

Scientific Contribution

Towards a dynamic definition of health and disease

Johannes Bircher

Department of Clinical Pharmacology, University of Bern, Murtenstr. 35, CH-3045 Meikirch, Switzerland (Phone: +41-31-829-2554; Fax: +41-31-829-2589; E-mail: jbi@swissonline.ch)

Abstract. A multifactorial and growing crisis of health care systems in the developed world has affected medicine. In order to provide rational responses, some central concepts of the past, such as the definitions of health and disease, need to be updated. For this purpose physicians should initiate a new debate. As a point of departure the following definitions are proposed: Health is a dynamic state of wellbeing characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture, and personal responsibility. If the potential is insufficient to satisfy these demands the state is disease. This term includes sickness, illness, ill health, and malady. The described potential is divided into a biologically given and a personally acquired partial potential. Their proportions vary throughout the life cycle. The proposed definitions render it empirically possible to diagnose persons as healthy or diseased and to apportion some of the responsibility for their state of health to individuals themselves. Treatment strategies should always consider three therapeutic routes: improvements of the biologically given and of the personally acquired partial potentials and adaptations of the demands of life. These consequences favourably contrast with those resulting from the WHO-definition of health.

Key words: disease, health, illness, life cycle, malady, responsibility for health, sickness, state of health

Introduction

In the past century medical research has led to enormous advances in medical practice. As a result in developed countries modern medicine has become a major asset for the society. This is most visibly expressed by the ever-increasing health care budget. Consequently many institutions and organizations try now to acquire a share of the health care market, to control it, or to benefit from it in any other way. This has led to a situation where physicians are no longer in control and cannot act exclusively in the best interest of their patients. In fact, they also need to take many other aspects into consideration, e.g. excessive administrative burdens, demands by insurance companies, implicit rationing, legal restraints, publicity, business needs, industrial seductions, etc. In contrast, the general population and in particular the patients are interested only in the best possible services for their health. In view of these discrepancies it has become urgent to re-evaluate the identity of medicine (Saracci, 1997; Sandy, 2002; Stauffacher and Bircher, 2002; Bloom, 2003). One core aspect of this identity concerns the definitions of health and diseases. Since antiquity there have been many such

definitions in the literature (van Spijk, 1991). They now need to be updated in a way that is meaningful for the practice of medicine in the 21st century.

Definitions are very much determined by cultural processes. It therefore is not conceivable that a proposal for new definitions of health and disease will be accepted without much questioning. In fact, a widespread discussion of new concepts is needed in order to render them useful in practice. As part of this process new definitions will likely be modified to suit the specific cultural pattern of the societies, in which they are supposed to be used. Consequently, the proposals offered in this paper are intended as a starting point to initiate the discourse on this burning issue.

Concept

Indispensable elements of a definition of health include the bio-psycho-social nature of human existence (Engel, 1977) and the fact that each person's health determines his or her future. In addition, the dynamic relationship between the demands made on an individual's life and his or her abilities to meet them is crucial (Nordenfelt,

2001). The demands of life vary with the life cycle, are culture-specific, and need to be met in personal responsibility. Taking all these aspects together health and disease could be defined as follows:

Health is a dynamic state of wellbeing characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture, and personal responsibility. If the potential is insufficient to satisfy these demands the state is disease.

All individuals aspire to be in control of their lives and their futures. Nevertheless at any moment there is an intimate relationship between individuals and their social network, which varies dramatically across their life cycle. Newborn babies are entirely dependent on care, whereas most adult persons believe that they are in control. Illnesses and the frailty of age increase again the level of dependence. The different stages of this evolution are associated with age- and culture-specific demands and challenges to which each individual has to respond. Those who are able to meet these demands are generally considered to be in good health (Nordenfelt, 1995, 2001). Conversely, inability to cope may be regarded as sign of disease. This can be due to symptoms requiring urgent intervention such as drug treatment or surgery. Alternatively, the discovery of a threat to long-term health – such as a carcinoma *in situ* – may lead people to seek medical care in order to protect their future. Interestingly, the simple presence of symptoms appears generally to be compatible with health, since studies have shown that most people who consider themselves to be healthy nevertheless experience headaches, back pains, abdominal

pains, etc. (Kiener et al., 2002). In the English language the terms disease, malady, illness, ill health, and sickness describe states deviating from health from different perspectives (Clouser et al., 1997). I chose to use the single word “disease” to cover all of these terms, because they all imply a need for medical attention.

The above considerations suggest that the state of health may be described as the potential that individuals have at their disposal to master the short-, medium- and long-term demands of their lives (Schad, 1998). The term potential appears to be appropriate, as it contains all future capacities to cope with these demands. Clearly, in general a woman or a man in good health has much greater future possibilities to respond to all sorts of challenges than a person in ill health or with a disease. The potential of each person has also much to do with his or her past history because it is related to the innate constitution, including the genetic background and to the previous personal conduct that influences health. Therefore it is necessary for a concept of health to include both the past and the future of the person under consideration. Consequently, it can best be described on a two dimensional diagram with time on the abscissa and the potential on the ordinate (Figure 1). Although there are no units to measure such a potential a graph may at least provide a helpful way of visualizing the concept.

The total potential is composed of two components or partial potentials, which must be considered separately:

1. *The biologically given partial potential* of individuals initially results from their genetic constitution and from their prenatal development. Consequently, it

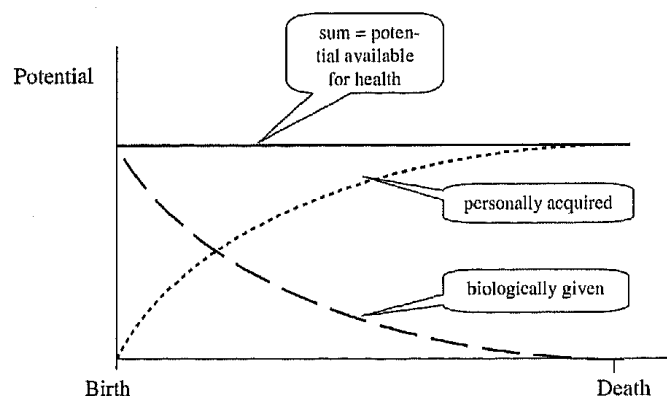


Figure 1. Graphic representation of the potentials throughout life: The total potential available for health is composed of the two partial potentials. The curves have been drawn arbitrarily and are different from individual to individual. The initial value of the biologically given potential may vary according to the biological lottery, e.g. in a patient with Down syndrome it is markedly reduced. The rate of rise of the personally acquired partial potential depends e.g. on social support and individual action. In the present example the total potential just happens to remain constant throughout life. In most persons this will not be the case.

varies from person to person, part of the injustice of biology. Engelhardt has called this the natural lottery (Engelhardt Jr., 1984). This partial potential is greatest at the time of birth and diminishes thereafter, because with increasing age the future biological capacity of a person to respond to challenges diminishes continuously. The biologically given partial potential reaches zero at the time of death. It will be temporarily or permanently reduced, if at any time a disease affects a person. The following examples illustrate this idea. In an influenza infection the partial potential may be diminished only for a few days. A myocardial infarction may damage it dramatically, yet reopening of coronary vessels in time may restore coronary and cardiac function to a great extent. Patients with diabetes mellitus type 1 must carefully correct hyperglycemia on a long-term basis in order to protect their biologically given partial potential. Currently, there is no possibility of restoring the spinal cord of patients with paraplegia. Therefore they require extensive rehabilitation in order to meet the demands of their life situation.

2. The *personally acquired partial potential* includes every potential an individual can acquire during life, such as immunological competence, physical abilities, learning and other skills, psychological and spiritual development, and social capital (Greenhalgh and Hurwitz, 1998). This partial potential is quite small at birth, increases rapidly during childhood and adolescence and, if cared for, may be augmented throughout the entire life. If it is neglected it may also diminish. Several aspects render it interesting: Its development lies to a great extent within the power and responsibility of each individual and of his or her social context. The relative contribution of each of these varies across the life cycle. Persons who strive for personally acquired potential will usually develop more of it. Influences from the social context may positively support an individual or may have deleterious consequences. For example, this partial potential may be increased by education and empowerment, or reduced by parental conflicts, social deprivation, stress, alcohol, addictive drugs, etc. Engelhardt has called this aspect the social lottery (Engelhardt Jr., 1984). Furthermore, Antonovsky has analysed important features of this partial potential in his description of the sense of coherence that is part of his concept of salutogenesis (Antonovsky, 1997; Wydler et al., 2000). He suggests that the state of health of an individual will be better, when the sense of coherence is high, that is when a person understands his or her life situation fully, can handle it,

and finds it meaningful. Thus, it could be argued that comprehensibility, manageability, and meaningfulness – the three components of the sense of coherence – may be part of the personally acquired partial potential. Finally, current concepts of mental health emphasize the need to contribute daily to the development of one's own personality (Rattner and Danzer, 1997). In so doing one certainly adds to the personally acquired potential.

Although the two partial potentials are not directly comparable with each other, every person has and makes use of both of them. Consequently, despite the lack of a scale it does not appear unreasonable to simply apply the sum of them to visualize the total potential a person has available for health. This idea can also be conceptualized intuitively and becomes pragmatically evident in the practice of medicine: Reductions in the biologically given partial potential may in part be compensated for by personally acquired partial potential. If e.g. physical defects cannot be restored medically, the application of rehabilitative medicine may improve the personally acquired partial potential of affected patients to the extent that they may themselves be able to cope again with the demands of their lives. For this reason, many persons with disabilities consider themselves to be healthy. Compensation of the reductions of the biologically given by personally acquired partial potential is also part of the aging process. Many elderly people think that they are healthy, even though their physical abilities have become markedly reduced. They may – at least in part – balance their low biologically given partial potential by a highly developed personally acquired potential.

The demands of life represent the third major component of health to be considered (Nordenfelt, 2001). The factors that determine them vary throughout the life cycle of a person. Initially, they are given by the social lottery, yet in adult life most persons can influence and assume personal responsibility for the demands they are faced with. Examples of exceptions may be persons being harassed at work, in poverty or who suffer from various disabilities or psychiatric illnesses, etc. For these persons society must assume a greater level of responsibility by giving medical, technical and social support. In elderly people too it is very important to reduce the demands made on them by life, so that they may consider themselves to be healthy. This idea is shown in Figure 2.

Considerations of the two partial potentials and the demands of life reveal what individuals can do

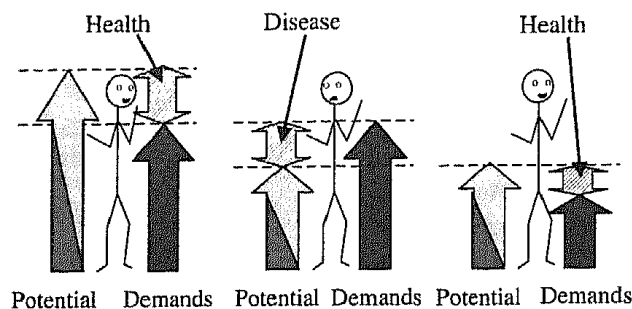


Figure 2. Graphic representation of model situations of health and disease: The relationship between the total potential and demands of life determines, whether an individual is healthy or diseased. In the examples shown the total potentials of the two individuals on the left hand side are different, whereas their demands are equal. Consequently, the first individual enjoys health, whereas the second is diseased. The individual on the right hand side, e.g. an elderly person, has the same reduced potential as the second, but is healthy because his demands have been reduced more than the total potential. The differences between the arrows for the potential and for the demands may be thought of as health reserve or severity of disease.

for their health and what society can contribute. Initially, all persons have to accept the starting point of their biological and social lottery as a fate (Engelhardt Jr., 1984). Thereafter, they can protect their biologically given partial potential by leading a healthy life and by avoiding diseases and accidents where possible. Initially the personally acquired partial potential and the demands of life are primarily the responsibility of parents and educators. Growing up is associated with more and more personal responsibility for these aspects. This illustrates how parenthood and education are essential for health and how daily physical activity, adequate nutrition, self-reflection, spirituality, etc. remain important throughout life (Rattner and Danzer, 1997; Koenig et al., 2001). But even for adult persons society must assume some degree of responsibility. There must be legislation to protect the health of people by e.g. sanitation, health and safety at work, etc. (Kiener et al., 2002). Furthermore, in a multicultural society some members may require personal support in order to assume responsibility for the demands of a life, which may be modified by specific cultural factors. These illustrations reveal that health is the result of a complex and dynamic interaction of three factors: fate representing the biological and the social lottery, personal responsibility and support from the social setting. The above deliberations do not suggest that social deprivation should be medicalized, even before a person becomes diseased. In contrast, they show that society has a responsibility to prevent socially vulnerable persons from becoming diseased.

According to the International Classification of Functioning, Disability and Health (ICF, 2001) impairments are defined as problems in body function or structure such as significant deviation

or loss. Whether or not impairments are compatible with health or represent disease states depends on the relation of each individual's potential to the culture- and age-specific demands of his or her life.

Limitations

By necessity the concepts we outline are imprecise as they result from our limited and imperfect perception of an infinitely complex reality. Despite this general limitation, all our intellectual communications are based on concepts. These are useful to the extent that they come close to our current cultural reality, and that we seem to agree on their meaning. As medicine is continuously evolving, it is necessary to periodically evaluate and discuss its core concepts such as those of health and disease (Saracci, 1997).

An analysis of the history of the definition of health is revealing. It shows that since antiquity the ways, in which the word "health" has been used, were closely related to the thinking at the time (van Spijk, 1991). This applies just as much to the definition accepted by the WHO in 1946 (Preamble of the constitution of the WHO, 1948): "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." With this wording the WHO made an important contribution: It widened the view of health to the mental and social dimensions. Yet, the unlimited idealistic aspect of the definition gives no help, when services for individual health needs have to be balanced against available resources. In addition, mental and social well-being cannot be reduced to a health problem. Consequently, the WHO itself has on several occasions reinterpreted its definition albeit without

changing its wording, which is part of its constitution (Burci and Vignes, 2004). More recent definitions have emphasized various aspects (Gadamer, 1993; Agich, 1997; Boorse, 1997; van Hooft, 1997; Schad, 1998; Nordenfelt, 2001; Bullington, 2003; Hellström, 2003; Jakobson, 2003; Nordenfelt, 2003; Petersen, 2003) including the relationship between the capacity to cope and the demands of life. They are given in greater or lesser detail and range from more social to more individual and from value-free naturalist to normative points of view. This subject has been treated mostly by brilliant philosophers yet surprisingly little by physicians. Therefore, the resulting concepts are theoretically sound, yet not always very closely related to the practice of medicine. The definitions proposed in this paper evolved from ideas put forward by the biologist Wolfgang Schad (Schad, 1998) and from concepts debated in the course of the project on the future of medicine in Switzerland by the Swiss Academy of Medical Sciences (Stauffacher and Bircher, 2002). They try to separate health from disease in a way that may be useful for both the practice of medicine and the organization of health care systems. Evidently they are normative and related to values in terms of both the biologically given and the personally acquired partial potentials, as well as age, culture and personal responsibility.

The proposed definitions are not identical with the bio-psycho-social model (Engel, 1977). Although the biologically given partial potential corresponds to a high degree with the term "bio" and the personally acquired potential with the term "psycho-social", the latter has important somatic aspects. While developing skills, i.e. while acquiring personal potential, musicians, athletes and other skilful persons must invest in their body. Therefore an adequate biologically given partial potential is a prerequisite to developing the personally acquired partial potential, yet parts of the latter may finally reside within the material aspects of the organism. The body can no longer be separated from the psychosocial development of an individual (Hell, 2003).

The emphasis on dynamic evolutions in the present definitions is in good agreement with recent ideas proposed in social and preventive medicine, which emphasize the cumulative consequences of health determinants. In this view diseases are considered to result cumulatively from all protecting and damaging events, which influence the health of people throughout their whole life. It is likely that critical periods occur during which individuals may be particularly prone to damage their

biologically given potential or to acquire more personal potential. Typical critical periods are foetal development, adolescence and menopause (Aboderin et al., 2002; Smith and Hart, 2002).

Implications

Evaluation of the value of the proposed dynamic concept of health and disease for medicine and for society will require much empirical research. Currently it must be evaluated on the basis of its hypothetical practical consequences. In order to analyse them, there are important theoretical reasons (Halmos, 1994) to carefully distinguish between medicine, i.e. care for individuals, and the health care system, the aim of which is to organize health care for social groups or whole countries. The following issues appear to be particularly relevant:

Some consequences for individual care:

1. Physicians may be confronted with the question whether or not a person is healthy. In the practice of medicine it is quite possible to assess the biologically given and the personally acquired partial potentials of an individual and to balance them against the demands of his or her life situation. In most instances this procedure will pragmatically lead to a reasonably clear answer to the question whether the person may be considered to be healthy or diseased. In contrast, the WHO-definition does not allow such a distinction (Burci and Vignes, 2004).
2. The proposed definitions clarify responsibilities in the doctor-patient-relationship (Sass, 1995; Medical Professionalism, 2002). Although physicians – as well as all health workers – are personally fully responsible for the quality of the services they provide, responsibility for their state of health remains with the patients. This consequence intends to justifiably diminish the benevolent paternalism of the past but with care not to reduce empathy. Supporting patients to assume responsibility for their health will strengthen their personally acquired partial potential and thereby improve their state of health.
3. For treatment planning the proposed definitions show the need to always consider all three methodological approaches to improve a persons state of health, i.e. increase in the biologically given partial potential, elevation of the personally acquired partial potential, and adaptation of the demands of life. Their relative importance will vary from patient to patient. If health professionals bear

all of them in mind, the public criticism that today's medicine does not perceive or treat its patients "holistically", will become invalid.

Some consequences for health care systems:

4. Health care in most of the developed countries is currently paid for by a system of communal financing either by taxation or by compulsory insurance. Unfortunately this undermines personal responsibility and exposes it to the so-called "moral hazard" (Höffe, 2002). In most other aspects of their lives all persons must decide about the risks they want to take or to reject. It might well not be in the best interest of the patient's health to separate responsibility for health from financial responsibility. On the basis of the proposed definitions of health and disease health insurances might in the future be tailored much more to the personal needs of each individual and exclude risks a person may want to take. Physicians should emphasize this "moral hazard" while maintaining their support for equity.
5. Since the WHO-definition of health requires complete physical, mental and social well-being, in today's societies everybody is a patient and it is not surprising that the demands made on the health care system by the public are unlimited. This presumably is one of the reasons for the growing costs of health care in developed countries. Implementation of the definitions proposed in this paper will justify the reduction in use of all those procedures, which are not specifically applied to a diseased person in order to substantially restore her health. Therefore it will limit health care to those who truly need it.
6. The concepts in this paper reveal the importance of social and preventive medicine, because they conceptualize what can be achieved on a short or a long-term basis by protecting the biologically given partial potential, by supporting the personally acquired partial potential, or by adapting the demands of life of individuals. The differential effects of family, education, social status, schooling, empowerment, care for the elderly, etc. may be described more clearly. The proposed definitions are compatible with the Ottawa Charter of Preventive Medicine (1986).

Acknowledgements

The author is very grateful for helpful discussions and critical comments by S. Benatar, F. Gutzwiller, D. Hell, W. Kuhlmann, N. McIntyre, F. Paccaud,

J. Reichen, U. Tröhler, W. Schad, J.L. Scully. He also appreciates the comments made by the group of the Swiss Academy of Medical Sciences working on the future of Medicine in Switzerland.

References

- Aboderin, I., A. Kalache, Y. Ben-Shlomo, J.W. Lynch, C.S. Yajnik and D. Yach: 2002, *Life Course Perspectives on Coronary Heart Disease, Stroke and Diabetes: Key Issues and Implications for Policy and Research*. Geneva: World Health Organisation.
- Agich, G.J.: 1997, 'Toward a Pragmatic Theory of Disease', in: J.M. Humber and R.F. Almeder (eds.), *What is Disease?* Totowa (NJ): Humana Press, pp. 221–246.
- Antonowsy, A.: 1997, *Salutogenese*. Tübingen: dgvt-Verlag.
- Bloom, F.E.: 2003, 'Science as a Way of Life: Perplexities of a Physician-Scientist', *Science* 300, 1680–1685.
- Boorse, C.: 1997, 'A Rebuttal on Health', in: J.M. Humber and R.F. Almeder (eds.), *What is Disease?* Totowa (NJ): Humana Press, pp. 3–134.
- Bullington, J.: 2003, 'Health as Receptivity: A Phenomenological Interpretation of Allostasis', in: L. Nordenfelt and P-E. Liss (eds.), *Dimensions of Health and Health Promotion*. Amsterdam, New York (NY): Editions Rodopi, pp. 83–95.
- Burci, G.L. and C-H. Vignes: 2004, *World Health Organization*. The Hague (NL): Kluwer Law International.
- Clouser, K.D., C.M. Culver and B. Gert: 1997, 'Malady', in: J.M. Humber and R.F. Almeder (eds.), *What is Disease?* Totowa (NJ): Humana Press, pp. 173–217.
- Engel, G.L.: 1977, 'The Need for a New Medical Model: A challenge for Biomedicine', *Science* 196, 129–136.
- Engelhardt Jr. H.T.: 1984, 'Shattuck Lecture – Allocating Scarce Medical Resources and the Availability of Organ Transplantation'. *New England Journal of Medicine* 311, 66–71.
- Gadamer, H-G.: 1993, *Über die Verborgenheit der Gesundheit*. Frankfurt am Main: Suhrkamp.
- Greenhalgh, T. and B. Hurwitz: 1998, *Narrative based Medicine*. London: BMJ Books.
- Halmos, P.: 1994, *Naive Set Theory*. New York, NY: Springer.
- Hell, D.: 2003, *Seelenhunger- Der fühlende Mensch und die Wissenschaft vom Leben*. Bern: Verlag Hans Huber.
- Hellström, O.: 2003, 'Health and Dialogue-based Medicine', in: L. Nordenfelt and P-E. Liss (eds.), *Dimensions of Health and Health Promotion*. Amsterdam, New York (NY): Editions Rodopi, pp. 113–131.
- Höffe, O.: 2002, *Medizin ohne Ethik*. Frankfurt/Main: Suhrkamp Verlag.
- International Classification of Functioning, Disability and Health*: 2001, Geneva: World Health Organisation.
- Jakobsson, E.: 2003, 'Health, Psychopathology and the Actions of the Talking Cures', in: L. Nordenfelt and P-E. Liss (eds.), *Dimensions of Health and Health Promotion*. Amsterdam, New York (NY): Editions Rodopi, pp. 57–67.

- Kiener, A., M. Graf, J. Schiffer, E. von Holzen-Beusch and M. Fahrni: 2002, *Mobbing und andere psychosoziale Spannungen am Arbeitsplatz in der Schweiz*. Bern: Staatssekretariat für Wirtschaft.
- Koenig H.G., M.E. McCullough and D.B. Larson: 2001, *Handbook of Religion and Health*. New York (NY): Oxford University Press.
- Medical Professionalism in the New Millennium: 2002, *Annals of Internal Medicine* 136, 243–246.
- Nordenfelt, L.: 1995, *On the Nature of Health, an Action-Theoretic Approach*. Dordrecht, Boston, and London: Kluwer Academic Publishers.
- Nordenfelt, L.: 2001, *Health, Science and Ordinary Language*. Amsterdam and New York (NY): Editions Rodopi.
- Nordenfelt L.: 2003, 'An Evolutionary Concept of Health: Health as Natural Function', in: L. Nordenfelt, and P-E. Liss (eds.), *Dimensions of Health and Health Promotion*. Amsterdam, New York (NY): Editions Rodopi, pp. 37–54.
- Ottawa Charter for Health Promotion*: 1986, Copenhagen: World Health Organisation, Regional Office for Europe.
- Petersen, B.: 2003, 'Health Doctors and the Good Life: A Footnote on Plato', in: L. Nordenfelt and P-E. Liss (eds.), *Dimensions of Health and Health Promotion*. Amsterdam, New York (NY): Editions Rodopi, pp. 3–22.
- Preamble of the Constitution of the World Health Organisation as adopted by the International Health Conference*: 1948, New York, 19–22 June 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the WHO, No. 2, p. 100) and entered into force on 7 April 1948.
- Rattner, J. and G. Danzer: 1997, *Medizinische Anthropologie*. Frankfurt/Main: Fischer Taschenbuch Verlag.
- Sandy, L.G.: 2002, 'Homeostasis without Reserve – the risk of Health System Collapse'. *New England Journal of Medicine* 347, 1971–1975.
- Saracci, R.: 1997, 'The World Health Organisation Needs to Reconsider its Definition of Health', *British Medical Journal* 314, 1409.
- Sass, H.M.: 1995, 'Intervention in Verantwortungspartnerschaft mit dem Patienten', *Münchener Medizinische Wochenschrift* 137, 134–137.
- Schad, W.: 1998, 'Gesundheit und Krankheit in Medizin und Ökologie', *Der Merkurstab* 51(4), 193–197.
- Smith, G.D. and C. Hart: 2002, 'Life-course Socioeconomic and Behavioral Influences on Cardiovascular Disease Mortality: The Collaborative Study', *American Journal of Public Health* 92, 1295–1298.
- Stauffacher, W. and J. Bircher: 2002, *Zukunft Medizin Schweiz*. Basel: EMH Schweizerischer Ärzteverlag.
- van Hooft, S.: 1997, 'Disease and Subjectivity', in: J.M. Humber and R.F. Almeder (eds.), *What is Disease?* Totowa (NJ): Humana Press, pp. 287–323.
- van Spijk, P.: 1991, *Definition und Beschreibung der Gesundheit*. Muri, Switzerland: Schriftenreihe SGGP No. 22.
- Wydler, H., P. Kolip and T. Abel: 2000, *Salutogenese und Kohärenzgefühl*. Weinheim und München: Juventa Verlag.