

Homeostasis: A Continuous Search for Health

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Introduction

In a previous report, we made the point that people are really different. Some are made of steel and indestructible, others of glass and break easily. The question is why? We have shown by example several resistance and susceptibility factors. All of this, put together, represents metabolism, often referred to as homeostasis, balance or harmony. These are highly measurable and mappable phenomena and we must look into the thousands of physiocochemical reactions that accompany them.

The strategy and tactics of the medical system take on new and different meanings once one accepts the fact that homeostasis, the steady state, may well be the centerpiece of our problem. Claude Bernard, Walter Cannon, and other pioneering researchers gave us this fundamental concept.^{1,2} What does it mean?

First, utilizing homeostatic "principles," only about five percent of the population falls into the category of being clinically sound. This is the segment of society that has no obvious ailment such as cancer, heart disease, arthritis. More importantly, by a more strict definition, no one is actually perfectly healthy. The difference between clinical and ultimate health is simply a matter of the subtle and subclinical stages of the disease process.

Secondly, increasing evidence suggests that the steady state is more stable than the early investigators described. For example, the normal blood glucose range is actually narrower than is traditionally accepted. Whereas the standard suggests a physiologic fasting blood glucose of 60-100 mg%, our evidence favors a range of approximately 75-85 mg%.³ While total serum cholesterol levels under ideal conditions are

viewed as anything under 200 mg%, we believe levels of 190-210 mg% are more optimal.

Thirdly, we would like to think that one of our major contributions has been an awareness that homeostasis is a mappable phenomenon. Our major efforts have been directed to the development of relatively simple two-dimensional maps. We have devoted considerable attention to identifying the principal parameters to be charted. At the moment, the evidence suggests that carbohydrate and lipid metabolism serve well as homeostatic measures. However, this focus is not generally agreed upon. For example, one school of thought has developed a concept based upon the alkalinity/ acidity ratio of the blood. Generally, optimal arterial and venous pH is considered to be 7.35-8.45 and 7.32-7.43 respectively. Wiley insists that the single best measure of "Bio-Balance" is a venous pH of 7.46 ± 0.01 .

Lastly, and this surely has not been emphasized in the early history of homeostasis, the steady state can readily and easily be modified by simple lifestyle changes, namely by the air we breathe, the water we drink and the food we eat.

The Stages of Disease⁴

From a practical standpoint, all disease is preceded by an incubation period. In the instance of acute mechanical trauma (e.g. an automobile wreck), the latency is obviously brief and inconsequential from a diagnostic and therapeutic point of view. In the case of chronic disorders such as cancer, the incubation time extends over months and frequently years or decades. Clearly, the longer the prodromal time, the greater the opportunity to anticipate the end problem and, hopefully, abort the process.

Initially, for example, the patient notes only feelings of fatigue. When one checks this symptom in our most contemporary and definitive diagnostic encyclopedia, the

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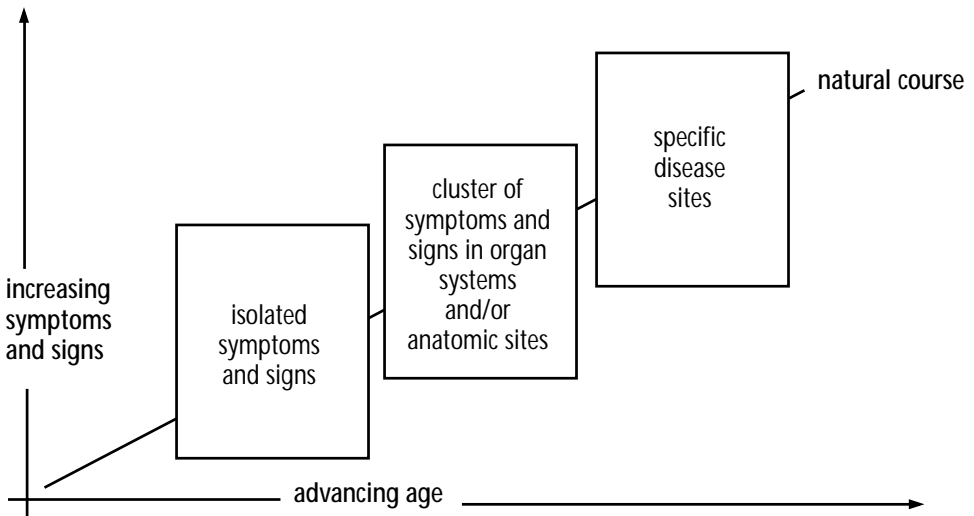
International Classification of Diseases, 9th Revision, 4th Edition, Clinical Modification, (ICD-9-CM, p. 472) one finds a list of 18 classifiable items. However, this particular symptom does not fit any single disease. Hence, the complaints may either be ignored, assigned a meaningless label, or regarded as a minor emotional problem. In any case, because the clinical state cannot be given a name, it follows that the treatment is purely symptomatic. At this stage the story is expressed in the first box in Figure 1. (below)

More often than not, the situation just described progresses or worsens, and other symptomatology appear. Sooner or later, the findings begin to cluster in systems, organs, or in localized sites. For example, the patient now also finds himself with several gastrointestinal complaints (i.e. indigestion, anorexia, constipation or hemorrhoids). At this stage, the constellation is still not classifiable with textbook terminology. Hence, symptomatic treatment continues. An al-

ternative is the recommendation for further observation. If many organ systems or anatomic sites are involved, the syndrome might, by exclusion, be assigned a psychologic/psychiatric etiology. This is the pattern pictured in the middle box of Figure 1.

Finally, when the syndrome is clearly identifiable in terms of a classical textbook description (i.e., available in the ICD-9-CM), a lump is discovered and a “diagnosis” is pronounced. This is the situation pictorially portrayed in the last box of Figure 1, (below). In the traditional practice of medicine, disease does not really exist until a diagnosis is established. A diagnosis is only possible when a set number and constellation of findings ripen. Therefore, for practical purposes, the long and tortuous incubation period—clinically, biochemically, and enzymatically—frequently goes unlabeled or given a meaningless tag. And so, in orthodoxy, the name of the game is the name!

Figure 1. The clinical sequence of events in chronic disease. At first there are few and diverse symptoms and signs (box on left). With time, the findings become more numerous and localized in a system or site (center box). Finally, the clinical evidence fits the textbook picture of a particular disease or syndrome (box on right).



The Quantity of Life

By definition, life span represents the biological limits of living. It depends upon when the body's systems simply break down and render further life impossible. The Biblical Methuselah lived 969 years! Genesis 6:3 hints, if not promises, 120 healthy and happy years. Moses is said to have lived 12 decades and to have retained his eyesight without the need for glasses! In the present day, many distinguished scientists in longevity research argue that the human organism should endure for this timespan. The logic for this hypothesis is that all wild animals (and humans can rightly be included) are known to live 10 times the age of puberty. Recognizing the onset of puberty at approximately 12 years of age, it seems logical to expect the human lifespan to extend to 120 years.

Obviously, some controversy exists on this point, and other investigators argue for different optimal life expectancies. Interestingly, well-documented human survival curves calculated each decade since 1900 converge to indicate that the maximum age of survival has been fixed at approximately 85-100 years.

How do Americans rate in this category? Statistics released by the Centers for Disease Control in 1996 place the life expectancy of the average American at 76.1 years (73 years for males, 79 years for females). A comparison of life expectancy data for 14 developed countries identifies the United States in last place. Obviously, factors such as chronic war, famine, political upheaval and economic crises significantly reduce the average length of life, but in the absence of such glaring dangers, health is the primary influence on quality of life. Compared to the residents of other industrialized countries such as Canada, Japan and Australia, Americans clearly need to make some changes in their health and lifestyle practices.

The Quality of Life

Surely, what we all really want is to add life to our years, rather than simply years to our lives. It seems clear that the aging

process entails a progressive degeneration or loss of organs. In fact, one could even say that we do not really die; we simply run out of parts! This can hardly be called good quality of life. What should happen (and apparently does in wild animals) is to function maximally up to a point, hopefully go to sleep, and simply not wake up. Even sudden death resulting from a catastrophic experience such as a massive heart attack or stroke is far preferable to the slow degenerative process most Americans endure. In short, the tremendous advancements of modern medicine have not made it possible to live as long and as well as we should.

The Current Medical Scorecard

Opinions as to the state of the modern medical system differ dramatically. With such a wide range of perspectives, the only real point of agreement is that there is obviously plenty of room for disagreement. At one extreme are those who believe that the USA has the best medical system in the world. Within this group, some will tell you the system needs nothing. Others will argue that all that is required is more doctors, nurses, hospitals, CAT scans...all readily available with more money.

The majority of the public, including medical experts, holds to the prevailing philosophy of medicine. They are satisfied, for example, with the germ theory of disease, even though Pasteur made the point that the cause of disease is not the germ but the "soil" on which the microbe is allowed to light. It follows from this traditional type of thinking that the majority of medical solutions involve the use of more and more drugs.

Finally, a small but increasing cadre recognizes that the present medical crisis results in large measure from an incomplete, or possibly incorrect philosophy of health and sickness. This avant-garde subset points to the need for greater emphasis on ecological principles.

What we need (and fortunately have)

is a hypothesis that recognizes the hostile external world about us with its many physical, chemical, microbial, thermal, and psychologic challenges. This equation notes that our ability to survive is a function, in part, of the world around us and, most importantly, our ability to cope with these bombardments. This coping ability is made possible by an internal world sometimes called host resistance/susceptibility, immunity, tissue tolerance, *milieu interieur* or homeostasis.

The Ultimate Solution: Education

We have already suggested that life-style modification represents the most logical therapeutic approach to most homeostatic imbalances. History has provided us with many wonderful and exciting accounts. A good example is a study of 240 dentists and 191 spouses.⁵⁻⁷ At the initial visit, each subject completed the previously described Cornell Medical Index Health Questionnaire (CMI) along with a dietary record form. Following data collection, the groups met for discussions of their personal clinical and dietary states. Two points must be emphasized. First, the subjects revealed many and sometimes serious clinical problems. Second, their diets left much to be desired. It became clear that the test subjects were generally consuming large amounts of refined carbohydrate foods, low quantities of protein, and suboptimal amounts of vitamins and minerals according to the RDA (Recommended Dietary Allowances) set forth by the Food and Nutrition Board of the National Research Council/Academy of Sciences.

At subsequent visits, it was possible to compare the changes in their CMI responses and the alterations in their dietary habits. For a example, at the end of the first year of educational sessions, obviously, everybody was one year older chronologically. Yet, clearly as a result of the education experience, the average participant was approximately 10 years younger biologically.

Hence, the natural sequence of events may be favorably altered by means of a lowering, stopping or actual reversal of symptomatology.

This experiment highlights the role of health education in secondary prevention (prevention of recurrence). What is most exciting about this study is the indication that one can favorably influence the general health of a population through simple and inexpensive educational techniques!

What other proof do we have of the role of education in health and sickness? The best answer comes from the last five Surgeons General and their comments about tobacco consumption. During the past 25 years, national voluntary health agencies, especially the American Cancer Society, the American Heart Association, and the American Lung Association have played a significant role in educating the public about the hazards of tobacco use.

Even the highly traditional and conservative medical establishment is beginning to recognize the importance of health education. The Surgeon General made mention of this earlier: "In the last decade there has been an increasing interest in involving physicians and other health care professionals in smoking control efforts. Medical organizations have played a more prominent role in smoking and health during the 1980s than they had in the past."

This role of education in health maintenance should come as no surprise since it has long been known that the dictionary definition of "doctor" is "teacher." This has been expressed in a report from the Council on Scientific Affairs of the American Medical Association.⁸

Health education efforts have grown dramatically over the past decade and seek to improve the health of individuals by providing them with information, that will lead to behavioral changes and thereby result in improved health. Physicians could add to the success of health education efforts by incorporating preventive services into their

patient encounters, particularly patients in high-risk situations. There are many examples of successful physician-based interventions, and a new emphasis on preventive services in primary care is emerging.

Further Evidence

To test whether community-wide health education can reduce stroke and coronary heart disease, the Center for Research in Disease Prevention at Stanford University School of Medicine compared two treatment cities (with over 100,000 persons) and two control communities (with approximately the same number) for changes in knowledge of risk factors, blood pressure, plasma cholesterol level, smoking rate, body weight and resting pulse rate. In their own words, "Risk factor changes resulted in important decreases in composite total mortality risk scores (15%) and coronary heart disease risk scores (16%)." And most amazingly, all of this was made possible by means of a 24-hour educational experience.

Still other reports demonstrate the efficacy of health education programs in the most desired area of primary prevention (prevention of occurrence). A study of the effectiveness of an intervention program designed to favorably modify behaviors connected to the future development of cancer was initiated among 1,105 children in 15 institutions in the New York City vicinity. Schools were assigned to either an intervention or a nonintervention group. Subjects in the experimental subgroup received each year, from fourth through ninth grades, a teacher-delivered curriculum focusing on diet and prevention of cigarette smoking. After six years (by the ninth grade), the rate of initiation of cigarette smoking was 73% lower among subjects in the experimental versus control schools. There was also a striking net increase in reported intake of total carbohydrates and a concomitant decline in total and saturated fats among subjects in this same

group. While there are obviously problems in experimental design, these findings suggest that such programs are feasible and acceptable and may have a favorable effect on diet and prevention of cigarette smoking in children.

Do we need more evidence to convince ourselves that enormous benefits can be derived by simple lifestyle changes? What more proof do we need that all of this is possible by simple and inexpensive educational modalities?

Conclusion

There is enough in history to assure us that wellbeing means walking a fine line. This series makes three contributions. First, it confirms that a fine line separates health and sickness. Secondly, it adds the fact that the concept becomes more meaningful as it becomes more measurable and mappable. Finally, with these additions, human health becomes more manageable.

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