FLAWS IN MEDICAL DIAGNOSIS

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In the cited article, I will show the common law concept developed before the science age has impaired the foundation of science.

5.1 Introduction

Everyone in the world believes that functional and structure-based diagnosis approach must be the best. Our question is why diagnosis tends to be far too late.

We will show that modern diagnostic approach is unworkable for the following reasons: (1) lack of diagnostic sensitivity and extremely poor resolution of all structural data, (2) low reliability due to random drawing of test samples and interference by a large number of factors in a totally open system, (3) lack of correlation between functional and structural changes and root disease cause factors, and (4) normally expected long delays (2 to 50 years).

While each one of the weaknesses is fatal, its inability to link disease cause factors determines that it cannot cure any chronic diseases. If cirrhosis is diagnosed, it cannot show what causes it and thus there is no cure for it. It is true for all challenging diseases.

5.2 Unreliable Random Samples

All objective data is drawn as a random sample. One problem is that the sample is randomly drawn. Thus acquired numbers are unreliable. The numbers would be different in each day, different times of a month, and different times in each year.

We will show how the same high blood pressure has different meanings due to sample error and a large number of other health parameters.

(1) Numbers rated in an arbitrary scale

Past blood pressure guideline. According to the past blood pressure guideline, 139/88 would be considered as normal blood pressure. When blood pressure in a person reached this number, a lot has been changed according to our quantitative model. The big problem is the terminal flow resistance reflected by the pulse pressure of 51 mm Hg. Compared with blood pressure with pulse pressure of 40 mm Hg, the blood pressure at 2X output could be 2×(51-40)=22 mm higher (ignoring the diastolic pressure drift). In 3X heart output, an expected increase in the blood pressure would be 3×(51-40)=33 mm Hg. This is only a part of story. The above computation does not reflect possibly bigger increase in other locations.

The increase in blood pressure means that blood vessels have narrowed or even blocked in some locations. In those locations, the blood pressure may be further increased over original values. This seemingly normal blood pressure does not tell a possible big pressure elevation. This increased terminal pressure in the brain base, and the elevation of blood pressure at the point right before the block point is added, thus resulting in a drastic increase in blood pressure on the walls of blood vessels at the point. Moreover, an elevated blood pressure can cause damage to blood vessels gradually that are not detectable in the early stage. Under the old guideline, the patient would be misled to be healthy.

(2) Lies told by normal blood pressure

Blood pressure, 139/73, appears to be normal under the new guideline, but the pulse pressure is 66. For each fold of heart output increase, it would raise blood pressure by 66 mm Hg (ignoring the elasticity and relaxation effects). One must see that the vascular system is a very bad shape. Three things could be inferred, due to the poor vascular system, the body ability to meet energy requirement must be poor. It is very likely that the person has to rely upon hormone reactions to raise blood pressures. In an attempt to increase heart output, the increase in both peak pressure and blood pressure in the brain base may be very high.

(3) Abnormal things behind normal readings

True blood pressure beneath normal blood pressures depends upon many other factors. The pressure, 128/78, appears to be good, but can lie for following situations:

(a) The pressure is acquired for an 18-year young man, who is highly inactive and has an overeating habit. This is clearly too high for his age and his lifestyle must play a role.

(b) The pressure is acquired for a person with historical lower blood pressure. This person has subjective sign of poor blood circulation in the brain including lose of sense of balance and blackout. The increase in the blood pressure might be caused by factors.

(c) The pressure is acquired for a sixty year old man with a blood pressure pattern of progressively decreasing for several years.

(d) The pressure is acquired for an adult who is sedative, obese, and has poor vascular dynamic properties. Even though the pressure is normal and pulse pressures is not bad, the poor vascular performance indicates that his rest blood pressure might be set at lower heart output. In response to a demand for more energy, the heart has to pump much header and faster to meet the demand. That would result in excessive high blood pressure.

(e) The pressure is acquired for an adult with clear signs poor blood circulation in the brain. This is a case showing the uneven circulation condition. In other words, the body has low flow resistance in most parts of the brain, but has poor blood circulation in the brain.

(f) The pressure is acquired for an adult with an undiscovered brain aneurysm. Even though the blood pressure is normal and pulse pressure is not bad, the existence of hidden aneurysm indicates that there might be blockages or abnormal flow pattern in the brain. The high pulse pressure and poor dynamic properties of the vascular system indicates stroke risk. As we have shown that abnormal flow pattern and blockages or narrowed blood vessels have much severe impact on peak blood pressure at relevant points. It can result in huge differences in blood pressure when there is an extreme demand. Resting blood pressure tells only part of stories.

Those examples show that the same blood pressure does not have much useful health implication. It all depends upon personal health, lifestyle, nature of daily activity, other factors, and other diseases. In contrast, if subjective signs are used, a person can tell whether the signs are good or bad and thus no objective references are necessary. If a person feels pain or discomfort, a disease exists. A subjective sign is absolutely right no matter what the rest world judge.

5.3 Lack of Meaningful Reference

One biggest fatal problem with objective diagnostic approach is its inability to appraise objective data for any person.

(1) No meaningful range

Modern medicine is unable to appraise objective evidence such as glucose level, cholesterol level, and blood counts because one could not tell what are good or bad. Thus, modern medicine has to use reference numbers to appraise detected diagnostic data.

Modern medicine has two dilemmas: to be accurate, it would have to use narrow reference ranges, but this would turn everyone into a diseased person. To avoid this problem, modern medicine must use broad ranges as references. Then, references are too broad. When such broad references are applied to a specific person, it is natural to reach wrong conclusions. Therefore, modern medicine must fail to find diseases in the early state. This is precisely the reason for modern medicine to fail to diagnose diseases in early time.

This failure of medical diagnosis is rooted in reality that it is incapable of finding accurate reference under ANY CIRCUMSTANCES. Thus, modern medicine attempts to build references by using diagnostic data from a population. Now, it gets the worst problem. All reference ranges contain huge variances from the Nine Big Factors; and applying such references to specific person in diagnosis of diseases must result in colossal failure.

(2) Imposing binary values on health properties

Human health is a quantitative property for which nature does not provide a definition. It varies in different degrees from very healthy to near death.

A common-law political system developed a strange culture: everything must be characterized as two states. Although this concept is good for characterizing legal rights and imposed human behaviors, this convention has been extended to anything including natural process, natural phenomena and finally to the human body. It is natural to create standards such as daily nutritional allowances and high blood pressure guideline. Strangely, in the western world, all political bodies, research institutes, non-profit organizations, and federal agencies must use the binary system.

In order to find a reference, an artificial healthy status must be assigned to each person. A recent change in blood pressure from 140/90 to 130/80 suggests that health care is a political question. So, whether a person is healthy is decided by experts or government agency. Basic logic and common sense would force us to question how an organization can add millions of more people into the national disease database overnight. It is natural for us to question whether blood pressure 130/80 is a magic number for all people in the nation.

Such concepts must have some benefits no matter how irrational they may be. One utility is that, if blood pressure in a person is close to the so-called recommended normal value, the person does not have high blood pressure in a rest condition. The person is safe in a resting state. The pressure measurement cannot be used to infer whether the vascular system of the person is in fact healthy.

We can show that such a notion is completely wrong. There is no rational basis to use normal and abnormal blood pressures if we note how people differ in the Nine Big Factors: races, personal genetics, age, sex, food, lifestyles, prior exposure, interactive compounds, and health conditions. Heart size is closely related to genetics and food. Just the difference in the heart size between a 200 lb white and an 80 lb Asian woman can make normal blood pressure readings meaningless. Deviations among human beings are more than the deviations among all different cars.

If one single combustion pressure standard is applied to all cars in the world, then most sports cars will be crippled, most small cars will blow out, and all performance cars will become lame ducks. If auto mechanics are required to fix cars according to two-binary standards, half of the cars will not run. Dead cars are found all over places. The good thing is that no one uses such a flawed method in repairing cars in auto shops.

It is strange that such a flawed standard bad been applied to human beings. We could not find similar standards for auto-making, TV making, disk making…. Government imposes regulations on all cars only concerning environment pollution and safety. No one uses same standard on car performance.

We found there are two major reasons for creating this strange tradition. First, each person is born without a product specification. The ancient rulers such as the King of England historically treated humans as same. Among a nation of people, the ruler divided them into only two kinds: reasonable and unreasonable. Among millions of types of human conducts, there are only two kinds of conduct: right and wrong. Liability is only yes-or-no; and a criminal defendant can be only guilty or not guilty. This tradition was created to make ruling tasks easy. The common-law approach reflects extremely poor modeling methodology. When such an oversimplified binary system is used in production, it destroys productivity. That is why common law nations are in rapid decline because it cannot deliver high productivity in the new competitive world.

The medical framework which is developed using the binary system is compatible with fast fixes which take also the binary standard. In contrast, health problems follow quantitative models which must be able to characterize small incremental changes, and true cures also follow quantitative disease model that is able to characterize very slow speeds. Thus, all research models and practicing models from the binary system are incompatible with nature of health problems and the nature of true cures. Thus, the medical landscape incorporated common law foundation is unable to find cures.

We show that stroke occurrence condition is a quantitative problem that depends upon a large number of genetic, personal, social and ambient factors. A real solution must be addressed in a quantitative way. Thus, the oversimplified binary system is incompetent for modeling any health problems in reality. Diagnostic methods, treatment methods, and purported cures developed using the binary system must be inaccurate, incomplete, or even wrong. When the basic model is developed using binary values, the model is the worst. When the binary standard is used in studies in conjunction of statistical analysis, study results cannot be right in nearly all cases.

We can show the obvious flaw in using objective data from optimization approach. All of medical analysis criteria come with big ranges. For example, the triglyceride concentration reference range is 0.51-2.3 mmol/L. This is a huge range. A normal cholesterol range is generally believed to be 1.3-5.2 mmol/L, and, thus, the mean could be about 3.25 mmol/L (for an abstract person that does not exist). Percent differences based upon this flawed mean concept would be 3.23±60%. If cholesterol level in a person is deviated by 5%, its long-term impact would be destruction of the vascular system. Here we see 60% deviation! Using such a method to cars across makes and models would certainly blow out or cripple every car.

We bet that the range is determined by finding measurement values of "normal human subjects" by using the common law approach. This range is actually determined by most likely measurement values for people who do not have diseases of clinical significance. Those values are not same as those for really healthy people (besides, health is really a quantitative property). In reality, the medical community does not have real ability to determine true health conditions. Lack of diseases of clinical significance is not the same as "imagined health." Indeed, most healthy people have the same diseases that have not been fully developed.

When a study is focused on only one factor with other factors being "controlled," most of the variables cannot be controlled. While early rulers used such a binary standard with small number of factors solely for convenience or for administrative purpose, applying it to health problems in the science age cannot be justified. If a finding can be reached by controlling variables, the results cannot be applied to anyone who is not controlled. Since no body can be controlled, this must result in colossal failure of medicine.

5.4 Lateness of Medical Diagnosis

As a general observation, we must say that modern diagnosis based on chemical, functional and structural data always fails to reflect true health condition.

The most determinate evidence is a well known and indisputable fact: the liver or kidneys could appear normal even if they have lost 50% functions. Dialysis is necessary only when the kidneys have lost 80% functions. Similarly, loss of 50% of cross-session areas in blood vessels cannot be detected in a reliable way.

All image data is used to determine structural changes. However, such data is of little value because all known physical instruments have very limited resolution.

We could not find any method that is able to detect compromised vascular system in an early stage. A study (Dr. Aron S. Buchman et al.) from Rush University Medical Center in Chicago, USA found that modern technology could not detect small microscopic infarct and arteriosclerosis. Neither blood pressure readings, nor brain CT images, nor NMI images can detect subtle changes in arteries or small tissue damages in the brain. The inability of instrument methods to detect early changes can be easily understood from examining their inherent limitations. We provide some computations to show the inherent limitations of instrumental methods.

Problem 5.1. The brain contains 86±8 billion neurons and equal **number** of non-neuronal cells. A parcel of brain tissue of 10,000 neurons would be only 10,000/(86±8 billion) = 0.00001% of the total brain volume. There is no possibility to see such a tiny volume in the brain. A parcel tissue of a million neurons would occupy about 1000,000/(86±8 billion) = 0.001% the total brain volume. There is no way for an image to resolve structural change involving a small parcel of neurons.

Problem 5.2. Some studies claim that instrument can detect 2 mm tumor. We want to know how many brain cells the tumor has replaced. If we use 1260 cubic centimeters (cm^3) as the volume of the brain, a 2 mm spherical tumor would occupies a volume $V = 4/3 \pi r^3 = 4.18$ cubic millimeters. This tiny tumor could have destroyed 285,301 neurons and 285,301 non-neurons (4.18/1260000 × 86,000,000,000 = 285,301) based upon the volume it has taken. If the instrument can detect a 4 mm tumor, it would have destroyed 2,285,825 neurons and 2,285,825 non-neurons.

Problem 5.3. The total diameter of a capillary is only about 10 μm. There is no way to detect fat coatings in capillaries. A coating of 2 μm would result in new cross-section area of $A=\pi r^2=3.14\times6\times6$ mm, and a reduction of area by (100-36)/100 = 64%. A coating of 2 μm fat layer would escape from detection by any practical method. When the capillary is reduced by 2 μm in the inner surface, red blood cells would have to be forced through by a much larger pressure. We believe that fat coating is a major contribution to high blood pressure and explain the magic effect of doing exercise intended to remove fats.

We know how many small arteries and veins are. As we have shown, a 5% narrowing can have a huge impact on blood flow resistance. There is no way to detect 5%, 10% or 20% of narrowing in small blood vessels. All dye-based imaging methods can only detect big fat plaques or big structural changes. All technologies such as magnetic resonance angiogram (MRA) or computed tomography angiogram (CTA) just cannot detect small structural changes in early stage. Even if all of our computations were wrong, we must say with confidence that structural and functional data is very poor. We can easily prove that a thin-layer of fat coatings can be detected by a battery of subjective testing methods, heart loading method, and analysis based upon historical lifestyles. It is safe to say that a reduction of 50%-60% cross-section areas cannot be reliably detected by any method (except in cases involving big fat plaques).

Many studies manipulate data with a twist of statistical analysis. They gave impression of high sensitivity. A change caused by death of a million neurons is probably too small to see. The cited article reveals that brain images are worse than autopsy data which is virtual inspection. It is safe to guess that autopsy must have a limited capability and can never detect early changes in physiological properties in the body. The failure of medical diagnosis is rooted on the large number of fatal flaws. All structural changes are a result of long-term cumulative effects of changed physiological processes. Changes in physiological properties in the body or tissues must take place long before functional and structural changes can be detected. When something is shown in a brain image or any kind of objective data, it must involve a really big chuck of brain tissue or big fat plaques. It is far too late.

5.5 Problems in Physical Checks

It is widely believed that annual physical check conclusions can provide a useful inference about personal health. This is a mistake. We have to conduct our analysis without being bound by the foundation of medicine and must go beyond well-accepted medical principles.

First, it is a randomly drawn number of a possibly infinitely large number of possible values.

Second, diagnostic data relating to the cardiovascular system cannot reveal true health conditions as far as stroke or heart condition is concerned. We note isolated cases where people passed physical checks in a fly color may suddenly die from a stroke or heart attack. None of the common criteria in the health reports can prove true condition of the vascular system.

Third, latent time periods of drug side effects, cancer, and many chronic diseases can be very long. For example, latent period of mesothelioma, a lung cancer, caused by asbestos, can be from 10 to 50 years. A patient may have passed 40 annual physical checks without being alerted of the cancer in development. Recurring breast cancer may also take up to five years to show up. Thus, none of those criteria can reliably predict developing diseases. Many drug side effects cannot be detected until kidney function is seriously damaged.

Fourth, physical check up is only a performance data in a baseline condition. This is very much like the performance data of a car in an idle stage in one time. The performance at the engine speed of 1000 RPM cannot be used to predict its performance at 5000 RPM or at the maximum allowed speed of 8000 RPM. A person who has passed physical check may experience severe breath shortness, great discomfort, even total failure, stroke and heart attack when his heart output is raised. An auto mechanic cannot fool car owner with idle performance data, but must show the car can run in a reasonable dynamic range. There is no rational basis to believe a baseline performance data can be used to predict the performance in a load condition.

Fifth, physical check up data are based on completely wrong system model—chemical reactors or a simple mechanical device. Human health must be treated as complex open systems. For such a super complex system, any static data is of little value. For example, a triglycerides level in the high end of the range may be harmless for those who are physically active, consume well-balanced and vitamins-rich diets, and have good fat metabolism. In comparison, a triglycerides level even at the lower end of the range may be still bad in those who do not exercise, consume imbalanced or vitamins-deficient diets, contain heavy metal pollutants, or have poor fat metabolism. Such interactions are so obvious that they cannot be ignored. Such references are largely useless.

Sixth, such physical check up data is also meaningless from kinetic analysis. It is rooted in the failure to understand the near-steady state nature of human body biological process. A large number of problems cannot be identified by looking into concentrations of immediate compounds such as glucose in the blood. Even if glucose concentration appears to fall within so-called normal range, it may be too high for a particular person. For example, the glucose normal range is 3.89-5.50 mmol/L, which is a huge range from kinetic point of view. We assume that the optimum level of glucose in a hypothetical person is 4.0 mmol/L. Let us show the impact by raising the glucose level by additional 1.0 mmol/L. At a first blush, it is only 25% more than the optimum level and cannot hurt the person. That might be true only if it only lasts a short time. However, a 25% or 1.0 mmol/L surplus can hurt the person very badly if average glucose level in 24 hours is 25% more than optimum number in a long period.

Problem 5.4. How 1.0 mmol/L (25% departure form an optimum value) would affect health. Since glucose has a formula weight of 180.1559 g/mol, 1.0 mmol/L would have (0.001 mol/L×180.1559 g/mol = 0.18 g/L) 0.18 g/L. That means that 0.18 g in each litter blood could not be used. If the person has an average heart output of 6 litters per minute (most people have 5-6 L/min), each year, the total heart output volume is $6\times60\times24\times365 = 3{,}153{,}600$ L. So, the total glucose that would be available for storage as fats is 3,153,600 L×0.18 g/L=567,648 g=567.648 kg. It is impossible because most glucose is re-circulated to the heart and cannot be stored as fats, and excessive energy will not be absorbed. Even if only 1% of the glucose is deposited in tissues, the person can gain 5.6 kg in a year. This example tells glucose reading is largely useless except that a really bad number can tell how bad the condition is.

When glucose is high in the blood, the liver responds to an increased insulin level by absorbing glucose. It packages glucose into chains called glycogen. These glucose granules fill up liver cells so that the liver works as a glucose warehouse for storing some excess glucose. When glucose levels drop, insulin production falls. The fall of insulin in the blood signals the liver to send its glucose back into the blood. This buffering function keeps the body to maintain proper level of glucose between meals and in the night. Both the glucose level and the demand for glucose are changing from time to time. At night, if glucose is overwhelmingly in excess, some of it is stored as glycogen and some of it is deposited on walls of blood vessels. At day time, when the person needs more glucose while glucose levels are low, glycogen will be converted back into glucose to be used as energy. Glucose is maintained in a dynamic equilibrium.

The above computation cannot be used to predict the outcome for a specific person because human body is more complex. What is important is to show the time-effect of a slight glucose imbalance. If duration is long enough, even a slight imbalance as little as 1% could cause serious consequences. Such an outcome can be caused by any problem in any of those mechanisms discussed above. This also shows a broad range of reference values cannot be used to achieve personal health. A persistent departure from the best value can have serious consequence due to long-term effects: even if one adds one gram a day on average, the result can be really bad. This is to show that a person cannot use averaged glucose value, the best value, recommended range, daily reference, or anything that is not based upon the person. It is a mistake that the person, after seeing physical check-up conclusions based so-called normal ranges, start eating cookies, candies, meats, and cakes to the fullest of satisfaction.

Seventh, most reported diagnostic values are actually random variables that could have any of a large number of potential values. Each reported value is just one of the potentially values. They often lie. You may get a different set of values if you try again. Blood pressure can have great fluctuations in a rest condition. Similarly, glucose levels can vary, depending upon when glucose is measured and under what condition it is measured. This value is not any kind of average. While we note that averages from other people are useless, time-averaged value of data from the same person would be more useful to the same person. However, it is impossible to acquire values for 24 hours period and different months. Due to obvious fluctuations, each reported value is only a ballpark value.

We believe that a physical check report has a limited utility. Reported values may be used to rule out diseases of clinical significance. This is consistent with the nature of the reference ranges that are acquired from people who have no diseases of clinic significance. In collecting reference data, no effort is made to determine if a subject person is really healthy. It is possible to read out more useful information from the report. For example, she or he should see how the values change from year to year, and pay attention to how the values deviate from the best values. You still need to be aware of measurement conditions. For the reasons stated above, reported values cannot be relied upon to rule out hidden health problems in development.

5.6 Summary

Modern medical diagnosis is useful only for finding serious and belated diseases. Chemical data often does not reflect real state reliably. Objective data lacks meaningful references. Use of relaxing ranges will cause patients to miss early diagnosis of diseases. A stringent standard will create too many false diagnoses. When structure in any major organ is changed, it is far too late to do anything to achieve health and longevity.

Objective diagnostic method is obviously borrowed from non-life science. It is not a good method for human beings.

To prevent diseases and achieve longevity, one must use subjective signs and feeling. However, the subjective sign method will be useful only if a massive searchable database containing great details of signs is available.

One cannot use modern medicine to achieve the maximum longevity. If a person has missed two to fifty years, there is no way to undo adverse impacts of diseases. That is why a pursuit for the maximum longevity must start as soon as possible.