start from the uterus.

2) Ren Mai & Du Mai, and Dai Mai & Chong Mai

Dai Mai travels through the meridians in the abdomen and lower back, and Chong Mai travels in length and get involved in the three Yin three Yang (三陰三陽). Du Mai governs the Yang and Ren Mai governs the Yin. Kum-oh Kim Hong-Kyung understood Ren Mai, Du Mai, Dai Mai and Chong Mai as the representative meridians of Yin Yang such as affirmation and negation, and femininity and masculinity respectively. The characteristics of each meridians are as below.

Ren Mai & Du Mai

Ren Mai is the 'sea of Yin meridians (陰脈之海)' and Du Mai is the 'sea of Yang meridians (陽脈之海)'. The two meridians have a close relationship by both starting from the centre of placenta (胞中) and mutually communicating each other at the perineum (CV 1; 會陰). However, they are opposite to each other in Yin Yang perspectives because Ren Mai travels through the centre of anterior surface of the body while Du Mai travels through the centre





of posterior surface of the body. The function of Ren Mai is to govern the conception (胞胎) while the function of Du Mai is closely related to the brain, spinal cord and kidneys.

Kum-oh Kim Hong-Kyung explained “Ren (任) means entrusting and this suggests that it is a trusting meridian. Du (督) means examining and this indicates a supervisory meridian. Thus it can be said that Ren Mai and Du Mai are the meridians which distinctly show Yin Yang. This includes the trust which is the positivity of mind and the denial which the negativity of mind.” In other words, Ren Mai is usually activated when there is trust or belief in the person's mind whereas Du Mai is usually activated when a person is of suspicion.

Kum-oh Kim Hong-Kyung also mentioned “Ren Mai is a Yin Qi (陰氣) concentrated meridian which starts from CV 1 (會陰穴) to the bottom of lower lip. Therefore a person with well-developed Ren Mai tends to have satisfying Yin tendency (陰的) characteristics such as embracing and trusting. Du Mai is a Yang Qi concentrated meridian which starts from GV 1 (長強穴) and terminates at the inside of upper lip. Therefore when a person's Du Mai is strongly developed, he tends to have dissatisfying Yang tendency characteristics (陽的) such as offensive and governing. Considering these reasons, the size, brightness, thickness and colour of the upper and lower lips are important in diagnosing the excess and deficiency of Yin Yang through inspection (望診) because the lips are where Ren Mai and Du Mai intersect each other. Furthermore, it is also possible to determine the person's positivity and negativity of mind, and the excess and deficiency of Ren Mai and Du Mai by considering the constitutional or habitual direction and obliqueness of the tail of lips.” This explanation by Kum-oh Kim Hong-Kyung holds the significant importance in terms of relating Ren Mai and Du Mai to the

person's opposing mind or emotional status. It is identical to how the Yin Yang of Ren Mai and Du Mai are contrary to each other.

Dai Mai & Chong Mai

The chapter on ‘Counterflow and Favourable Flow, Fitness and Skinniness (逆順肥瘦)’ in ‘Spiritual Pivot (靈樞)’ discussed Chong Mai as ‘the manly Chong Mai is the sea of five Zang and six Fu organs (夫衝脈者 五臟六腑之海也)’, and the chapter on ‘Move and Send (動輸)’ in ‘Spiritual Pivot (靈樞)’ discussed Chong Mai as ‘the sea of twelve meridians (衝脈者 十二經脈之海也)’. Therefore Chong Mai has the function of accommodating and controlling the Qi and Blood of five Zang and six Fu organs and twelve principle meridians. The chapter on ‘On True Man of the Remote Antiquity (上古天真論)’ in ‘Basic Questions (素問)’ discussed Chong Mai as ‘the females... When they are 14 years old, the female blood flows through Ren Mai, and the Chong Mai becomes full. Then they start to have the menstruation and are ready for pregnancy (女子...二十而 天癸至 任脈通 太衝脈盛 月事以時下 故有子)’. Thus Chong Mai also has a close relationship with the menstruation and fertility of females.

The chapter on ‘Ling Lan Mi Dian Lun (靈蘭秘典論)’ in ‘Basic Questions (素問)’ stated that ‘the kidneys are the organs that generate the energy and one's flair comes from the kidneys (腎者, 作強之官, 技巧出焉)’. Kum-oh Kim Hong-Kyung mentioned that “Chong Mai is derived from the Foot Shao Yin Kidney meridian and it is an impulsive meridian as its name indicates. The impulsive Chong Mai is a meridian representing the characteristics of males.” He also mentioned that Chong Mai is derived from the kidneys which generate the energy and flair (in Chinese, 作強之官), and therefore a person who hopes to become a master of martial art or athletes needs to focus on





developing Chong Mai. This is a very acceptable opinion based on the three different meanings of the Chinese words 作强 (zuo qiang).

The functions of the word 作强 of kidneys generally have three meaning. Firstly, it strengthens the bones to improve the physical strength. Secondly, it enriches the brain to enable the prompt reasoning process. Lastly, it enables the quick movement. Judging from this, a person's flair is derived from the kidney essence. Those three meanings are the essential requirements for those wanting to become a master of martial art or athletes.

The chapter on 'Dividing Meridian (經別)' in 'Spiritual Pivot (靈樞)' discussed Dai Mai as "Foot Shao-Yin divergent meridian comes out from the popliteal of Foot Shao Yin meridian, joins and flows together with Foot Tai Yang divergent meridian up to kidney, and then separates out at the second lumbar vertebra and belongs to Dai Mai meridian (足少陰之正 至臍中 別走太陽 而合上至腎 當十四椎 出屬帶脈)". The 'Nei Jing (內經)' did not specifically discussed about the pathways of Dai Mai but it can be inferred from this 'Spiritual Pivot (靈樞)'s' statement that Dai Mai has a close relationship with the Kidney Zang (腎臟) located on both sides of the second lumbar vertebra (十四椎).

Kum-oh Kim Hong-Kyung said "Because Dai Mai is derived from Foot Shao Yang Gall Bladder Meridian and as its name 'gird or belt (帶)' implies, Dai Mai is activated when a person carries an object on side or is pregnant. Thus it is a representative meridian for the female characteristics". He also said that the pregnant woman can raise the foetus in her body because of the vigorous function of Dai Mai which is connected to Ren Mai.

3) Corelationship between Yin Yang Wei Mai & Yin Yang Qiao Mai and Four Trigram Constitution Theory

Zhang Zi-Yang (張紫陽, 984~1082), the famous hsien and the leader of 'hsien middle south group (仙術中南派)' in North Song Dynasty wrote in the book 'Eight Extraordinary Meridians (八脈經)' that "eight meridians are the root of the innate ultimate truth (八脈者 先天之大道 根本)." He also stated that the eight extraordinary meridians are the root of the innate law of nature and Yi Qi (一氣). Therefore it can be concluded that the extraordinary meridians are derived from the innate life energy, and functions of the twelve principle meridians are based on the action of eight extraordinary meridians.

Yin Yang divides into the Four Trigrams (四象) and then further divides into the Eight symbols (八卦). Kum-oh Kim Hong-Kyung explained that the four trigrams are the innate forms (先天象), and Yang Wei Mai, Yin Wei Mai, Yang Qiao Mai and Yin Qiao Mai are respectively correlated to Tai Yang person, Tai Yin person, Shao Yin person and Shao Yang person in the Four Trigram theory created by Dong-moo (東武) Lee Je-Ma.

The correlationship between the four meridians and the Four Trigrams are shown in Figure 1. Yang Yao (陽爻, one long hyphen) and Yin Yao (陰爻, two short hyphens), which are located under Yang Wei Mai and Yin Wei Mai can be understood as 'the other party to myself' and 'myself to the other party' respectively. Yang Yao and Yin Yao which are above Yang Wei Mai and Yin Wei Mai can be interpreted as 'to be free from restraints' and 'restrain others to form a group' respectively. Yang Yao and Yin Yao below Yang Qiao Mai and Yin Qiao Mai can be understood as 'the other party to myself' and 'myself to the other party', and the ones above Yang Qiao Mai and Yin Qiao Mai can be understood as 'actively communicates





with others' and 'passively waiting for others to communicate with me'. These understandings or interpretations can be proved by applying Zhou Yi Gua Xiang (周易卦象), which are also known as Gua symbols in Classic of Changes.

The followings are the characteristics which are summarised from the details in the book 'Song of Kum-oh One Acupuncture (金烏一針歌)' and the information I heard from Kum-oh Kim Hong-Kyung.

Yang Wei Mai and Tai Yang Person

The chapter 28 of 'a variorum edition of the Classic of Difficulties (難經集注)' stated that "Yang Wei Mai connects all the Yang (陽維者 維絡諸陽)". That is, Yang Wei Mai connects and communicates with all the Yang meridians of a person.

Kum-oh Kim Hong-Kyung mentioned that "the character Yang (陽) means 'you' and the character Wei (維) means 'tie up or bind'. Therefore Yang Wei Mai is a meridian which usually activates when a person does not like getting restrained by others and wish to be free from them." He also mentioned that "Yang Wei Mai is usually more active in the Tai Yang constitutional person who dislikes to be controlled by others and tends to criticise the people without manners." For example, it is possible to deduce that the rebellious and suspicious Tai Yang constitutional person where Yang Wei Mai is often activated is suitable for a revolutionist, a judge or a prosecutor.

Yin Wei Mai and Tai Yin Person

The chapter 28 of 'a variorum edition of the Classic of Difficulties (難經集注)' stated that "Yin Wei Mai connects all the Yin (陰維者 維絡諸陰)". In opposed to Yang Wei Mai, Yin Wei Mai connects and communicates with all the Yin meridians of a person.

Kum-oh Kim Hong-Kyung explained that "the character Yin (陰) means 'myself' and the character Wei (維) means 'tie up or bind'. This indicates that Yin Wei Mai usually activates when a person restraints or intervenes others." He also said that "It is usually active in the Tai Yin constitutional person who likes to gather others to form a group". The politicians and company owners are the examples of Tai Yin constitutional people who have strong tendency of forming a group and thereby Yin Wei Mai is easily activated.

Yang Qiao Mai and Shao Yang Person

The 'Exposition on the Eight Extraordinary Meridians (奇經八脈考)' stated that "Yang Qiao Mai is a divergent meridian of the Foot Tai Yang meridian (陽蹻者 足太陽之別脈)" and the section 'Yang Qiao Mai' in the chapter 28 of 'a variorum edition of the Classic of Difficulties (難經集注)' stated that "Mr. Yang said that Yang Qiao Mai is the fundamental basis for a person to walk and run and move his feet as indicated by the character 'Qiao (蹻)' which means 'quickness'. Thus it was called Qiao Mai (蹻脈) (楊曰蹻捷疾也 言此脈 是人行走之機要 動足之所由 故曰蹻脈焉)". This explains that Qiao Mai has a function of controlling the lower limb movement.

Kum-oh Kim Hong-Kyung explained that "the character Yang (陽) means 'you' and the character Qiao (蹻) means 'build a bridge across'. Considering the definitions of the characters, it is possible to define that Yang Qiao Mai is a meridian which is active when a person passively waits for others to communicate with him. Also it is more active in a Shao Yin constitutional person who is naturally passive and inactive." The religious people and artists are the examples of Shao Yin constitutional people and Yang Qiao Mai is more active in them.





Yin Qiao Mai and Shao Yang Person

The 'Exposition on the Eight Extraordinary Meridians (奇經八脈考)' stated that "Yin Qiao Mai is a divergent meridian of the Foot Shao Yin meridian (陰蹻者 足少陰之別脈)". The chapter on 'Cold and Heat Diseases (寒熱病)' in 'Spiritual Pivot (靈樞)' stated that "It divides into Yin Qiao Mai and Yang Qiao Mai. Yin and Yang interchange at the inner canthus of the eye. A person wakes up when Yang Qi (陽氣) is excessive and he falls asleep when Yin Qi (陰氣) is in excess (陰蹻 陽蹻 陰陽相交 ... 交於目內眥 陽氣盛則瞋目 陰氣盛則瞑目)." From this statement, it is known that the opening and closure of the eyelid is controlled by Yang Qiao Mai and Yin Qiao Mai.

Kum-oh Kim Hong-Kyung mentioned that "Yin Qiao Mai is a meridian that is activated when a person himself actively communicates with others. This can be understood by the definitions of the characters of Yin Qiao Mai where the character Yin (陰) means 'myself' and Qiao (蹻) means 'build a bridge across'". He also said "Yin Qiao Mai is more active in Shao Yang constitutional person who is naturally very active and socialised." The athletes and celebrities usually control themselves in a good manner and well-socialised, and they are examples of Shao Yang constitutional people where Yin Qiao Mai is more active.

Conclusion

The following conclusions are achieved through the research on Kim Hong-Kyung's view of eight extraordinary meridians.

1. Kum-oh Kim Hong-Kyung defined the meridians as pathways for consciousness and emotions, and interpreted the twelve principle meridians and the eight extraordinary meridians with the view of spiritualism. This holds the significance in the history of acupuncture as it was the first time that the meridians were interpreted in the view of spiritualism.
2. Kum-oh Kim Hong-Kyung explained that Ren Mai and Du Mai are the meridians which distinctively show Yin and Yang such as positivity and negativity of the person's mind. Relating our different mind or emotions to Ren Mai and Du Mai has the significance.
3. Kum-oh Kyim Hong-Kyung explained that Chong Mai is derived from the Foot Shao Yin Kidney meridian. As its character indicates, Chong Mai is an impulsive meridian and represents the characteristics of the males. Dai Mai is derived from the Foot Shao Yang Gall Bladder meridian. As its character 'gird or belt (帶)' indicates that it is a meridian which is active when a person carries an object on side or is pregnant, and is a representative meridian of female characteristics.
4. Kum-oh Kim Hong-Kyung explained that Yin Yang is divided into Four Trigrams (四象), and then it further divides into the Eight symbols (八卦). He explained that the Four Trigrams are the innate forms (先天象), and he believed that Yang Wei Mai, Yin Wei Mai, Yang Qiao Mai and Yin Qiao Mai are respectively correlated to Tai Yang person, Tai Yin person, Shao Yin person and Shao Yang person from the Four Trigram theory created by Dong-moo Lee Je-Ma.
5. Kum-oh Kim Hong-Kyung explained that Yang Wei Mai is usually activated when a person does not like to be restrained by others and hopes to be free from them. Also it is more active in the Tai Yang constitutional person who naturally dislikes to be controlled by others and has strong tendency of criticising others.
6. Kum-oh Kim Hong-Kyung mentioned that Yin Wei Mai is usually activated when a person enjoys to intervene or restrain others. It is more active in the Tai Yin constitutional





person who naturally has strong tendency of forming a group.

7. Kum-oh Kim Hong-Kyung mentioned that Yang Qiao Mai is activated when a person is passive in communicating with others. It is more often seen in the Shao Yin constitutional person who is naturally passive and inactive.
8. Kum-oh Kim Hong-Kyung explained that Yin Qiao Mai is a meridian which is activated when a person actively communicates with others. It is more active in the Shao Yang constitutional person who is naturally active and socialised.
9. The correlationship between Wei Mais and Qiao Mais and Four Trigrams can be proved by applying Zhou Yu Gua Xiang (周易卦象) as follows. The Yang Yao and Yin Yao located below Yang Wei Mai and Yin Wei Mai can be interpreted as “the other party to myself” and “myself to other party” respectively. The ones above the Yang Wei Mai and Yin Wei Mai can be understood as “to be free from restraints” and “restrain others to form

a group”. The Yang Yao and Yin Yao below Yang Qiao Mai and Yin Qiao Mai can be understood as “the other party to myself” and “myself to the other party”, and the ones above Yang Qiao Mai and Yin Qiao Mai can be understood as “actively communicates with others” and “passively waiting for others to communicate with me”.

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This Thesis is a translated copy of the thesis titled as Kim Hong-Kyung's view on extraordinary meridians which was published in February 2014.

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Systemic states and quantum mechanics in the acupuncture?

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Abstract

The acupuncture micro-system approach used in the diagnosis and treatment is widely attested in practice. The author characterizes the basic principles of the systemic states. He uses the quantum mechanics principles to explain the acupuncture therapeutic effect in a large group of 1134 examinations in patients.

The validity of the superposition principle in the treatment of different groups of patients is confirmed with the 92.37 % rate and 81.75 % therapeutic success rate in the group of patients with the complex meridian cardinal points system characteristics, with the 91.3 % therapeutic success rate in the group of patients with the meridian block points system characteristics, with the 84.61 % therapeutic success rate in the group of patients with the Ma Danyang points system characteristics and with the 85.71 % therapeutic success rate in the group of patients with the Sun Simiao points system characteristics.

Keywords

Acupuncture Microsystems, quantum mechanics

The General Systems Theory generalizes the principles of the wholeness, organization, equifinality (A general feature of opened systems to achieve a dynamic equilibrium.) and of the isomorphism of opened systems (The relative similarity of mathematical systems. When systems resemble even in a one element, they are similar).⁽¹⁾

If the system is in the dynamic equilibrium, it means that it meets the characteristics of a certain space-time relationships. In the time dimension, the system is always different, always occurs in a different state, and the equilibrium has other functional characteristics. Then we talk about the energy-interactional systemic state.

The dynamic equilibrium of the systemic states depends on the relations between them. We call it systemic organization, which reflects the information about the system and its relationships.⁽³⁾

In the acupuncture diagnosis and treatment is usually used the philosophy of acupuncture microsystems, represented by anatomical projections or projections of organ functions. Subsystems are used during the treatment with the allopathic methodology – to affect one system or some pathologic organ with the aim to cure it.

Diagnostic and therapeutic microsystems, whose essence is the projection of the dynamically fundamental energy-interactional states (elements), allows us the targeted access to the system through the projection of the one point. This approach is widely used on the basis of the TST (tactile Solar test) diagnostics.⁽⁶⁾

How do we understand the system in the acupuncture diagnosis? The system is not only a group of structures in a quantitative sense. Every physical structure that comes into interaction with another structure is considered to be a system. According to us, the system is also an acupuncture point projection in terms of the energy-interactional structure.





In other words, the different amount of microsystems in the acupuncture diagnosis is manifested by the different characteristics and features. There is a kind of chaos, which the body perceives as a discomfort. This chaos is in the language of quantum mechanics a certain or an infinite amount of mathematical possibilities that are happening at the same time. We are talking about a superposition of states. The aim of the therapist is to enter this process and choose the appropriate option. The so-called decoherent superpositional state becomes coherent, which is perceived by the body as a comfortable state.⁽⁵⁾

This is the way the therapist comes in to makes a change by entering to the interaction with the one superpositional state.

The goal of the study is to

1. Answer the question why various therapists effectively treat patients with the same disease using different methods.
2. Confirm the existence of the equifinality and isomorphism principles of the mathematical opened systems in acupuncture.

Hypothesis

If it is true that in case of polymorbid patients the microsystems occur in the superpositional state, then by selecting one of the mathematical possibilities (using one or two acupuncture points) the examined microsystem equilibrium and psycho-somatic difficulties retreat.

The methodology

During the period from January 1, 2009 to April 30, 2011 we realised 1134 TST (Tactile Solar Test) with polymorbid patients. We created a group of 657 (58 %) examinations of patients treated by the system of one or two

acupuncture points. All the patients underwent the examination of the extraordinary vessels system, Sun Simiao points system (by now has known 14 points), Ma Danyang points system (by now has known 14 points) and the meridian block points system.

The definition of block in the TST level – in case of the different tactile sensitivity (hypersensitivity or hyposensitivity) in the direction of the meridian's chi potency growth we talk about the meridian block.

If there is hypersensitivity in the place of the point projection above the block in the direction of the chi potency growth, we talk about the decreasing tactile gradient.

If there is the hypersensitivity in the place of the point projection below the block in the direction of chi potency growth, we talk about the increasing tactile gradient.⁽²⁾

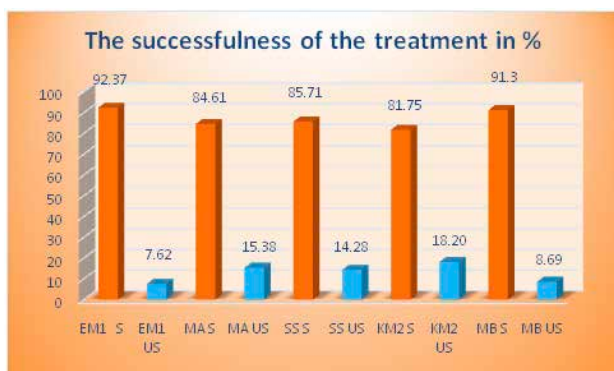
For the purposes of the work we have created 5 groups of patients.

1. The group of patients in which we used during the treatment the cardinal points of extraordinary vessels system characteristics.⁽⁴⁾
2. The group of patients in which we used during the treatment the two points, the cardinal point and another point system characteristics of the meridian forming the tactile gradient.
3. The group of patients in which we used during the treatment the Ma Danyang points system characteristics.
4. The group of patients in which we used during the treatment the Sun Simiao points system characteristics.
5. The group of patients in which we used during the treatment the meridian block points system characteristics.





Results



Graph 1

EM1 – the group of extrameridian vessel system – the treatment is successful with one point

EM2 – the group of extrameridian vessel system – the treatment is successful with two points

MA – the group of the Ma Danyang points system

SS – the group of the SUN SiMiao points system

MB – the group of the system meridian block points system

S – the treatment is successful with one or two points

US – the treatment is unsuccessful with one or two points

1. It seems that on the basis of these results we confirmed that the application of the element characteristics of one or two points as a system leads to the dynamic system equilibrium in 91.3 % in the group of the meridian block points system, in 85.71 % in the group of the Ma Dan Yang points system, in 84.61 % in the group of the Sun Si Miao points system, in 92.31 % and 81.75 % in the group of the cardinal points system.
2. We confirmed the existence of the isomorphism principle (the similarity of mathematical systems), which is actually the essence of Hahnemann thesis in the treatment of similar by similar. We assume that the element under which all systems are similar is the element system characteristic.
3. According to these results we assume, that in the acupuncture treatment the Quantum Superposition Principle is applied.

The Conclusion

A lot of works have been dedicated to the understanding of the acupuncture effect.

All these efforts have resulted in the variety of theories from the local effect, through the reflective theory to the bio-cyber theories.

It seems that the microsystemic approach in the diagnosis and treatment reveals interrelations between the systems. Recent findings in physics of quantum mechanics address us with the principles that apply generally to all the phenomena of the microscopic as well as macroscopic world. To a large extent they also contribute to the understanding of acupuncture, illuminate the hazy understanding of the chi and the processes taking place in our body.

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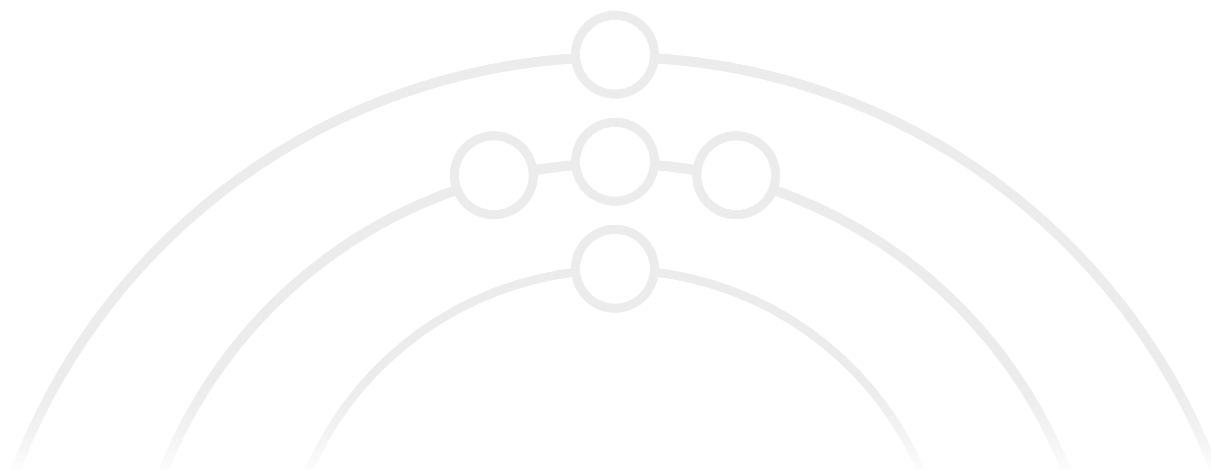


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Cardiovascular Diseases and Medical Geochemistry

Doc. Dr. Miloslav Khun, CSc.

Abstract

This contribution is dealing with the relationship between water hardness and mortality from cardiovascular diseases, using exploration of examples from foreign and domestic literature. It is reporting on one of the first papers regarding this topic (end of the fifties, Japan), as well as more latter epidemiological studies in which causal relationships were demonstrated. The causality represented here, is an inversion connection between occurrences of cardiovascular diseases and consumed drinking water, i.e. the more water hardness, the less occurrence of diseases. Due the objectivity, opposing studies are presented, in which similar connections were not confirmed or with contrary results.

Keywords

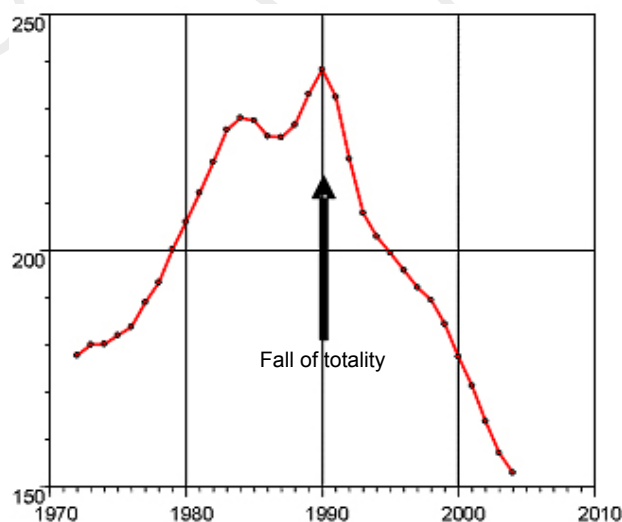
cardiovascular diseases; water hardness; medical geochemistry; calcium; magnesium

Cardiovascular diseases are the main reason of deaths world-wide and also in Slovakia. More than one half of all deaths of men and women are attributed mainly to ischemic heart disease and cerebral apoplexy in Slovakia. For example in the years between 1994–2003, 15 000 deaths related to ischemic heart disease in average were recorded yearly in Slovakia, with a slight female prevalence (53 %) and with age median of 77 years. At the age of less than 50 years, it was approximately 3 %. There were 3000 deaths recorded from apoplectic strokes and infarctions in this time span, also with slight female prevalence (55 %) and with age median

of 77 years. At the age less than 50 years it was approximately 10 % (Rapant et al., 2010).

Hujová (2005) stated that among confirmed reasons of cardiovascular diseases occurrences there are: age, genetic predisposition, family anamnesis, sex (so called fixed risk factors) as well as higher LDL-cholesterol and lower HDL-cholesterol concentration, respectively, smoking, obesity, diabetes mellitus of type II., lack of physical activity, unhealthy food, stress (so called modificative risk factors).

Ginter et al. (2013) documented in a very illustrative way the dependence of premature cardiovascular mortality on the political system in Slovakia (see Fig. 1).



Obr. 5. Dramatic decline of premature cardiovascular mortality in Slovak males after the fall of communism (Ginter et al., 2013)

The environment is another possible factor that affects human health. According to General Declaration of WHO, environment can act to





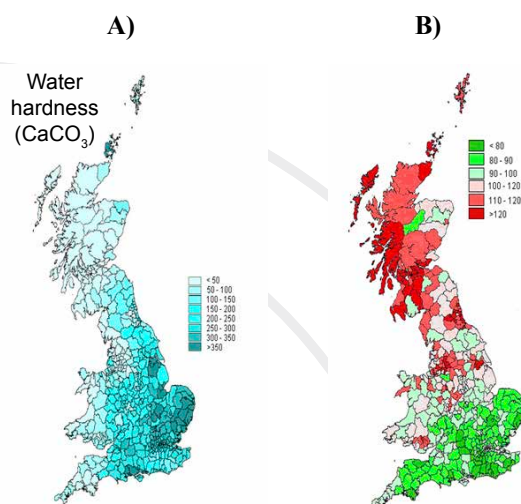
final health status of population with 10-20 % contribution. Geographic distribution of mortality from cardiovascular diseases was investigated in many countries. For example in Japan, USA, Great Britain, Sweden and other countries, very interesting connections were recorded between the mortality degree and the geochemical environment character. Attention was focused especially to chemical composition of drinking water; fewer studies were dealing with soil composition or atmosphere influence. Recorded relations are not of the same significance in all countries or regions, but they confirm that the influence of geochemical environment on human health can be of more importance than it was presumed.

One of the world first papers on medical geochemistry issue was a study by Japan scientist Kobayashi (1957). It demonstrated and statistically confirmed relations between water hardness and mortality from cerebral apoplexy. After World War II in Japan, this disease became the main cause of deaths. Aforementioned Japan scientist was a long time dealing with the chemical composition of river waters in Japan. He determined interesting differences in geographical distribution of river waters with different geochemical types. By the comparison of mortality caused by apoplexy and the river distribution he stated close connection between these parameters. Namely in Japan, there are increased number of sulphate type river waters (dominating ion SO_4^{2-}) towards NE, whereas world-wide „normal“ river waters have calcium-carbonate character and sulphates are in accessory concentrations. Geographical distribution of these special type river waters (i.e. with Ca deficiency), correspond with the levels of mortality from cerebral apoplexy.

From the latter case studies we can take example from one epidemiological study that took place in Italy in the years of 1969–1978

Abruzzo region (central Italy) with a population of 594 313 inhabitants. This study manifested inverse correlation between water hardness and deaths due the cardiovascular diseases among inhabitants at age 45 to 64 years (Leoni et al., 1985).

Further medical geochemistry study from Great Britain was also dealing with the geographical distribution of cardiovascular diseases and water hardness. Fig. 2 illustrates an increasing water hardness; NW regions with its “soft” waters down to SE part of the country with hard water and adverse geographical dependence from the male cardiovascular mortality point of view (Catling et al., 2005).



Obr. 6. Geographical distribution of water hardness (expressed as $\text{mg.l}^{-1} \text{CaCO}_3$)

(A) and mortality from cardiovascular diseases in Great Britain in males (B). Mortality is presented as standardized mortality ratio for all age groups. Adapted after Catling et al. (2005)

In the former Czechoslovakia, Švec (1976) pointed out relationships between hardness of treated drinking water and mortality by cardiovascular diseases in the years of 1965–1969. He already considered the drinking water as an important source of elements input to the human organism and the geochemical





environment as an important factor influencing population in a certain region.

One of the first studies in Slovakia in this topic, was the observation of drinking water effect to cerebrovascular diseases in Michalovce district (Bírová et al., 1985). The results indicated that there is a similar negative correlation between chemical composition of drinking water and cerebrovascular diseases occurrence as it is in case of cardiovascular ones. Authors point out an important fact when searching similar relationships that it's necessary to use only the results from villages supplied by the unique water source. Further Slovak study of water hardness impact to cardiovascular diseases, simulated soft drinking water from High Tatra Mts region in comparison with drinking water used in Bratislava (Bratislava water pipeline from water source Sihot'). This study has been accomplished on experimental animals. Experimental group of rats were given artificially prepared water with identical composition as water in pipeline at Štrbské Pleso (High Tatra, very soft water 0.157 mmol^{-1}). Control group of animals drunk water from Bratislava water pipeline (middle hard water 1.99 mmol^{-1}). The results imply potential negative impact of soft water to cardiovascular system. Authors recommended to human population not to use soft water for drinking and cooking (Bada et al., 1998).

In the time-span of 2006–2009 State Geological Institute of D. Štur was solving a research project „Environmental and Health Indicators of Slovak Republic. This research is included into pilot project of WHO “Environmental and Health Information System”. The aim of this project was to monitor the impact of the environment on the occurrence of cardiovascular diseases, especially the influence of water hardness to health of Slovak citizens. (Rapant et al., 2010).

Rapant et al. (2014) in their current paper divided geological environments of Slovak Republic to 8 units, in order to assess the potential impact of this environment to the health of Slovak population. The geological environment of neovolcanic rocks (andesites and basalts) has the least favourable impact on health of Slovak population, while geological environments of sandstones, shales and claystones (Paleogene Flysch) have the most favourable impact. This finding can probably be associated with the entire lack of Ca and Mg in groundwater from the Neogene volcanics.

Actual impact of Ca and Mg contents as well as water hardness to cardiovascular diseases on the basis of these selected geological units in sense of Rapant et al. (2014), solved Sípóš (2014) in his dissertation thesis at the Department of Geochemistry (Faculty of Science, Comenius University Bratislava). Author presented an inversion relationship of these geochemical parameters to monitored cardiovascular diseases in all selected units. It must be said that though all the correlation coefficients were negative, the closeness of connections can be discussed.

It is necessary to assign due the objectivity that not all world and local epidemiological studies with this topic demonstrated or confirmed causal relations and the authors have formulated their conclusions in a conditional manner. As we are unable to present all of these studies, I will restrict to only some cases. For example Leurs et al. (2010) searched for mutual relationships between Ca and Mg contents, as well as used drinking water hardness in the Netherlands to study mortality rates caused by ischemic heart diseases and stroke. Following data from 1986 shows that inhabitants were supplied as following: 36 % with soft water, 26 % with middle hard water and 38 % with hard water, respectively. Any statistically significant





connection was found between the monitored parameters.

It is heart-warming that also some students in Slovakia approach this topic critically and without dogmatism. Kováčiková (2011) dealt with the assessment of the ground water hardness effect on selected forms of cardiovascular diseases for all municipalities in Slovakia. In her dissertation thesis, she demonstrated a positive impact of hard water to some parameters of cardiovascular diseases (Dpt. of Geochemistry, Fac. Sci., Com. Uni Bratislava). As she states, "Although favorable impact to some health indicators was demonstrated we can't forget that WHO claims the environment to influence the health condition of a population with only 10- 20% rate. Hence we must take into account this topic in a comprehensive way and we can't eliminate further factors having an impact on these diseases"

When interested a reader can find an analysis of epidemiological studies dealing with this topic published after year 1957 e. g. in the paper from Calderon and Hunter (2009).

Conclusion

As far health effects of calcium and magnesium in the drinking water are concerned, direct confirmation about impact of water with various hardness to the cardiovascular diseases was recovered in the middle of the last century. There were more than 100 expert studies published during the first twenty years of research already. More epidemiological and medical geochemistry studies have confirmed causality between water hardness and mortality from cardiovascular diseases. On the other side, there are still studies with contradictory results. Kožíšek (2003) notices that calcium and magnesium are antagonistic, i.e. the effect of water on health can be conditioned by their summary concentration, further elements such

aluminium, manganese, zinc, barium, strontium and iron can contribute as well. We can assume, that with further sophisticated research of this medical geochemistry problem, we can reach the conclusion of H. A. Schroeders slogan known from the sixties of the 20th century: "The harder the water, the softer the vessels".

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Acknowledgement

This contribution is the result of the project implementation: Comenius University in Bratislava Science Park supported by the Research and Development Operational Programme funded by the ERDF Grant number: ITMS 26240220086





Natural Therapy of Economy

Prof. Ing. Ján Košturiak, PhD.

In the current world the scientific disciplines are being specialised more and more and the specialists have sometimes a problem to see the whole. The patient in the hospital is often in a position of an object in a complicated logistic centre which moves between specialised departments. The whole world is endangered by the monocultural way of thinking, intellectual incest and specialisation, however, the whole passes unnoticed. The natural medicine is an interdisciplinary science which views people but also their environment where they live as integrated systems. Also the economy, society and companies where people work and whose products they consume, is part of this system. In this article I would like to look more closely at the changes in this area and to show that the economic systems and enterprises behave like live organisms.

1. Diagnosis? Pleonexia

Let's look around us. After elections each politician speaks about growth. About the growth of GDP, consumption, production and sale. Hardly anybody of them speaks about the growth of happiness, happy family life, free time for people's development, the growth of the good in ourselves and in the society we are living in.

How is the economic growth achieved? It is achieved through consumption of people and spending money on things they mostly do not need. There are lots of tools for persuading the indecisive customers – from stupefying advertisements in the mass media through

arousing desires for new things and experiences up to stimulating people by various sales and loans they sometimes never pay back.

People buy and the companies receive signals they are to produce more (and at the same time they create waste) and to consume more (the raw materials and energy from the nature). The banks lend people money for consumption and the companies for purchase and manufacturing. In the end people, firms but also banks which do not get the loans back are indebted. And again it is the turn of politicians who save the situation – they print new money and give it to those who are the biggest spenders. In this way whole countries are overextended and those ones whose loans are smaller help the countries whose debts cannot be paid back any more. Alcoholism is treated by alcohol.

And the result? On the one hand there are the rich who make money on transactions, speculations, intermediary operations and virtual economy, on the other hand unemployed and indebted people, the poor. The bank buildings had grown taller than temples, the health and other insurance institutions are built of marble and their clients have no means for treatment or receive low pensions. The supermarkets dictate their customers what they will buy and consume and the producer for how much they will produce. Let's add our devastated nature – our Earth is step by step giving out its last deposits of raw materials and water.

Joe Egerton writes in his article called "Aristotle writes to Gordon Brown" – what are the deeds arousing the crisis? He claims it is the activity of limitless acquisition of more and more – the Greek word *pleonexia* which means defect, vice which is the opposite to integrity





and righteousness of people. It is an activity of a never-ending acquisition of things and unfair people – pleonektikos – are those who have to acquire more and more good things and to permanently avoid bad ones.

Is there any solution of this vicious circle of the growth, consumption, production and destruction of human lives? Yes, there is – healing the cause and not the effects. If the disease called pleonexia (who knows if it is in the list of diagnoses) is the cause it is necessary to treat it. And we can start from ourselves. Can people be happy though they do not possess more and more? Can people be happy though they have less and less? A lot of people will agree with me that it is better to have more love than money, more time for ourselves and our family than to stack property, to have many good people around us than a good holiday with a lot of experiences. So, why do we want more and more? Why do we stack things we do not need and the property we also do not take to the other world? Somebody once said we would take to the other world only things we had been able to give up during our life here.

2. How to Cure Ourselves

St. Thomas Aquinas writes in his work *Summa Theologiae* that to use a fraud for selling something over the reasonable price is always a sin. If the price exceeds the real value of the things or – vice versa – the thing exceeds the price, the equality of justice is disrupted. And therefore to sell a thing more expensively or to buy a thing more cheaply than it costs is per se wrongful and not allowed.

It is estimated there are about three hundred million unemployed worldwide. If we take into account also those people who have no job but are not registered, this number exceeds to one billion and will probably even increase. During the history of mankind the work productivity

has been increased and it results in reducing the number of employed people. At the beginning people were working in agriculture. They gradually transferred from this branch to industry and later from industry to services. We currently utilise new technologies (internet, self-service systems) and this fact reduces also the jobs in the area of services.

In the USA 0.5 % of people are working in agriculture, 14 % in industry and 80 % in the area of services. The number of people without work is increased. More than three billion people in the world live on a daily sum of 1.50 EUR – a value for a bus ticket or one beer in the pub in Europe. One billion people cannot read a book and write their name, eight hundred million people worldwide are starving.

The Egyptian Desert Father Evagrius Ponticus says that excess is a disease of soul which tortures it and does not allow it to find peace because the greed, avidity and excess will never tell us – enough. We achieve the state of the internal exhaustion most quickly when we are impatient, we have no self-restraint, expect too much, ask for and require the best results as quickly as possible. The famous Benedictine monk Anslem Gün differentiates work resulting from a “muddy spring” and work coming for the Holy Ghost. If people work with good intentions, with love and enthusiasm, they do a lot of work in a short time and do not get tired. Just the opposite, the work makes them stronger; it will give them new energy. The writers, painters but also managers and priests know it.

A lot of people are overloaded because they run in a similar way like a rabbit in the field. They work seven days a week, more than twelve days a day. What sense does it have? One Japanese proverb says – who goes slowly, goes fast. In other words, who stops, listens to, feels will understand the principles given by the God – He does not need to hurry because his





way is right. It requires peace, calming down, balance, immersion to our mind. People have to know how to calm down, to get somewhere away from the roar and unrest of the current world and to look for the secret of correct decisions in themselves. The Desert Fathers had known this, the current monks know it too and also managers and entrepreneurs are looking for their way to monasteries today.

Ora et labora – this is how to express the essence of the time management. This rule of St. Benedict encourages the monks in the Benedictine monasteries to search for the rhythm of their lives. It expresses the polarity and looking for balance between rest and work, between the rapid time (chronos) and slow time (kairos), between the passivity and activity. An old Indian chief watched the behaviour of white people and said the white men have an only God and his name is tik – tak. He tells them what to do. We should learn how to get rid of the “tik – tak” world and to find a world of silence and peace – a world where we could feel the real life and hear the most important signals. During the last century our world has changed into factories where standardised and unified employees are working. The unique human beings have become machines and geared wheels, the human lives the “tik-taking” chronos. The result is that millions of barrels of oil are flowing to the oceans, we eat “yogurts” made of powder and we daily run to work under concrete buildings through which we cannot see the sun. Anslem Grün says the work pause is based on the Greek word anapausis which say to have a rest, to breathe out, to recuperate. The sacred peace. The flow of time stops. The time stands still. We enjoy the time we have at disposal, we become ourselves in a unity with ourselves as well as with everything that exists.

We can meet people who look for planning calendars and the time management systems

everywhere. They always repeat that time is money. They learn how to rationalise, delegate, synchronise, parallelise and manage according to priorities and objectives. They forgot how to sit and listen to the silence without doing anything, to climb a hill and look at remote places, only to watch a flowing river or birds, to stop themselves and time and to touch the eternity of our world. Don't let's exchange our time for money. Time is our life – a gift we obtained from the God. It depends only on us what we will do with our time.

Professor Vladimír Krčméry writes that out of six billion people almost five billion are living in the developing countries. Approximately one and half a billion of them suffer from starving, two billion are infected by tuberculosis, six hundred thousand people contract malaria every year and approximately fifty million people became infected by HIV. Tens of millions of children who could change this situation die of these three most frequent infections. Hunger is the cause of death of ten million people. We believe that each of us would like these children to be sitting in the jury box on our Judgement Day. However, Vladimír Krčméry works more than writes. He and his team found hospitals where the Slovak doctors and volunteers help, cure and teach. In difficult conditions with an annual budget which is smaller than a Christmas party budget of a lot of companies in our countries.

We do not like listening to unpleasant things. However, if we close our eyes and ears against them, we will destroy our world. We take from the nature more than we really need and return more waste than our nature is able to process. The oceans are full of time bombs in the form of chemical weapons and nuclear waste. People have been able to destroy 80 % of the forests on our planet.





Long ago the constables were beating the peasants with whips for the people to be scared and to work on the nobles' fields. Today the manipulated mass media, risk- and financial explosion-makers scare us. Our grand-grandparents were able to build a house for themselves, to grow foodstuffs and were able to operate autonomously. Their life was hard. Our life is easier; however, we have to pay a large tax for it. If we do not pay we are without water and energy. We are forced to eat food made in chemical factories. When we have our own opinion they threaten us with courts. If we do not obey, they restrict our basic human rights. Today the minorities terrorise the majorities through money, threats and fear.

We are controlled by the credit card economy – borrow, buy and have a good time. These slogans scream at us at each corner. The more indebted people will be and more scared are, the better they can be controlled. We have slaveholders and slaves again. No whips and shackles are necessary any more. It is enough to liquidate the crafts, to liquidate the skills to cultivate soil and breed domestic animals. A global company will sell you seeds which were genetically adjusted in such a way that you have to buy them every year. Arrogant developers build new era temples in the middle of the towns where you can buy goods which you do not need. And the bankers will you give a loan without problem. Is your account blank? We will transfer you money. Do you not have any money for instalments? We will lend you. And in the end? We will take you everything. The property and your freedom as well.

There is a generation of twenty and thirty year old people. At school they had no lessons of logic, they are more chatting than talking, they prefer surfing on the internet to reading, they do not use their hands for writing but typewrite quickly on their tablets. In the USA

the research of this young generation has showed interesting results. A quarter of them do not possess enough financial means for purchasing inevitable needs. Each fifth person of this type has a debt amounting more than ten thousand dollars on his/her credit card. The overall debt of students exceeded 867 thousand dollars last year. Each fifth of them postpones the marriage and having children due to the financial reasons. A quarter of them returned to their parents because they have not money. A lot of others even did not move from the parents at all and they are not going to do it. The unemployment of young people to 24 years is close to 50 %. We have not enough craftsmen who are able to repair houses, farmers who would work in the fields and breed cattle. However, we have enough intermediaries, wheeler-dealers, dealers and players of pyramid games. We cease to understand real work and we have lost respect to it. The virtual world stultifies us more and more.

3. Treatment of the Sick World

Our world undergoes a big change which a lot of us have not noticed yet. Some of us consider the transformation a crisis and expect the economy to return to the original state. Others are fighting the crisis and repeat the nonsense about stimulating the GDP growth. Those who are cleverer follow the new trends and recognise new opportunities for their business.

We have arrived at the turning point and we will have to switch the points. The politicians and economists look like train drivers in a train which speeds down a hill without control. The train drivers helplessly push the buttons and try to postpone the disaster. However, the train has been out of control for a long time and everybody knows what will happen.

The bankruptcies of the countries, banks, companies, families, massive depreciation of money, social unrests, etc. If we began to





follow the employment rate instead of the unemployment rate we would acquire surprising numbers. We will be in a state when only less than 70 % of people will have a job and the young people will be dominant here. It will cause further economic and social problems.

Negative effects? There will be no money, consumption, growth, there will be no work.

Positive effects? An alarm clock for people to start learning again and doing useful things.

Everybody will be an entrepreneur. A company owner, a self-employed person and employee. Some people will work at home, others as free-lancers will provide their activities for more employers and others will work on the seasonal basis. But they will have to learn how to do business with their talent, education and to offer more than the others. The group of people who will get a job with difficulties will increase. The ill and handicapped people, people with life difficulties but also those who will be unable to cope with high demands on new technologies and work organisation will belong to this group. The entrepreneurship will have a greater social, ecological dimension but also a dimension of searching of the sense of life.

The economy and enterprises do not operate here like machines but like living organisms. They adapt and learn, the processes of growth, division and decomposition are running here.

Every company has two parts – the visible and invisible one (see the figure 1).

1. The visible part is often described in books dealing with processes and company management. The enterprise here is usually described as a dead, mechanical system – the machine can repeatedly change the given input into a precisely defined output. The structure of the company is its visible part; it is described in the process maps and organisational schemes. However, no company operates according to these

mechanical schemes because the enterprise where people work is a living social system. The invisible part of the company is its real organisation where people work and does not perform like a machine but as a living organism.

The company is an autopoietic organisation. The autopoiesis (from the Greek words *autos* – alone and *poiein* – to perform, create) is a term which describes the nature of the systems which arise and maintain thanks to their own structure.

The biologist Humberto Maturana explained by this term the living cells and processes which organise and maintain themselves. Maturana described these processes in such a way they operationally divide from their surroundings and maintain their organisation until they cease to exist thanks to a permanent exchange of substances with their surroundings.

Based on this, the sociologist Niklas Luhmann described later a theory of the society and the principle of the autonomous operation and maintenance of the organisation and its permanent adaptation during steady changes of persons and their relations.

Professor Zelený describes the company as a living organism as follows:

The organisational processes of a self-creating organisation can be defined as a network of interactions including at least the following processes (see the figure 2):

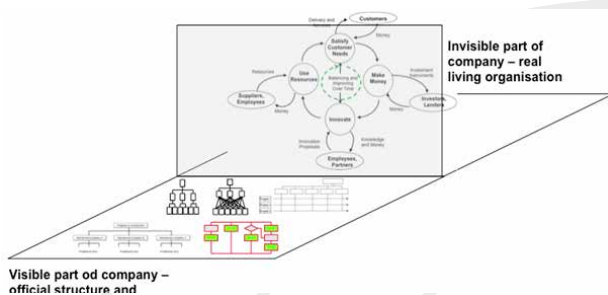
1. The production: i.e. the rules and limitations which manage and check the input of new components – their adoption, entrance, birth, membership and acceptance.
2. The bonding: the rules managing the cooperation, contracts, associations, agreements, the rise of networks of producers, functions and positions of individual components during their operation in the organisation.





3. The degradation: the rules and processes connected with trade or termination of the membership, e.g.: death, decomposition, division, consumption, withdrawal or exclusion.

An organisation becomes autopoietic if these three types of processes are in equilibrium and work in harmony. If one of the three types is missing or if one of them dominates (the system is unbalanced), then the organisation can be either heteropoietic or allpoietic, i.e. being able to produce “things”, more than itself. E.g. the production and connection without any subsequent degradation quickly exhaust the nourishment of the environment and arouse a development brake.

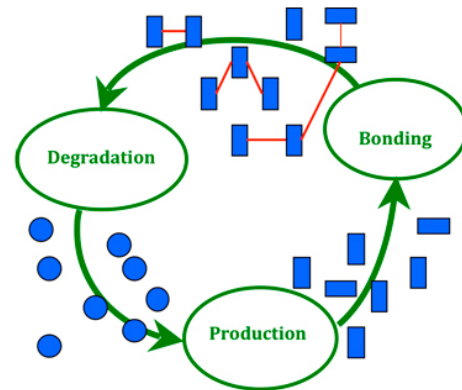


Obr. 7. The visible and invisible part of the company

The managers and consultants prefer the visible part of the company and describe it by various linear models with arrows which have their inputs and outputs. According to these mechanical descriptions they try to manage their companies and are surprised when it does not work. Some of them try to change the created structures but the company always behaves in a different way than the process maps and manuals describe.

The cause is clear – the company does not work as linear arrows which change the inputs into outputs according to the defined rules. The company works in a circle and this circle is changing according to how the elements which create the relations between them permanently

alter. The living systems assess the external impulses and respond to them each time in a different way – new relations and memberships arise inside of them.



Obr. 8. The autopoietic company cycle
(M.Zelený)

The cycle depicted in the figure shows not only the basic principle of the company life but also of the whole economic systems – the rise of an idea, establishing the company and start-up of the business. Subsequently the interconnection to the networks and growth and in the end the termination. The company growth is frequently connected with success and an exceptional position which sometimes leads to underestimating the competitors, customers, pride and – degeneration and termination. The company life span in this cycle can be prolonged if the company has a built-in self-purifying mechanism of the crisis; it is able to innovate its products, services and processes and to reproduce its culture and knowledge.

The figure shows that the crisis is a purification process – it removes from the market and society the parasitising segments which have degenerated and misuse their position, do not add value neither to the customers nor to the company.

A new world which opens a chance for new, innovative and flexible companies is being formed. It is an opportunity to send the dinosaurs





to history, to give a chance to new players and to bring new products and services.

These are several trends which give a chance to new entrepreneurs:

1. **Mass customisation.** More and more frequently, customers prefer an individual solution to a standard one. Customers are more and more involved in innovations and the development of new solutions – they themselves want to choose, draw, configure and design the products and services they pay for.
2. **Self-service.** Customers will do many things by themselves. The breakfast buffets in restaurants, internet banking, booking air tickets or purchasing books through the internet may serve as examples.
3. **Disintermediation** – complicated chains of intermediaries, distributors and dealers have gradually been developed between the manufacturers and customers. These networks often take 40–70 % of the product value and use arcane practices towards the customers, as well as the suppliers. These inter-segments are little by little being excluded from the chain and the producers and customers are directly interconnected.
4. **Collocation** – the producers are more closely linked with the suppliers and partners in production, development and also business. The suppliers are becoming part of manufacturing and the development of their clients. In this way synergic networks come into being.
5. **The digital technologies** are principally changing the entrepreneurial methods. The internet and social networks are more and more utilised for marketing and innovations (open innovations), the 3D printers enable producing components and rapid prototypes directly at the place of consumption, the virtual reality systems and 3D modelling are more and more frequently utilised for the speedy testing of prototypes, but also for demonstrating solutions to the customers.
6. **From information to knowledge.** The major firms behave assiduously, they analyse, plan, assess everything; they try to avoid risks. Their managers prefer to make no decision or take no action rather than make a mistake. The information and plans dominate the realisation. We can see this in the area of politics, at universities but also in company managements. Actions and deeds that bring real knowledge and experience are important in this turbulent world.
7. **From work division to integration.** The narrow division of work and specialisation are replaced by multi-functionality and integration. Here also the whole system of education, training and coaching of people will change dramatically. Today sometimes one worker has to know how to make the whole product, the innovations do not run between departments but in “cross-section” teams of people from marketing, sales, service, production, logistics, development, design, etc.
8. **The innovation of whole entrepreneurial systems** – innovation develops on a higher level than a product, service or company process. They are created on the level of the entrepreneurial systems. The internet gives us the best known examples. Similar models develop today in the area of electro mobiles or passive houses. The new business models frequently utilise completely new technical solutions, materials, they create new supplier networks and communities of customers.
9. **From globalisation to re-localisation.** Globalisation has discovered its boundaries. A problem in one part of the world can have global consequences, control is being lost as well as the safety and security and identification





of the goods. The transportation negatively affects the environment. Production in local networks is arising – the information is transferred globally, products are made locally. The new technologies enable this process but also the customers require it.

10. **New political self-awareness.** Where have we ended up? On the one hand the rich who make money on transactions, speculations, intermediary operations and virtual economy, on the other unemployed people, the poor and indebted people. The supermarkets dictate the customers what they will consume and the producers what and for how much they will manufacture. Let's add to it our devastated nature out of which we liquidate the last deposits of raw materials and water. People start to be angry with corruption and expensive states which do not fulfil their basic functions. The entrepreneurs start to engage in the social life and to speak loudly about removing unnecessary and parasitising intermediary segments – politicians and their parties.

The world will change – except for the economic collapse, good news only.

4. Transformation of Entrepreneurship and Principles in Doing Business

Professor Milan Zelený writes that this transformation results from the previous transformations: the rise of agriculture and towns (*the agrarian sector*), the Industrial Revolution (*the manufacturing sector*), the rise of *the service sector* (after the World War II) and the growth of the *state sector* (state employment, unemployment, social benefits) in our millennium. These four sectors represent everything that can be produced from the point of view of economy: to produce foodstuffs, to manufacture things, to provide services and

to “do nothing” (i.e. to consume the financial resources created by other sectors, to live from the taxes). For the first time in our history the developed countries face exhaustion of the potential of all four sectors from the point of view of employment: we do not know the fifth sector and we are even unable to imagine it. The signs of this transformation can be seen everywhere around us: the self-service and outsourcing oriented on the customer, disintermediation (removing the intermediary segments), mass customisation (tailored to the people's needs in the price of the mass production), re-localisation (return to local and regional economies), re-integration (specialisation and division of work are weakened), technologisation of production and services (digital technologies), virtualisation (from the physical to the information internet space), etc. Our lives will become more self-sufficient, more autonomous.

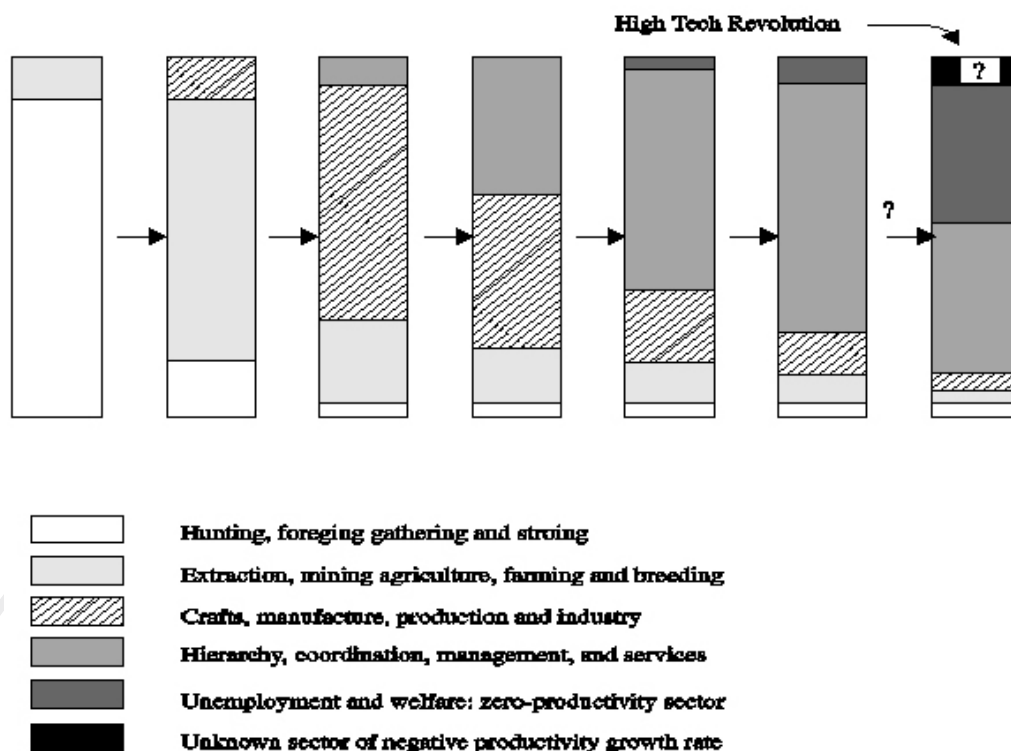
The re-localisation runs on many levels: the so called global localisation (*glocalisation*) concerns the global and international companies which adapt their products to the local conditions. In the USA the expression *local sourcing* – making use of the local resources – has found its place – the supermarkets complete their assortment from the closest surroundings (maximally 30 miles) for the goods to be fresh and to be from the locally preferred products (especially foodstuffs) but also as a consumer support of the local agriculture and industry, regional economy and the development of the more self-sufficient communities. Similarly, the *insourcing* (utilising the internal resources) represents a counterbalance to the traditional *outsourcing*. The relocalisation can be seen also in India where some cars are assembled even locally, i.e. at the point of sale. Multi-central networks with autonomous “hubs” arise. The distribution of foodstuffs in New York and





its surrounding is based on the local production as well as supplying of some restaurants. The reduction of the supplying chains reflects in popularity of the QRM – Quick Response Manufacturing – and co-location of the suppliers directly at the customers' lines, especially in the automotive industry. It is fascinating to follow

the first signals of the new trend. For a lot of enterprises it is still very difficult (though very important) to recognise such trends in time – the competitive environment of thousands of small enterprises will bring new, for many of us, insurmountable challenges.



Obr. 9. Fig.3. Transformation of job sectors in time (M.Zelený)

Millions of managers learn daily “miraculous” advices and methods which have brought success to global enterprises or entrepreneurs. And the same repeats all the time – sometimes these methods are successful, they work, bring their fruit but another time they bring nothing and the managers continue looking for “miraculous” solutions. Why is it so?

The farmers know when the appropriate seed is to be planted to the soil and what is to be done for them to get the crops in. It means that the farmer has to know the principles which are given, are generally valid and do not depend

on his/her wish. It is not important what a big plough the farmers will use for cultivating their fields (the tools) but how appropriately they know the principles of the nature and world – without knowing them the seeds would never germinate (principles). Not the methods but the principles lead to the goals in our life. Those managers who will understand this fact will save a lot of money for studying revolutionary methods at the schools of management.

The principle exists independently of us. It does not matter if we know gravitation, if we drop an object, it will fall to the ground,





the thrown balls move along exactly defined paths, beer in ten glasses gets warmer at the same speed, the sun rises always on time (although as a matter of fact our Earth rises every morning), if we moved by 87 % of the speed of light, our time and biological processes would achieve only half of the current speed, etc.

The scientists have been able to describe a lot of principles of the world around us. They have succeeded less in describing our consciousness, the internal and spiritual world.

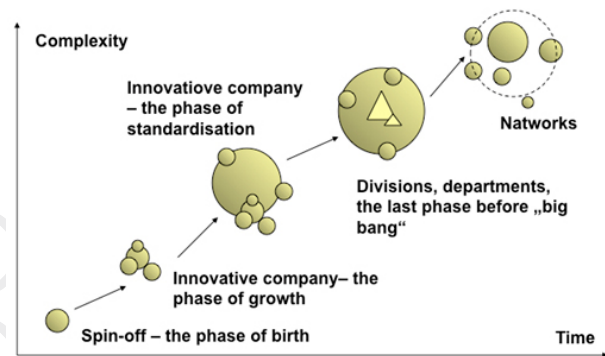
First of all we have to grasp that the economy and the companies do not work like machines where an exactly defined input creates an exactly assumed output. The economic and company systems behave like living organisms and the following principles are valid for their internal operation:

1. The principle of division

(see the figure 4). The figure shows a typical company development. At the beginning a cell/foetus or a spin-off company arises – it splits from its mother. This company which is usually built on a new idea, innovative idea, new value added grows step by step. In a certain phase it is necessary to define clear organisational rules, standards and guidelines. The company gradually loses its innovativeness, i.e. the phenomena which were the source of its growth at the beginning, it puts on weight, its procedures become bureaucratic and it changes into a ponderous and inflexible organisation. In the end it decomposes into smaller parts. A lot of companies that have understood this principle try to manage the division process intentionally (the amoeba organisation) and do not admit any organisational unit to exceed the defined size.

The constant creation of a vital market space: the decomposition and destruction of obsolete structures, companies and networks enable the entrance of the enterprises to new relations,

new growth. This is the only way how new companies can arise and new entrepreneurs enter the process. The renewed creation of the new market space – in the same way as the old free their place to the young in all biological and natural social systems – is the basic assumption of life and capitalism. If we artificially maintain the dinosaurs, it closes and fixes the space which could be entered by new companies, new entrepreneurial models and new ideas.



Obr. 10. Principle of division

2. The principle of equilibrium

Similarly as in the case of nature and living creatures any disruption of equilibrium leads to changes which can result in a disaster or disease, also the company business systems require equilibrium and to maintain it. The figure 5 depicts the simplest company business system which contains the minimal number of elements for the enterprise to operate in a long-term perspective. The equilibrium between these elements is the basis of this operation. The company cannot operate only in the cycle customer – finance for a long time but it has to invest and innovate. It cannot innovate if it does not follow the market, customers and their needs. The investments as well as innovations would not make any sense if the company was not able to create effective processes which will deliver the required product or service (value) to the customer.

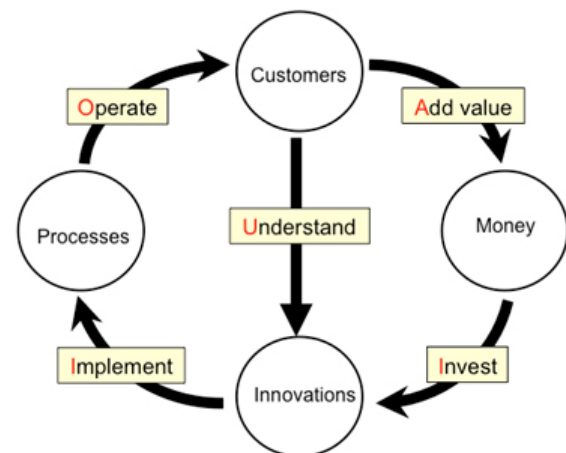




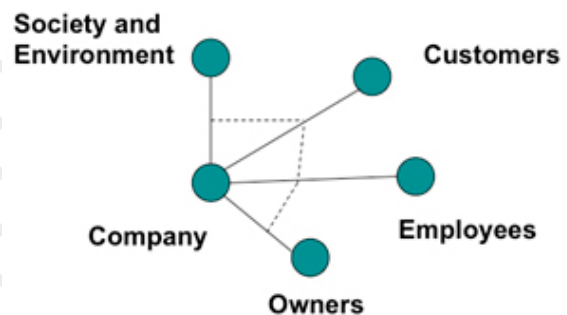
The company has to maintain equilibrium between the interests and values of the shareholders, customers, employees and the company. It is unsustainable from a long-term point of view if the company owner takes more from the business relation, however, such a company which is a “slave” of the customer cannot survive either. Some automotive companies ruled by union leaders stagger at the edge of bankruptcy today, however, those enterprises which create their profits at the expense of the customers cannot be successful either. The companies have to maintain equilibrium towards the society too – they must not do business to the detriment of the environment, damaging health, morale and education.

The world of nature possesses huge variety of living organisms arising during the repeating cycle of the seasons. There is a minimum of entropy. In the nature everything works in equilibrium, there is enough of everything, one thing completes the other and operates in an amazingly economical way.

Also in the society it is valid that the success should not be achieved on the expense of others, not the compromises are the best solutions – it is the equilibrium based on searching for the solution win – win.



Obr. 11. Company business system, its basic elements and equilibrium between them



Obr. 12. Equilibrium of relations and value for all

3. The principle of circulation

is connected with the two aforementioned principles. The whole nature works on the cycle principle. Nature has no raw materials and waste. For you were made from dust, and to dust you will return. The companies of future seem to work in a circulation – their outputs will inputs at the same time (recycling, cleaning and repeated utilisation of the “waste”, eco-entrepreneurship, re-manufacturing).

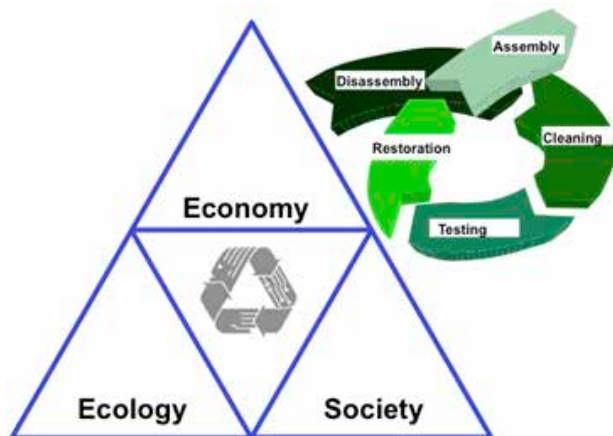
4. The principle of life cycles (S curves)

Similar life cycles as in the nature work also in the companies. The fact we know them enables us to plan the assortment changes and company processes better. The figure 8 shows the so called





S curve. It is very important to know it because of innovation management in the enterprise. The problem which has been occurring recently is that the S curves are shortened and the new S curves are to be planned during the phase of growth.



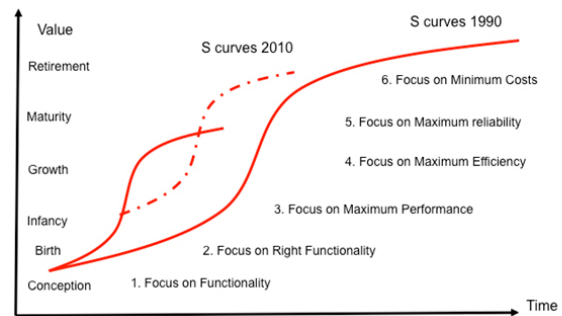
Obr. 13. Principle of circulation

5. The principle of evolution – DNA

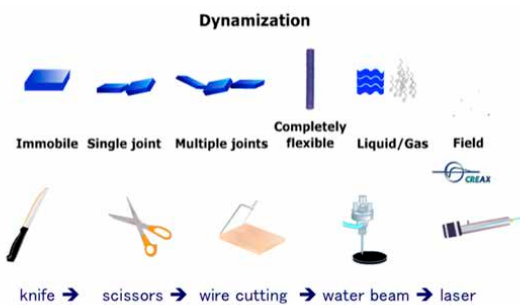
The laws of the technical revolution – the principles which are valid during the evolution of the technical systems and it is possible to predict the directions of the further development and to look for inspiration for their innovation according to them.

The strategy does not mean defining visions, missions and describing actions. The strategy is a set of actions, it is what we are doing and not the things we are planning and speaking about. Similarly as a lot of mistakes and errors develop during the DNA reproduction in the nature and the nature is able to rectify them quickly, also the company strategy should be realised. Professor Milan Zelený said – I planted a tree in my garden and observed what would happen. It was growing. I planted another tree to the first one and followed them. I was building my whole garden in this way. Some plants did not take roots, some dried out. It was a set of actions which led to the fact that I have a beautiful garden today.

It was a strategy. A strategy without any perfect master plan, a strategy responding to changes, a strategy of learning and improving. Exactly the same happens in the nature.



Obr. 14. Product S curves



Obr. 15. Evolutionary trends – an example

6. The principle of effectiveness and usefulness

The principle of effectiveness and usefulness says that only those organisms which fulfil a certain necessary function (they have a customer) have the right for existence and they fulfil this function through expending minimal resources (they produce a competitively capable value). All living organisms are typical by high effectiveness which is a condition of survival.

The enterprises and entrepreneurship work similarly like the nature. Our nature does not like unnecessary things, there is a sufficient quantity of everything and everything works maximally economically and effectively. The systems and organisms which have no customers and are ineffective cease to exist.



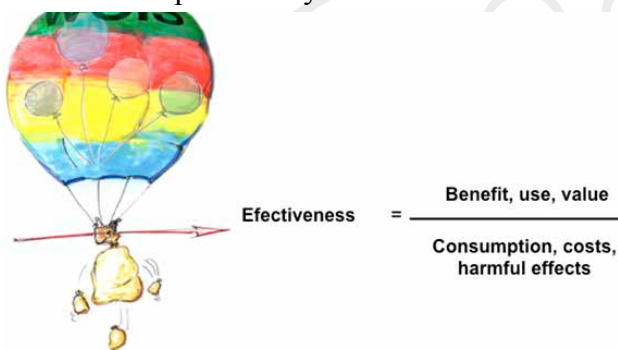


7. The principle of learning

Every company has two basic functions:

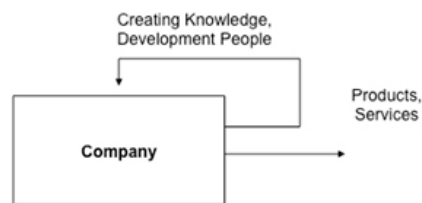
1. To manufacture products and services which enable to make money, create profit and develop the enterprise.
2. To create knowledge, develop people and produce ourselves – this task is the basis for coping with the function number one from a long-term point of view.

A lot of people speak about successful entrepreneurs who were lucky. The real “luck” consists in patience and stamina, in the ability to learn (on the mistakes of others not on our ones). Edison carried out 147 unsuccessful experiments until he found the appropriate fibre for his bulb, the brothers Wright took off 805 times (and fell down) until they realised the successful flight thanks to which they wrote their names upon history.



Obr. 16. Principle of effectiveness

Some companies proved the company longevity depends especially on learning, creation, sharing and capitalising the knowledge. The knowledge is not information. The information is a description of an action (a recipe) and the knowledge is the action itself (the ability to prepare a meal properly). Learning is no proliferation of information but proliferation of knowledge.



Obr. 17. Two company functions – production and self-renewal through learning and knowledge development

People are long-term assets because they acquire abilities, machines are depreciated and lose their value, the people’s value, on the other hand, grows. When we develop the human potential in the company it is necessary to realise that not only the selection of right people is important but their linkage and “maximising” their potential for them to be able to collaborate and develop the knowledge in the company systematically.

On the other hand we know that utilising the human potential in the companies belongs to the worst forms of wastage. The productive utilisation of many employees in the manufacturing and non-manufacturing areas is often under 50 %. It is a consequence of wrong organisation of work, a lot of non-productive meetings and bureaucracy, vague objectives, insufficient confidence and frequent conflicts, vague vision, strategy and company values.

The companies often do not know the real value orientation of their employees, their motivation factors, real abilities and areas of interest. On the other hand an exact definition of knowledge and abilities for a certain position and the testing methods are missing. This results in a fact that inappropriate people occupy inappropriate positions for which they have no professional or psychological abilities. This causes problems to the employees themselves but also to the surroundings and the whole organisation suffers from conflicts and low performance efficiency.





8. The principles of ethics and honesty

The success in life or doing business should not be achieved at the expense of other people.

Jan Baťa said: one means of payment has not found its place in our economic and public life. It is called honesty. A lot of people think it is possible to get everything for money. It is not true. You can obtain for your honesty much more.

The golden rule finds its expression in all world religions.

The Taoists say – consider your neighbour's success for your success and his failure for your failure. The Qur'an adds – none of you is a believer until you wish to your brother the same as to you. And Christ said – how you would like people to deal with you, you deal with them, it is the whole Law and Prophets.

Time is money and that one who stops, is a loser, a lot of managers claim. One Japanese proverb says – who goes slowly, goes fast. In other words, that one who stops, listens to, feels, understands the principles does not have to hurry because he/she has taken the right way.

Gary Hamel writes – take part in a typical top management meeting which will discuss e.g. the strategy, budgets, employees or anything else – not only you will see a striking absence of thinking which requires the right brain hemisphere but you will not hear practically anything that would indicate the meeting participants had "heart". Beauty. Truth. Love. Service. Wisdom. Justice. Freedom. Compassion. These are the moral commands which have been waking up the human creatures to extraordinary performance for ages. It is sad that the management has so little space for these virtues.

Conclusion

- o We are sick of excess and feverish effort to possess things we do not need at all.

- o We have to learn how to stop, calm and think more about the sense of our deeds and our life.
- o The world around us is sick – it is built on the growth of wealth, imbalance of the world, human misfortune and destruction of nature.
- o The economy and enterprises are no machines and people are no geared wheels, let's thank for the crisis which probably will lead us to recognising the real wealth and happiness in this world.
- o The thing which is designated as a crisis by many people and we fight against that, is, as a matter of fact, a transformation and treatment of the sick world.
- o This world needs more love, compassion, service, justice, freedom and truth than GDP growth, increase of profits, market shares, globally manipulated and abused people.
- o Let's thank for the crisis and transformation, let us be sensitive to the signals which are emitted towards us and let's utilise them as an opportunity to cure ourselves and the wicked world around us.

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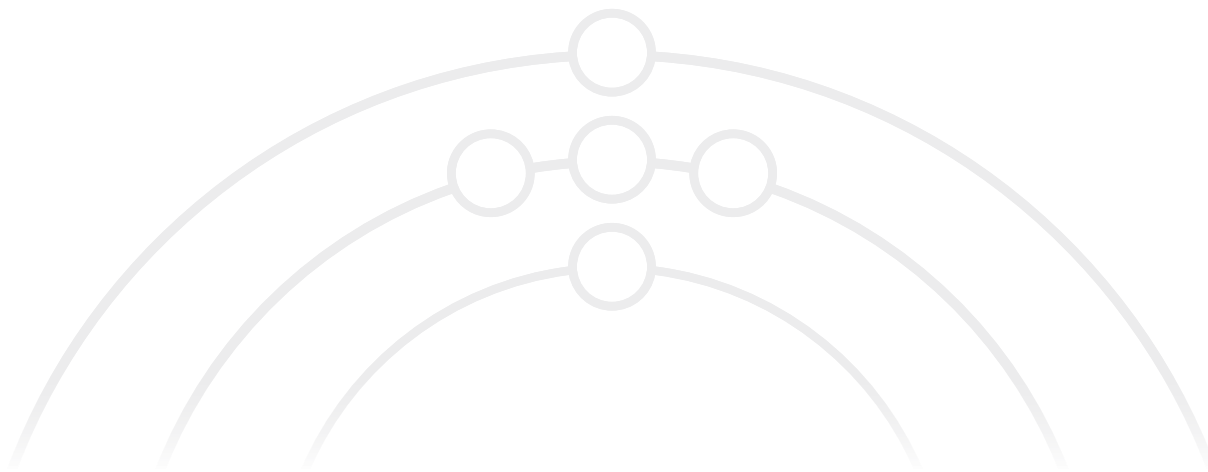
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Larval therapy I. – a modern method of treatment long-term non-healing wounds and use in clinical practice

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Abstract

Larval therapy (Maggot Debridement Therapy – MDT) is the intentional application of alive larvae of green bottle fly (*L. sericata*) to non-healing wounds, which have three mechanisms of actions on wounds: debridement, disinfection, stimulation of healing. MDT is used for the purpose of debridement and disinfection of chronic wounds with necrotic tissue. On the other side, larvae should not be used in open wounds, in sinuses, or in wounds around large blood vessels. We used three basic application techniques of MDT, “retention cage” – modification application techniques derived from the techniques of Shermanom, a new method of applying the “retention cage” with using adhesive tape on base of polyvinylalcohol and most practical application of larvae in a “biobag”. Sterile larvae and eggs for MDT application in Slovak Republic are made and distributed by organisation Scientica s.r.o. Nowadays MDT is used in many countries as an alternative to surgical treatment, which provides a fast and efficient wound debridement and contributes in the wound healing process as well as reduces the total cost of treatment.

Introduction

While technological advances have led to significant improvements in medical care, including wound care, non-healing wounds

still remain a significant problem. The rising prevalence of nonhealing wounds is due, in part, to the medical advances that have increased our life expectancy and have converted fatal diseases into chronic diseases. More people are living with conditions that increase their susceptibility to wounds or impair their wound healing. Additionally, our antibiotic arsenal is no longer as effective at controlling skin and soft tissue infections because of the growing number and prevalence of antibiotic-resistant microbes (Sherman 2009).

Traditional principles for the treatment of acute and chronic diseases include wound debridement and wound dressing. Wound debridement is defined as the removal of necrotic tissues, exudation, and bacteria to encourage a normal process of wound healing. We apply the wound dressing and by this we inhibit local contamination, lighten the debridement of exudates, and prevent infection (Attinger et al. 2006). For the purpose of developing new techniques to improve and accelerate the process of wound healing, studies have looked at local growth factors, products of tissue engineering, hyperbaric oxygenotherapy, and vacuum wound healing (Attinger et al. 2006).

Desperate to advance wound care, many clinicians and researchers are looking back into medical history and reexamining earlier technologies with the advanced tools





and wisdom of the 21st century. One of these reexamined technologies is maggot therapy, which is also known as maggot debridement therapy (MDT), biodebridement, or simply larval therapy. Maggot debridement therapy is the intentional application of alive, “medical-grade” fly larvae to wounds in order to effect debridement, disinfection, and ultimately wound healing (Sherman 2009). Nowadays MDT is used in many countries as an alternative to surgical treatment, which provides a fast and efficient wound debridement and contributes in the wound healing process as well as reduces the total cost of treatment (Thomas et al. 2001, Wollina et al. 2002).

We can register the systematic application of larval therapy in Slovakia since 2004, when the 1st Department of Surgery of University Hospital and Faculty of Medicine at Comenius University, in cooperation with Institute of Zoology of Slovak Academy of Sciences, began to apply larval therapy to clinical practice. At the beginning, sterile larvae were produced at the Institute of Zoology SAS, but after the first positive clinical experiments, the program was established at the non-profit organization Medicinal alternative (Medalt). Medalt, with the help of a grant from the European Social Fund, formed a sterile larvae (*Lucilia sericata*) breeding program. In 2007, the new organization Scientica, Ltd. was established, which supplied the medical larvae of about 15 clinical departments across the country. One key focus of the organization is in addition to the production of larvae for medical needs also extraction, identification and production of active substances from the salivary glands and digestive tract of fly larvae. We acquired substantial results in this sphere. Moreover, we disproved the hypothesis that larvae excrete antimicrobial substances in excretions/secretions (E/S) only in a nonsterile environment. Instead,

we demonstrated the effect of E/S on fibroblast – on fast cell division, the activation and migration of fibroblast, the vasodilatation effect of E/S, and mitotic and differential activity on human stem cells. We made the isolation, identification, and preparation of active molecules from larval ES in a laboratory condition. Nowadays, this molecule is object of future experiments in the treatment of chronic wounds. Today, researchers in more health departments have begun clinical experiments of larval E/S, which are applied into hydrogel.

Effects of larval therapy

Larval therapy have three mechanisms of actions on wounds:

- **debridement,**
- **disinfection,**
- **stimulation of healing.**

More recently, other mechanisms of action have been hypothesized: to inhibit and break down biofilms of various bacteria (Sherman 2009, Gottrupp et al. 2011).

Debridement

Primary aim of wound debridement is the transformation of the wound from a chronic to acute stage by the help of wound dressing and wound treatment management and by the help of materials and technologies, which stimulate the wound healing process. This is the first general step before beginning of chronic wound healing. Debridement of necrotic tissue removes many bacteria in the wound and thus eliminate odors from the wound. Necrotic tissue acts as cultivating medium for bacteria and its removal reduces the risk of infection.

During the inflammation phase of the healing process, host leukocytes help proteases play an important role in the debridement by degradation of the extracellular matrix. The wound defect is filled in temporarily by the extracellular matrix,





which is composed of fibrin and fibronectine. Released out of neutrophile, macrophage, fibroblast, epitel, and endotel cells are other proteolytic enzymes. The damaged extracellular matrix is removed by the help of proteases. During wound healing, the new compounds of extracellular matrix as collagen, elastin, and proteoglycan are synthesized.

Barnard facilitated our understanding of wound disturbance by showing that as the larvae crawl around the wound, they use their mouth hooks. It has been assumed that research on the mouth hooks can ease wound debridement. Another study analyzed the excretion/secretion (E/S), which identified three groups of proteolytic enzymes. These enzymes effectively degrade the extracellular matrix compounds, including laminin and fibronectin. Secretion can help the digestion of the matrix of the wound in a process that leads to effective debridement (Barnard 1977).

Nowadays, scientists are investigating the mechanisms of larvae, which remove devitalised necrotic tissue out of wound. Results of the examination of larval debridement revealed that larvae make a cocktail of digestive enzymes such as carboxypeptidase A and B, leucin-aminopeptidase, collagenase, and many serine proteases. Four proteolytic enzymes were detected, which have two serine proteases such as metaloproteinase and aspartyl proteinase, with a molecular weight of 20 to 40 kDa and with activity in a wide sphere of pH. Degradation the extracellular matrix compounds of laminin, fibronectin, and collagen I and III type showed a chymotrypsin-like serin protease, which can play important role in the digestive wound matrix and in effective debridement. The mechanical activity of larvae in a necrotic wound was considered to be a helpful factor in wound debridement. Larvae have a pair of mouth hooks, which help move tissue and in its fixation.

Debridement is facilitated by wound disturbance as the larvae crawl around the tissue using their mouth hooks. Over feeding these hooks are used for destruction of membranes and then proteolytic enzymes enter the necrotic tissue (Barnard 1977). The mechanical stimulation and secretion of active proteolytic enzymes are effective in removing the necrotic tissue.

Desinfection

For the purpose of wound healing across the inflammation, proliferation, and remodeling phases, infection must be eliminated from the wound. Aerobe and anaerobe bacteria occur in most wounds. The antimicrobial treatment of infected and non-healing wounds include wide spectrum of antimicrobial substances, which can disinfect the wound.

The mechanisms by which larvae kill bacterial infection in wounds are studied many years, but include the production of natural antibiotic-like agents, the modification of wound pH, and the ingestion and destruction of bacteria as part of normal feeding processes. Growth-promoting agents have also been detected in larval secretions, a finding that is consistent with the clinical observation that the introduction of larvae often causes a previously indolent wound to heal rapidly. The excretion of ammonia (waste product of larvae *L. sericata*) is considered as important in the battle against bacterial infection, because ammonia heightens the pH in a wound with consecutive alcalization, which is inapt for many bacteria (Whitaker et al. 2007).

In the midgut of *L. sericata* larvae are live commensal *Proteus mirabilis*, which produce antibacterial compounds such as phenylacetic acid (PAA) and phenylacetaldehyde (PAL). *Proteus mirabilis* is an endosymbiont of screwworms and several blowfly species and controls the microenvironment in the gut and





the wound. pH of larval secretion is between 8–8,5. The antibacterial effectiveness of PAA is small and PAL is unstable in alkaline pH so it would limit its contribution as a bactericide (Erdmann 1987).

It is far more likely that larvae kill the bacteria as that they feed upon large numbers of bacteria. This destruction of the bacterial infection was published by Robinson and Norwood in 1934, when they investigated that the stomachs of larvae was strongly contaminated by bacteria and the hind-guts of larvae were sterile. Mumcuoglu et al. observed the fluorescent *E. coli* in digestive tract of the *L. sericata*. They investigated that a proximal alimentary canal was more contaminated and it contained 67 % live bacteria in the esophagus and 18 % of posterior hindguts harbored living bacteria (Mumcuoglu 2001).

Simmons studied the antibacterial activity of substances in the body and excretions of *Lucilia sericata* investigations disclosed the active antibacterial substances in larval secretions. The antibacterial substances would have to be present in the excrements of larvae, because the hind-gut is sterile. Simmons collected the excretions of non-sterile 3-days larvae, which fed on decomposing beef liver. Materials were autoclave and he used the non-sterile larvae because the antibacterial substances are temperature stabile. Simmons tried to work with sterile larvae but he investigated that the secretion of sterile larvae were less active than the secretion of non-sterile larvae. We do not have confirmation of this conclusion in our experiments. So that larval secretion induced strong and fast disinfection (Simmons 1935, cit. v Mumcuoglu 2001).

Simmons found the antibacterial activity of larval excretion to ward off *Streptococcus pyogenes*, *Streptococcus faecalis*, *Streptococcus mitor*, *Clostridium perfringens*, *Proteus vulgaris*

and *Salmonella typhi* at in vitro experiments. Wound disinfection induced by larvae is complex but it is not examined in detail. In the 1930s many authors believed, that microbes are killed by the feeding and digestion of bacteria (Simmons 1935).

Greenberg demonstrated how bacteria is killed within the maggot gut and provided evidence that the activity was due, at least in part, to the metabolic products of *Proteus mirabilis* (a commensal gram-negative bacterium within the larval gut (Greenberg 1968).

Erdmann and Khalil went on to identify and isolate two antibacterial substances (phenylacetic acid and phenylacetaldehyde) produced by *Proteus mirabilis* that they isolated from the gut of screwworm larvae *C. hominivorax* (Erdmann & Khalil 1986).

Researchers were able to isolate active antibacterial peptides out of the secretions and hemolymph of *Phormia terraenovae* and from the larvae of *Lucilia (Phaenicia) sericata* (Friedman et al. 1998).

The antimicrobial activity of larval secretions is observed by a number of authors. Bexfield isolated larval excretions according to molecular weight using ultrafiltration techniques to three groups (>10 kDa, 0,5–10 kDa, <500 Da). Fraction >10 kDa was without antimicrobial activity and other fractions had significant antimicrobial activity against *S. aureus* (Bexfield et al. 2004).

Larvae are equipped with a wide range of external protection against microbes. This is a result of environment conditions in which larvae grow – in necrotic tissue colonized by pathogenic microorganisms. Larvae are threatened by many microbes so they are equipped by protection mechanisms. Presence of effective antimicrobial substances is confirmed by clinical experiments and by using larvae in human medicine. Isolation, identification and synthesis of antibacterial substances produced





by larvae can allow us an advantage, so these antibacterial substances can be applied in clinical applications, for example in the treatment of human infections. Application of larvae into the infectious wound leads to fast elimination of these infectious microbes. (Thomas 2000, Courtenay 1999, Hinshaw 2000).

The most common pathogen isolated from acute and chronic wounds is *Staphylococcus aureus*. 1/3 of the population and 40–70 % of hospital staff are vectors of *S. aureus*. Microbes are located usually in damp nasal mucous membrane, the axilla and perineum. Nowadays, it causes huge problems, because it is able to gain resistance to many antibiotics. In the 1948, four years after the wide application of penicillin to clinical practice, more than 50 % nosocomial *S. aureus* was penicillin – resistant because of the production of penicillinase (β -lactamase) – enzyme which inactivates the β -lactamase antibiotics. In the present days, most of isolated strains of *S. aureus* are penicillin-resistant. In 1960, due to structural modifications of penicillin the production of methicillin was introduced which was active towards penicillin-resistant *S. aureus*. But the first clinical isolation of Methicillin resistant *Staphylococcus aureus* (MRSA) was recorded already in 1961. Since then MRSA disseminates and causes serious hospital and population infections all around the world with a global increase of morbidity and mortality (Bexfield, 2004; Beasley & Hirst 2004).

Promotion of Wound Healing

A basic characteristic of larval therapy is the promotion of wound healing and growth of new extracellular matrix – granulation tissue. Wound healing is a complex and interactive process. Three groups of bioactive molecules are important regulator of wound healing: growth

factors, cytokines, and chemokines. All of them are local synthesized polypeptide or proteins.

The wound healing process began after the destruction of dermal tissue. The wound healing processes by releasing a number of soluble mediators including Platelet-derived growth factor (PDGF), Epidermal growth factor (EGF), Fibroblast growth factor (FGF), and Transforming growth factor-beta (TGF-beta). These growth factors rapidly diffuse from the wound and inflammatory cells are drawn to the area of the injury. In general, growth factors are mitogens that stimulate the proliferation of wound cells (epithelial cells, fibroblasts, and vascular endothelial cells). Most growth factors are also able to stimulate the directed migration of target cells (chemotaxis) and regulate differentiated functions of wound cells. Cytokines were initially identified according to their influences on chemotaxis, proliferation, and differentiation of inflammatory cells. The growth factors, cytokines, and chemokines initiate significant vasodilatation, increased capillary permeability, migration of polymorphonuclear leukocytes, and macrophages to the site of the wound. These cells play an important role in wound debridement (Schultz et al. 2003).

Some substances of extracellular matrix such as fibrin are produced in chronic wounds, which form growth factors and signal molecules to begin wound healing. The stagnation of healing can be involved in reduced levels of TGF- α and TGF- β (Falanga et al. 1994).

What can larvae give to the wound in this environment? Larvae help the healing process by proteolytic fragmentation and the disinfection of necrotic tissue. Larvae have other mechanisms which accelerate wound healing (Wollina et al. 2002, Sherman 2003).

Since William Baer's time, many researchers have attempted to isolate the wound healing molecules that underlie the proteolytic,





antimicrobial, and growth-promoting activity of maggot therapy. Some propose that such compounds could someday replace the maggot itself. On the issue of maggot debridement, or dressings without the maggots, Baer had this to say: *“Whether we can get the active principle, whether this is an enzyme, whether we can get out that enzyme and treat without maggots, I do not know; but I do know that [maggot therapy] is the most successful and easiest way of curing chronic osteomyelitis that I have yet had.”* (Baer 1931, cit. Sherman 2009).

In the past, the primary role of larvae in wound healing was considered the stimulation of viable tissue by the circular motion. One of the theories was an idea of mechanical stimulation of the wound by larvae and improvement of oxygenation in wounds.

Mixture of digestive molecules is complex and synergic. Physical movement of larvae is also contributing to debridement by „rasping“ of necrotic tissue and the motion of larvae also helps the enzymes to get deeper inside infected tissues. FDA (Food and Drug Administration) ranked medicinal larvae as a medical assistance tool and not as a drug.

Other scientists anticipated, that the effects of allantoin (2,5-dioxo-4-imidazolidinyl urea) or ammonium bicarbonate could had been responsible for the growth of granulation tissue. In larval excretions of green bottle fly *L. sericata* its nitrogen waste consists of: 10 % allantoin (used in cosmetic and pharmaceutical industry) and 90% ammonium, these two substances in the experiment are supporting growth of granulation tissue. The volume of ammonia produced by larvae in wounds showed as sufficient to the increase of pH in the wound from acidic to neutral or slightly alkaline – pH 7–8 (Wollina et al. 2000).

Prete had observed the effects of digestive enzymes and hemolymph of green bottle fly

which stimulated growth in human fibroblast. Both extracts had stimulated the proliferation of fibroblasts and in the presence of stimulative concentrations of the epidermal growth factor, the larval extracts significantly promoted the growth of fibroblasts. This lead to a theory that larval extracts can either stimulate the fibroplasia by different mechanisms as epidermal growth factor or they can have synergic effect (Prete 1997).

Mumcuoglu published the findings of high interferon gamma levels and IL-10 in larval secretions (Mumcuoglu et al. 2001). Nibbering had proved that endotheliocytes incubated with larval secretions produced increasing numbers of cytokines including IL-8, IL-10 and growth factor β -FGF (Nibbering 2004).

Indications of MDT

MDT is used for the purpose of debridement and disinfection of chronic wounds with necrotic tissue. The publication *“Clinical Practice Guideline For The Treatment Of Acute and Chronic Wounds With Maggot Debridement Therapy,”* published in 2010 by the Mexican Association for Wound Care and Healing is a clinical practice guideline used in Mexico and the countries of Latin America. We translated this publication with the permission of the authors and it is one of the guidelines of our organisation Medicinal alternative (Medalt n.a.). MDT is successful in the treatment of a variety of ulcers, including necrotizing fasciitis, perineal gangrene, post-surgical wound infections, and burns (Zarchi & Jemec 2012).

Wollina et al. (2002) demonstrated that MDT can reduce the main and standard sensitivity in wound scores from $13,5 \pm 1,8$ to $6,3 \pm 2,7$ ($p < 0,001$) by simple application of larvae for 1–4 days. Wound scores were proportional defined to wound exudate, smell, granulation, and the inflammation of skin.





Larvae effectively removed the necrotic tissue and exudate without damage of healthy tissue. They stimulated tissue granulation and reduced the smell caused by infection. Benefits of larval therapy were recorded in the treatment of different chronic wounds (Tab. 1).

The increasing incidence of antibiotic resistance has renewed interest in the last few years. Recently, industry has begun producing sterile larvae, primarily of the common greenbottle fly *Lucilia sericata* (Beasley et al. 2004, Tse 2006). In comparison with conventional methods of treatment, MDT was effective for the treatment of venous ulcers, diabetic feet, and decubites (Wayman et al. 2001, Sherman 2002, 2003).

Tab. 6. Type of wounds/lesions treatment by MDT (Chan et al. 2007)

INDICATIONS OF MAGGOT DEBRIDEMENT THERAPY
Diabetic ulcers
Venous ulcers
Neuropathic(non-diabetic) ulcers
Decubites
Thromboangiitis obliterans
Posttraumatic wounds/ulcers
Necrotizing fasciitis
Pyoderma gangraenousum
Excised absces on malleolus
Pilonidal sinus
Significantly infected finger
Osteomyelitis
Infected wounds after replantation of antibrachium
Wounds after prosthesis
Infection in wound after breast operation
Infected bullet wound
Malignant wound
Ambustions
Non-healing surgical wounds
Wounds infected by Methicilin resistant <i>S. aureus</i> (MRSA)
Mixed arterial-venous ulcers
Subacute mastoiditis

Contraindications of MDT

A few decades ago, larval therapy was used in the treatment of osteomyelitis, gas gangrene, and other infections, which are treated by surgery and antibiotics today. In the 1930s, larvae were put on wounds for 24–48 hours after the resection (excision) of infected bone. Nowadays, larval therapy would not be used as alternative of surgical debridement of necrotic





bones. The larval debridement of necrotic bone is slow, several week process. Ischaemia is a relative contraindication. Larvae can make the debridement in more wounds, but pallid wounds probably don't heal. Inadequate arterial perfusions can therefore be an indication of a needed amputation. The short cure of larval therapy (1–3 cycle) usually showed either the line of vascular health tissue or the still increasing pallid necrotic tissue. This approach of larval therapy is used to detect a level of tissue's vitality and to determine amputation (Sherman & Pechter 1988).

Larvae are not able to treat tumour diseases but they are used in the management of three complications of necrotic tissues – they can effectively decrease of the necrotic mass, drainage from wound and smell. MDT management of these complications have improved the quality of life of many patients with malignant diseases. We can verify these conclusions with our own data.

Relative contraindication are dry wounds, because larvae need the wet medium. Sherman suggested using the hydrocolloid dressings on dry wounds a few days before the application of larvae (Seaquist et al 1983, Reames et al 1988, Bunkis 1985 – cit. Sherman 2002).

We should not use larvae in open wounds, in sinuses, or in wounds around large blood vessels (Richardson 2004). Antibiotic treatment, age, pregnancy, immobility, and mental diseases are not contraindications of MDT. The massive colonization of a necrotic wound with *Ps. aeruginosa* can be regarded as relative contraindications of larval therapy in our experiences and in the literature (Andersen et al. 2010). Absolute contraindication of MDT is disagreement of the patient with therapy.

To be continued in next issue: Larval therapy II. – a modern method of treatment long-term non-healing wounds and use in clinical practice – Material and methods.

Acknowledgements

This study was established with the support of the Operational Program Research and Development an co-financed by the European Fund for Regional Development (EFRD). Grant: ITMS: 26240220020: Establishment of biotherapeutic facility and technology proposal for production and development of bio-drugs.

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Acupuncture and the change of my spiritual self

Solijon Mamarasulov

My first contact with acupuncture can be dated to the time when I was a medical student in the far Tashkent. I was talking with my older sister the neurologist about the basics of acupuncture while she was completing the basic course of acupuncture called “Reflexology”.

Later, during university studies in my 5th year I took a new study programme in a form of a year course – Natural (Folk) Medicine. The course was based on detailed study of Ibn Sinna’s books (Avicenna), his world famous Canon of Medicine (“al-Quanun fi at-tibb”). Basic theses of the “Canon”- earth, water, air and fire remained a mystery for me. I didn’t know where and when to use them. That was the reason I rather focused on studying “classical” medicine instead.

I started to work as a medical doctor on the Department of Anaesthesiology and Intensive Care (DAIC) at Children Hospital in Tashkent after I finished my university education. During my work as paediatric anaesthesiologist I observed that children not only from groups at risk (after a difficult parturition or those with hereditary disease) became our patients. Children that “accidentally” caught some minor infection or had some other common childhood disease and their state became complicated as much that they needed care and treatment on DAIC. Being the medical doctor of these children questions as – what is a healthy individual? who is healthy? Is a happy individual healthy? or vice versa...? occurred in my awareness.

Medicine is in fact an art, a science that deals with issues of maintaining and restoring

human health. However, a question remains: does classical medicine help finding the right medication? “Contra vim mortis non est medicamen in hortis!” (No medicinal herb against the power of death can be found in the garden).

A long time I have been fascinated about “de vita et morte”. This led me eventually to contemplation about the sense of life. I worked in Slovakia at that time already and I happened to find (now I know it was no accident) a notice about the basic course of acupuncture starting in the Centre of Acupuncture in Bratislava.

It is unbelievable how this course helped me to look on the oriental philosophy from a different point of view. It was as if I would see the other side of the coin. Answers on my unsolved puzzle began to fit in the correct system. These thoughts guided me to the solution of my problems. “Medice, nosce te ipsum, cura te ipsum...” (Doctor, know yourself, heal yourself). I started to perceive the universe differently. For better understanding I simplified it “pars pro toto” from macro to microsystems. This enabled me to see the simple model – the base of every function – Yin and Yang. Later I had an awareness “medicus curat, natura sanat...” (Doctor treats, nature cures).

Philosophical debates with lecturers opened different boundaries of knowledge in me. They helped my spiritual rebirth and eventually also to understand the idea of “Vita pulchra et necessaria, vivere est cogitare, vivere militate est” (life is beautiful and inevitable, to live means to think, to live means to fight).

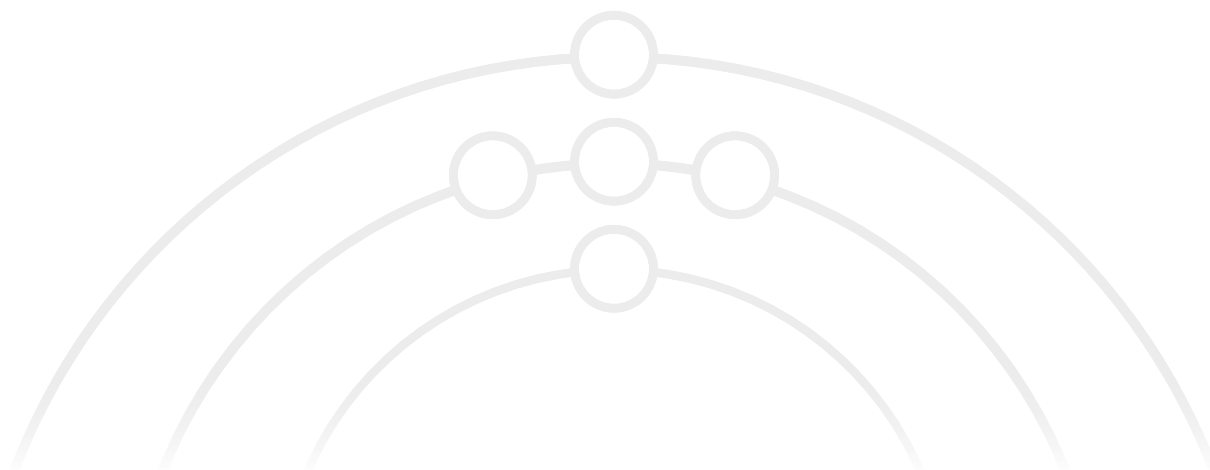
I am glad that destiny brought me to Slovakia and I became an acupuncturist here. I





am devoted to Su Jok and I am always happy with my patients that I can help them by using “a single needle” to solve their health problems.

Solijon Mamarasulov, doctor
MED STAR, s.r.o. Bratislava
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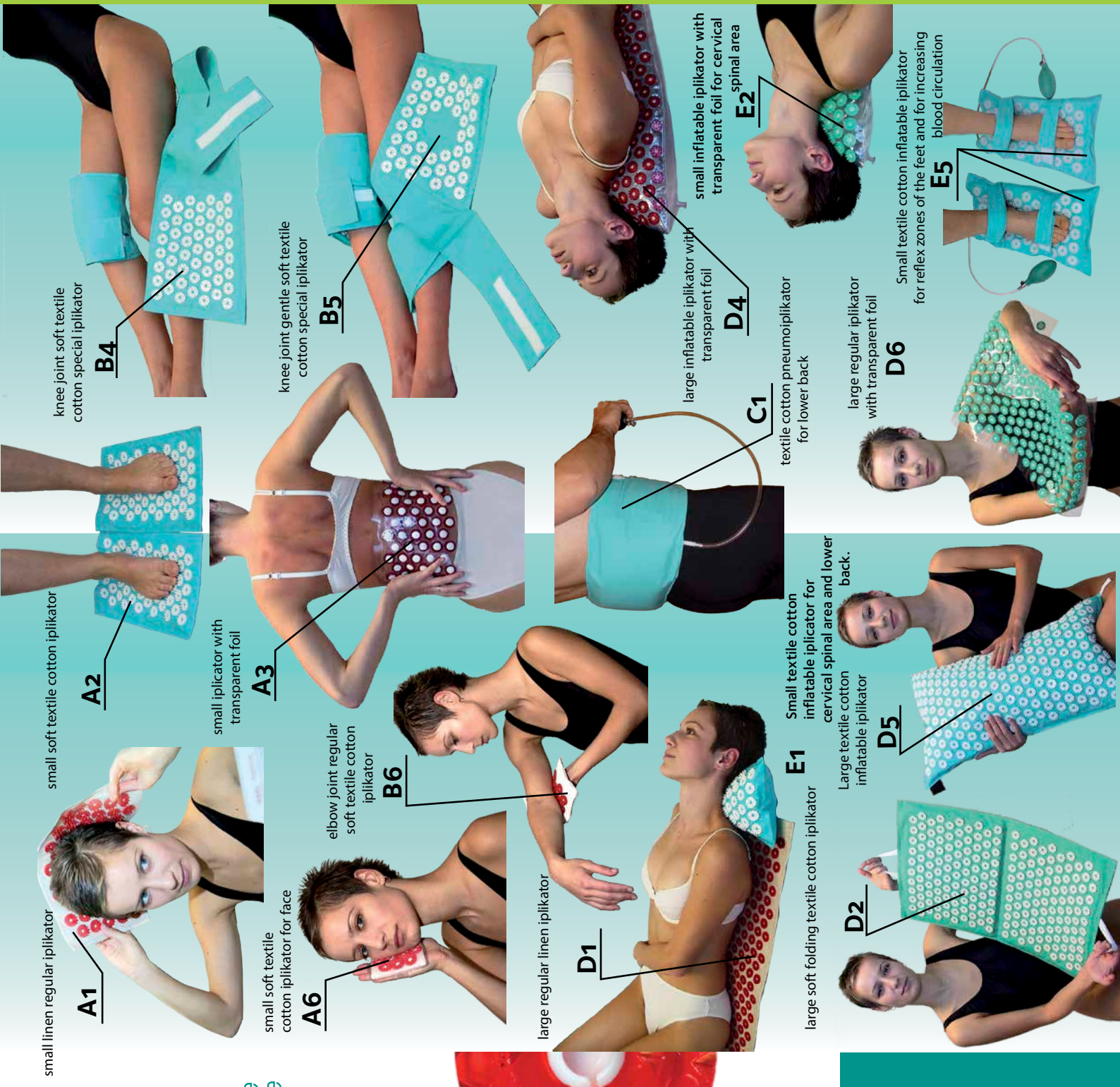
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The form of studies and surveys:

- **Basic format:** MS Word, font Times New Roman, font size 12, double spaced, unaligned on the right edge, paragraph 5 strokes from the left, aligned to the left, no page numbering, refrain from word division;

- **The first page** contains the name of the study, the author's name and institution, abstract in Slovak language, respectively, in the language of the paper, max. 600 symbols (including spaces), Times New Roman font type with font size 11 points, 4–6 key words, phrases;
- A **summary in English language** below the study shall be present, approximately 10 lines (600 symbols including spaces) in lengths, including the author's name and address, or e-mail address;
- **Citations:** kindly include citations of less than 4 lines in double quotation marks inline, quotes exceeding 4 lines shall be divided into visually separate short paragraph absent of quotation marks, 5 strokes from the left, using Times New Roman font type size 11 points;
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- Short bibliographic reference styled as (Bakoš 1966, 115) following a citation shall be used;
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Bibliography: (examples)

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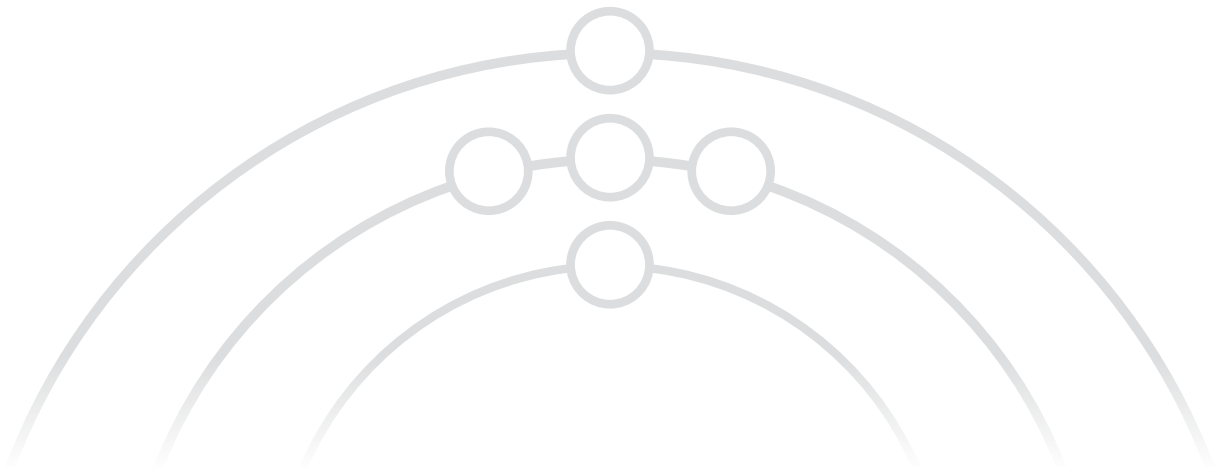
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Acupuncture and Natural Medicine

4/2014



ISSN 1339-4703