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Research Article

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Studies on frequency distribution analysis of autonomously regulated biological data

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Abstract

The frequency distribution of biological data may be approximated by a lognormal curve (physiologically) or by a normal=bell-curve (pathologically). For the analysis of the data are in use the Chi-square and the Kolmogorov-Smirnov tests. In 325 patients with 15 different diagnoses we examined the tendencies of these groups towards (a) a chaotic or (b) a rigid state of the organism regulations. E.g.: active cancer usually is chaotic, however, this is imitated by allergies and auto-aggressions. In case of sclerosis two types exist. Stress leads to rigidity. An index for the best discrimination is evaluated and diagnostic ranges are assigned. The results display the relevance of this system analysis of the human network in medicine.

Keywords: Frequency distribution analysis, Medical decision making

Introduction

In former publications several authors mentioned the frequency distribution of biological events and/or dates allowing an evaluation of the health state [2,9,10,12,13,14]. The lognormal distribution is considered to represent health and the normal distribution (=bell curve) shall be suspicious for cancer. However, rigidity as the opposite of chaos has not yet been considered, and there is a deficit concerning clinical examinations.

The bell curve is a result of accident and refers with living beings to a deficit up to an absence of regulatory networks and of coherence what is to be referred as chaos. Missing cohérence and chaotic growth e.g. are signs of cancer. In the normality of a high-powered and controlled arrangement which is in a steady state, an asymmetric=lognormal distribution [4] surrenders. Recently we published that an exaggeration of this, results in an approximation of the regulations of the systems to a starting-state (Delta-distribution).

It is accompanied by rigidity biologically as for example with M. Parkinson or the arterial sclerosis [3].

Those methods are used for differential diagnosis of biological data. The basic principle is that the normal state of all controlled systems as for example of the vegetative nervous system contains a certain variation-an oscillation-around the middle how it is usual at phase transitions as the laser threshold.

The chaos theory supplies the reason, that the best adaptation is guaranteed conditions changing on themselves continuously in the environment through the inherent order in a chaos [4,6,7,8,11], or through the deterministic chaos of non-linear andor dissipative systems, respectively. Pure chaos is too confused and pure order too inflexible, so naturally a mixture of both developed in evolution, similar to representative democracy instead of anarchy on the one hand and dictatorship on the other hand.

A synergy comes ahead between parts of the organism enabled to coherence, with the result of a highly organized entirety (Figure 1). This shows itself equal to the demands and appropriately reactive to external stressors and dangers [9].

The distribution of excited electrons and consequently the entropy become keys for the understanding of the organization state of the organism.

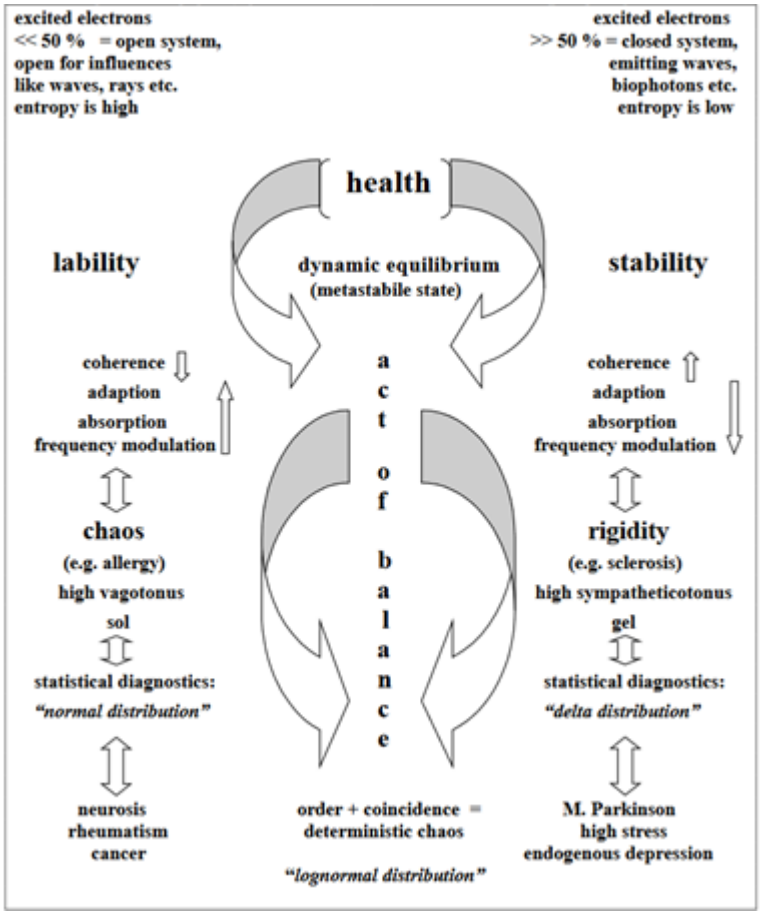

Figure 1: Relatioships between physics, ststemic statistics, and medicine concerning frequency distribution.

Benford [1] described 1938 in the law named after him the probability of the occurrence of decimal digits that is highly asymmetric and applies for multiplicative instead of additive growth courses in natural systems. We see for example that natural biological distributions follow not linear, but exponential lines in the sensitiveness of the sense organs, reflected in the decibel scale. So, nature can be sensitive with the case of low impulse numbers and differentiate on the other hand high impulse densities without being blocked by their strength.

Living beings can recognize a chaotic hissing obviously and judge as background, and they can extract within that, occurring information peaks of considerably lower strength and they can process them similar to a radio set. The organisms learned to receive frequency-or amplitude modulated events (in the same way as strange molecules on the part of the immune system), to classify them according to their interference model and to use this as information pulses with resonance, and/or to answer with a stress reaction at dissonance.

We use as qualified measured values the skin resistances in the original and/or final points of meridians within the meridian diagnostics and achieve a number of mostly more than 2000 results per patient. So a good statistical processing is guaranteed. In this study by means of different diagnostic groups, it should be examined to what extent different conditions and diseases can be inserted in this consideration, and to what extent this analysis might be applicable as a diagnostic aid.

Problem Formulation

Up to now the theory of chaos and the methods of statistical analysis seem to be more important than the nappearances in nature. However, the experiment should have the priority and this is-concerning human beings- the findings in as many diagnoses as possible. So we decided to run an open system and to ask 325 human organisms with clear diagnoses made by conventional methods elsewhere, if and to which extent they may coincide with the published theories.

Previous results [2,3] had led us to the assumption that the distribution analysis is not only a question of distinguishing between normal and lognormal but of more types of distribution possibilities.

Beyond the lognormal curve a Delta-curve exists which represents an exaggerated stability up to rigidity. The pathologic meaning of this state is unclear yet. Furthermore the routine usage of the distribution analysis showed us that distributions with two or three peaks representing the coincidence of different abnormalities are not so rare. Diagnostic ranges do not exist yet. These questions

should be evaluated in the study.

Material and Methods

325 patients from the routine meridian diagnostics (having clear diagnoses) received an evaluation of their dates retrospectively by means of Chi-square and Kolmogorov-Smirnov analysis of their frequency distributions. The resistance values are converted into their reciprocals of the conductivity since those correspond to the vitality status.

The patients could be allocated to 15 diagnosis groups as follows:

1) Chronic Fatigue syndrome (CFS)/Fibromyalgia
2) Cancer, active state (entodermal origin)
3) State of a neurosis
4) Allergy
5) Auto-aggression, e.g. rheumatic arthritis
6) Arteriosclerosis, model A (older patients)
7) Normal findings
8) Metabolic syndrome
9) Brain-organic psycho-syndrome
10) Cancer, stationary stage or successfully treated
11) Encephalomyelitis disseminata (multiple sclerosis)
12) Organic brain illness
13) State of strong distress
14) Multimorbidity
15) Arteriosclerosis, model B (younger patients)

Following nine criteria of the analysis were taken into consideration, in particular concerning their capabilities to separate the groups:

1) Mean value (MV)
2) Standard deviation (SD)
3) Chi-square test of the normal distribution (Chi-N)
4) Kolmogorov-Smirnov test of the normal distribution (KS-N)
5) Chi-square test of the lognormal distribution (Chi-LN)
6) Kolmogorov-Smirnov test of the lognormal distribution (KS-LN)
7) N/LN relationship of the Chi-square tests (N/LN-Chi)
8) N/LN relationship of the Kolmogorov- Smirnov tests (N/LN-KS)
9) Sum of both (relationships (Sum N/LN)=Sum Index

Further parameters such as obliquity (3rd momentum) and bow (4th momentum) were evaluated, they are not reported here, however, since they clinical-diagnostically did not produce any information profit.

Problem Solutions

Results

Parameter/ Group	MV	SD	Chi-N	KS-N	Chi-LN	KS-LN	N/LN-Chi	N/LN-KS	Sum N/LN
CFS	4358	889	41	0,04	84	0,07	0,6	0,6	1,2
Cancer active	4377	1064	31	0,04	51	0,06	0,9	0,7	1,6
Neurosis	4179	898	72	0,05	72	0,06	0,9	0,8	1,7
Allergy	6425	868	88	0,05	111	0,07	0,9	0,8	1,7
Autoaggr.	4790	832	34	0,04	50	0,05	1,1	0,7	1,8
Sclerosis A	2827	977	239	0,08	198	0.09	1,3	1,0	2,3
Normal pop.	4310	1342	89	0,06	33	0,04	2,6	1,6	4,2
Metab. Syn.	4485	1424	186	0,09	48	0,04	4,2	2,1	6,3
Brain psycho	6369	2595	246	0,10	61	0,05	4,4	2,0	6,4
Cancer rest.	3801	1385	149	0,08	43	0,05	4,7	2,0	6,7
Mult. scler.	3372	1368	169	0,08	37	0,04	5,3	2,5	7,8
Org. brain ill.	5935	2353	201	0,09	33	0,04	6,8	2,4	9,2
Disstress	5623	2035	151	0,09	19	0,03	9,6	3,3	12,9
Multi-morb.	3515	1296	152	0,08	14	0,03	13,4	3,1	16,5
Sclerosis B	4087	1643	201	0,09	21	0,03	14,8	3,9	18,7

Table 1: Listing of the average of the skin conductanace of the 9 parameters values in the 15 diagnostic groups.

On the one hand the two questions to be answered within the evaluation were which illness groups show clear tendencies towards the chaos or towards the rigidity, and on the other hand, which criteria are best to discriminate the groups under each other and of the normal group. For this purpose a variation analysis was performed concerning the distinction of the group of the normal population. A listing of the significance of the 9 parameters shows table 2. In this case correspond: low significance of $p<0.1$=*, medium significance of $p<0.05$=** and high significance of $p<0.01$=***.

Parameter/ Group	MV	SD	Chi-N	KS-N	Chi-LN	KS-LN	N/LN-Chi	N/LN-KS	Sum N/LN
CFS			**	*	**	*	***	**	***
Cancer, act.			***	*			***	**	***
Neurosis							***	**	***
Allergy	**	*			***	*	***	**	***
Auto-aggr.		*	**	*			***		***
Sclerosis A	*				***	**	**		***
Normal population									
Metab. Syn.			*						
Brain psycho	*	*	***	**					
Cancer, rest.									
Mult. scler.	*								
Org brain. ill		*	**	*			*		**
Disstress				*	**	*	**	**	***
Multi-morb.					***	*	***	**	***
Sclerosis B			**	*	*	*	***	***	***

Table 2: Listing of the distinction significances of 14 groups compared with the normal population concerning the 9 parameters.

Discussion

The typical signs of the 15 groups concerning the 9 parameters are:

1. CFS: Chaos, recognizable by means of N/LN-Chi, and the Sum Index
2. Cancer, active: Chaos, recognizable with Chi-N, N/LN-Chi, and the Sum Index
3. Neurosis: Chaos, recognizable with N/LN-Chi and the Sum Index
4. Allergy: Chaos, recognizable with Chi-LN, N/LN-Chi and the Sum Index
5. Auto-aggression: Chaos, recognizable with N/LN-Chi and the Sum Index
6. Sclerosis A: Chaos inclination, recognizable with Chi-LN and the Sum Index
7. Normal
8. Metabolic Syndrome: Of the normal population not distinguishable
9. Brain-org. Psycho-S.: Staring-inclination, recognizable with Chi-N and KS-N
10. Cancer at rest: Of the normal population not distinguishable
11. Multiple sclerosis: Of the normal population not surely distinguishable
12. Org. brain illness: Staring-inclination, recognizable with Chi N and the Sum Index
13. Distress: Rigidity, recognizable best with the Sum Index
14. Multi-morbid.: Rigidity, recognizable with Chi-LN, N/LN-Chi and the Sum Index
15. Sclerosis B: Rigidity, recognizable with N/LN-Chi, N/LN-KS and the Sum Index

The discrimination capabilities of the parameters may be described as follows:

1. Mean value: High conductivity at allergy and brain-organic psycho-syndrome, low at multiple sclerosis. Low information capability.
2. Standard dev: Small in the case of allergy and auto-aggression, high at all brain processes. Low information capability.
3. Chi-N: Discriminates from normal population: active cancer, auto-aggression, brain-organic psycho syndrome, organic brain illness, and sclerosis of younger people. Good information capability.
4. KS-N: Moderate distinctions. Good only as an additional parameter.
5. Chi-LN: Discriminates from normal population: allergy, sclerosis of older people, and multi-morbidity. Good information capability.
6. KS-LN: Discriminates the sclerosis of older people. An additional parameter.
7. N/LN-Chi: Very good parameter.
8. KS N/LN: Good additional parameter.
9. Sum Index: Parameter with best discrimination capabilities.

The logical assumption, that the combination of both statistical methods of analysis in their relation to both distribution models delivers the best mathematical description of the tendencies towards chaos or rigidity rigidity, is confirmed.

The next question is to what extent within the chaos groups on the one hand and the rigidity groups on the other hand a distinction exists. Genuine cases of Chronic Fatigue Syndrome are characterized by an extremely low N/LN quotient, they are thus markedly chaotic. CFS cases without this feature might be false diagnoses.

Active cancer cases are chaotic and distinguish from allergy,

neurosis, and arteriosclerosis of older people through lower Chi-N and Chi-LN values; concerning CFS this succeeds with Chi-LN. From an active auto-aggression (figure 2) an active cancer is, however, only hardly distinguishable.

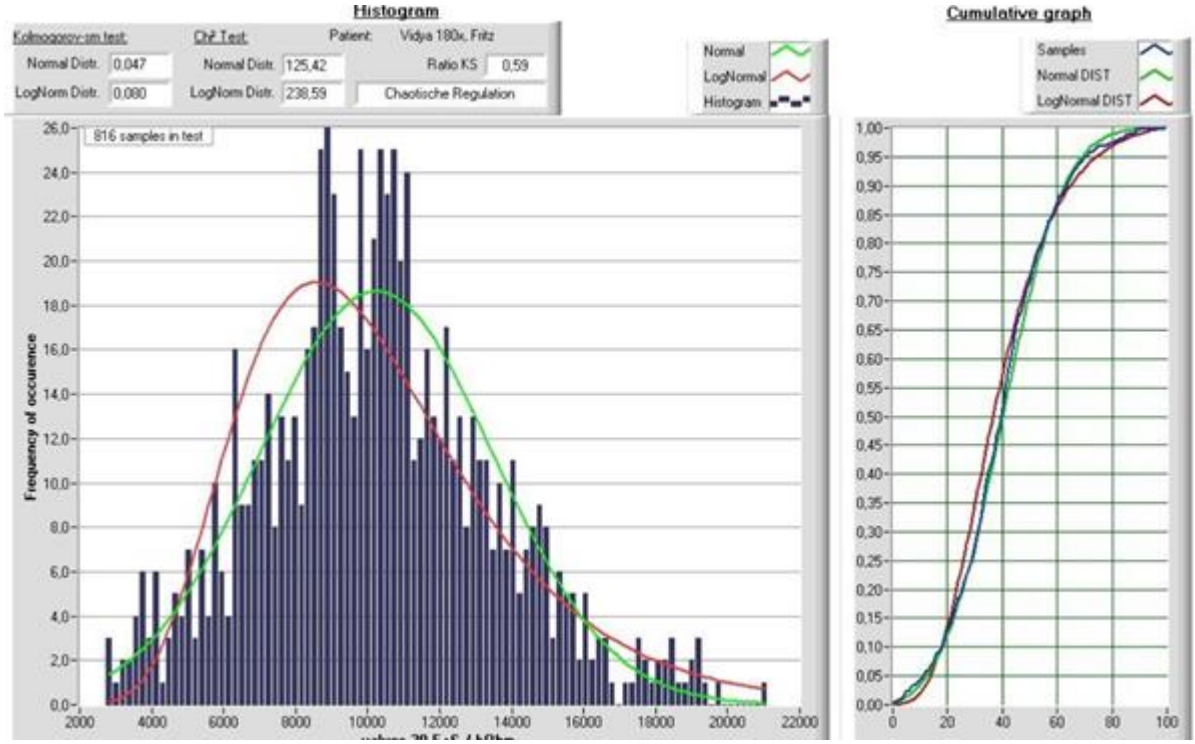

Figure 2: Examples of a frequency distribution: a case of auto-aggression (rheumatism).

Example of a frequency distribution: A case of auto-aggression (rheumatism). Important is that a stationary cancer is not distinguishable from the normal population. Concerning cancer diagnosis it is not allowed to claim a cancer danger from an existent chaos. This is justifiable only in the form of a process observation on an individual basis. It is to be mentioned also that there are kinds of cancer, which are not accompanied by chaos. The results presume that tumors of the endoderm may impress chaotically, whereas meso-and ectodermal tumors as for example brain tumors, sarcomas and malignant melanomas do not develop in a chaos. A follow-up in several cancer patients over 2-3 years showed us that the steps to get cancer are often: long term sympatheticotonia+rigidity->break-down of the adrenalin (adrenal glands insufficiency)->sharp shift to vagotonia+chaos->cancer.
With regard to the arterial sclerosis one must consider that it can develop on two different basics: with older people: going around with metabolic troubles and organ functional constraints, with chronic evolution and rather chaos inclination (group A), with younger people: going around with hectic life-style, ambitions, over-acidification, high interior tension, and the feeling to live under pressure. The sclerosis evolution can go acutely and contain spasms of blood vessels. Here a rigidity exists (group B). It represents the next (and often irreversible) stage of distress.

It is to be considered thus, that regulation abnormalities may exist temporarily and reversibly: distress leads to a rigidity as well as a neurosis to a chaos. Such functional-abnormal discoveries are not to be interpreted thus as illnesses although they deviate from the normal strongly.

A further problem consists, that with the existence of two or more different affecting diagnoses the frequency distribution in fact shows a superposition of two or more typical peaks. Here a pattern recognition analysis, which can indicate distribution models characteristic for every illness, might be important.

Finally mentioning is that the standard finding in our normal population was not the adaptation of the LN curve but one between the LN-and the N curve sited distribution. This refers to nowadays being hardly yet completely healthy persons, but meanwhile a chaotic part is belonging in our society to the “norm”. Medicine may be forced, similar as in the Lab diagnostic, to distinguish between an absolute-normal (e.g. adolescents without electro-smog exposure) and a usual-normal population (complaint-free persons without known illness). Consistently a perfect lognormal approximation does not prove normality but is a case of staring-inclination. A severe sclerosis (group B), however, displays a Delta distribution.

As diagnostically relevant ranges for the most meaningful parameter of the Sum Index of the N/LN quotient result: Chaos<1.9, Tendency towards chaos 1.9-2.6, Normal range 2.7-5.2, Tendency towards rigidity 5.3-8.2, Rigidity>8.2.

Conclusion

The analysis of the frequency distribution of biological dates (here: the skin resistance values in original and final points of the meridians) facilitates a diagnostic insight into the systems of the organism to be gained easily. With chaos inclination go both, illnesses (Chronic Fatigue Syndrome, allergy, auto-aggression, active entodermal cancer) as also conditions (neurosis). In the same way illnesses (multi-morbidity, arteriosclerosis of younger people) and conditions (distress) show rigidity-inclinations.

An inclination for the chaos exists with the arterial sclerosis of older people, a staring-inclination with the Brain-organic Psycho-syndrome and with organic brain lesions. Of a normal population hardly distinguishable are metabolic syndrome, multiple sclerosis and stationary cancer cases. An active auto-aggression and an active cancer do not distinguish clearly concerning their chaotic state.

Exclusion diagnoses are possible, for example with Chronic Fatigue Syndrome. The frequency distribution analysis is not a method of its own but is a side product of other diagnostic procedures in medicine creating adequate numbers of biological data (>500). As a small computer program it may be implemented into a lot of medical routine activities. In each case the state of the regulation network is determined and the patient may receive well-based recommendations for his lifestyle, in many cases a second opinion is derived in the field of medical decision making. This mathematical- statistical procedure as a system analysis of the human organism has proven high relevance. Of course, not only skin resistance values can be used for this analysis, but also, e.g.: heart rate=RR intervals (HRV), respiratory rate, blood flow, blood pressure, heat/infrared radiation etc. The analysis is always the same.

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