The fallacy of reducing people to genetics

H. Jochemsen, MSc, PhD
Prof.dr. G.A. Lindeboom Institute,
Centre for Medical Ethics
The Netherlands
www.LindeboomInstituut.nl

Abstract

This paper deals with the tendency in the popular press but also in publications by professionals to put forward genetic information as determinative for human beings. From a brief analysis of the character of modern medicine and medical genetics it is concluded that in the prevailing medical genetical thinking the role of genetic endowment is over-emphasized. From a theoretical point of view this is unwarranted and for medical practice it constitutes the danger of treating and classifying people on the basis of genetic endowment.

Paper presented at the conference `The Christian Stake in Genetics', organized by the Center for Bioethics and Human Dignity (CBHD) of Trinity International University, Deerfield, Ill., in cooperation with the Christian Legal Society, Christian Medical and Dental Society, Nurses Christian Fellowship, Trinity International University and The Wilberforce Forum, that took place July 18-20, 1996.
Published as: H Jochemsen, "The fallacy of reducing people to genetics" in: JF Kilner et al. (ed). *Genetic ethics: do the ends justify the genes*? Grand Rapids: Eerdmans/Paternoster Press 1997.The Horizon in Bioethics Series by Eerdmans and Paternoster Press, in 1997.

Keywords: Genes, scientific method, abstraction, geneticization.

Introduction

"Our genetic blueprint has made believing in an Infinite Absolute part of our nature". This is a quote from an article on faith and healing in Time magazine of June 24, 1996, taken from S. Benson's book Timeless Healing. In a succinct but eloquent way it expresses what has been called the geneticization of people.[1] People being reduced to genetics, or rather to their genes. Even the seemingly innate religiosity of the human being is ascribed to the genes and the `genetic blueprint' is presented as rather determinative. One author defines geneticization as: "an ongoing process by which differences between individuals are reduced to their DNA code, with most disorders, behaviours and physiological variations defined, at least in part, as genetic in origin. It refers as well to the process by which interventions employing genetic technologies are adopted to manage problems of health".[2] Hubbard and Wald, among others have given a number of examples.[3] It is very difficult to indicate how widespread this thinking is among the general public, among scientists and physicians. It seems to be undeniably there and is likely to be furthered, willingly or unwillingly by the Human Genome Project, since just by the fact that it is being performed, this draws attention to man's genetic information.
In order to avoid the pitfalls of this thinking it is necessary to know some of its backgrounds and understand why it is incorrect and dangerous. In this contribution a main element of that background as well as some criticism will be presented.

The model of the genes in mainstream (medical) genetics

Modern science

Medical genetics, like medicine in general, is based primarily on the principles and results of natural sciences. Before discussing the predominant paradigm of medical genetics, it is helpful to define the character of natural science in general as it prevails in our culture.

Modern science is characterized by a specific way of investigating the reality in which we live. It tries to explain phenomena on the basis of empirical functional relationships. Central to the methodology to achieve this is abstraction. Generally this goes together with reduction of reality, objectivization of what is investigated, quantification of what is observed, the establishment of causal relations between observations and the formulation of models and theories.[4,5,6] The scientific approach to reality implies a reduction of the real 'thing', or individual creature under study to an impersonal object (objectivization), taken out of the context in which it naturally or normally is situated. As a consequence, only what can be perceived by the senses, directly or indirectly, is taken into consideration. The search for the origin of things is transformed into a question about the material causes; reflections on the essence and meaning of things are replaced by querying their function and usage.[7]

As long as the specific and limited nature of scientific knowledge is recognized it can be quite valuable and useful. However, in the course of modern western history there has been a tendency to overestimate scientific and technological knowledge and to consider that which is presented in the scientific models as the real or really important world. For it is one thing to use a certain methodology to study reality, to set up models of certain phenomena and to have specific questions answered in a way that allows some intervention. It is quite another thing to consider these abstract

models as true representations of reality itself, thereby conveniently omitting the notion that the models are a reduction of reality. For dealing with reality just on the basis of those reduced representations leads to a violation of reality. Unfortunately this is what has happened to varying degrees in mainstream modern medicine.

Modern medicine

For main-stream modern medicine the explanatory strategy can be rendered with the words reductionism, dualism and determinism.[8] *Reductionism* manifests itself in the fact that the machine has become the main metaphor for the human body (even though it may be seen as a genetic-neurological-hormonal information processing machine) and in the understanding of disease as physiology gone astray.[9] As a consequence basic sciences like physics, biochemistry and molecular biology are considered the basis for the applied sciences that make up medical science: anatomy, physiology, pathology etc. *Determinism* shows up in the modern `medical gaze' in which the human being is as it were reduced to genetical, physiological and mental processes that in principle could give a causal explanation of diseases and disorders at the material level.[10] The mind-matter *dualism* of modern science manifests itself in medicine in three forms:[11] the mind-body dualism (the so-called Cartesian image of man[12]), the dualisms between the human being and its natural environment and its social environment.[13,14] In this model, disease is a deviation in the body's structure or processes that in principle can be localized and treated on a material basis.

Medical genetics

In medical genetics the predominant `medical model' finds a particular expression in the so-called central dogma of molecular biology.[15] This states that the hereditary information is stored in DNA in the form of a code, and that this information is expressed by two sequential processes: transcription into RNA and then translation into specific proteins, that are essential for the expression of the individual traits (see fig. 1). In other words, the genetic information encoded in

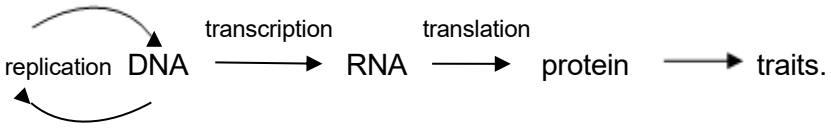

Fig. 1. The central dogma of molecular biology.

DNA determines the phenotypic traits of an organism through the direction of the synthesis of proteins. The flow of information occurs in one direction: from DNA via RNA and proteins to traits. A gene is defined as a unit of heredity containing the information for one protein.

This model clearly implies a rather deterministic view of man. The genes determine how the individual will be, or at least how that individual can be. The environment, both the natural and the social environment, influences the extent to which certain traits will be expressed, but not the character of the traits themselves as fixed entities.[16,17] This model clearly invites to study the genes

and gene defects as the most fundamental causes of disease. At the Ciba Symposium in June 1989 Sydney Brenner, a leading scientist involved in the mapping and sequencing of the human genome, expressed his view on genetics as follows: "Genetics investigates the plan of the organism. This plan is embodied in a collection of genes that is handed down in the germ-line to specify the construction of the organism". And, at the end of his lecture: "The manifesto - if not the programme - of molecular genetics must remain the computation of organisms from their DNA sequences. Understanding the language of genes remains the major scientific objective of all genetic research".[18]

Criticism

Objections

It is clear that the prevailing approach in modern medicine has been very successful in elucidating the functioning of the human body and in discovering causes of many diseases at the material level. This has resulted in many possibilities for therapeutic or palliative interventions, that has been and continues to be of great benefit to many people. As yet, the benefits of medical genetics mainly concern diagnosis and counseling, not so much therapy.

At the same time we are becoming increasingly aware of the limits and insufficiencies of the just described predominant understanding of medicine in general and medical genetics in particular. Its *theoretical framework*, though effective in certain respects, is inadequate in others. Furthermore, the very character of such medical genetics, because of its inadequate theory, constitutes a *danger to medical practice*. Both objections will be elaborated briefly.

Theoretically inadequate

We saw that the so-called central dogma of molecular biology is still a leading model in molecular biological and anthropogenetic research. This model, however, over-simplifies and over-stresses the role of the genes in organisms, especially in humans. Correctly understood it just presents a simple model for the biophysical and biochemical relationship that exists between a particular nucleotide sequence of some stretch of DNA and the structure of a particular protein. The structure of a protein determines its function(s), given the right circumstances. This knowledge of the fundamental role of DNA in the process of protein synthesis, in combination with recombinant-DNA techniques, has made possible the production of important human proteins, like insulin and interferon at a reasonable price. This is done with micro-organisms, cultivated in special growth media, that are forced by specific manipulations to synthesize such a protein. However, the relationship between a specific protein and the expression of a trait of an organism under normal conditions is mostly unknown, even for micro-organisms, let alone for the human being. The relation between the biochemical structure of proteins and the structure of organs or an entire organism is probably only indirect.[19] An undisputed expert like Francois Jacob has formulated this as follows:"...during the development of the embryo, the world is no longer merely linear. The one-dimensional sequence of bases in the genes determines in some way the production of two-dimensional tissues and organs that give the organism its shape, its properties, and... its four-

dimensional behavior. How this occurs is a mystery".[20] So, to postulate a straightforward relation between genetic information and traits is unfounded.

In this context I want to briefly mention an epistemological objection against the prevailing view on the role of genes in living organisms, including man. In this view, a rather direct causal relation is supposed between the genes and the traits of an organism. So, one not only speaks of genes for physical traits like colour of eyes or hair, or of genes for well-known monogenic `genetic' diseases like sickle cell anemia, or phenylketonuria (PKU). Reports are also dealing with genes for such complex conditions as obesity,[21] Alzheimer, manic-depression, schizophrenia and even alcoholism and homosexuality.[22] In some cases a claim of having identified the gene for one of these conditions withstood the test of criticism only for a short time. But similar claims are being made time and again. Such claims do not sufficiently distinguish between two kinds of knowledge.[23] Molecular biological knowledge of DNA sequences of a certain individual differs fundamentally from the knowledge comprised in a clinical diagnosis of an individual patient.[24,25] The former concerns scientific knowledge marked by the abstractions of the scientific method, whereas the latter relates to the health conditions of an unique individual. In the process of making a diagnosis general scientific knowledge is not just applied, but included in a cognitive process that is not so much marked by reduction and objectivization, but by recognition and judgement by which the scientific knowledge is integrated and interpreted in a wider framework of data, insights and meaning.[26] The two forms of knowledge presuppose two different epistemic attitudes and cannot, therefore, be equated.[27]

The observation that in a number of cases specific genetic defects are highly correlated with certain clinical pictures does not contradict the above. For that observation does not prove that genes are causally related to traits. It only proves that gene *defects* can cause a disturbed development of the organism. The former incorrect conclusion takes for granted the existence and functioning of the organism as the context in which the gene or gene defect only acquires meaning in the first place. In other words, the observation that concrete genetic information is a necessary precondition does not make that information a *sufficient* precondition for a 'normal' development.[28]

Also from an information theoretical point of view, it can be argued that DNA cannot be the `cause' or origin of biological life. Speaking of the genetic code or of the genetic message, as geneticists do, in itself presupposes that there is someone or something that can read and interpret the code or the message. The word `message' implies that there is a meaning to be interpreted. The really astonishing thing about the genetic information, and of the living organism, is that the DNA sequence contains a message for the organism, because the organism contains the 'mechanism' that can translate the DNA sequence into meaningful activities. The meaning of the DNA sequence is not generated by the mechanism; this mechanism presupposes the meaning of a genetic message. Nor has the DNA generated the translation mechanism. This is impossible, since for the expression of this meaning the DNA precisely needs that mechanism.[29,30] So, the genetic message cannot give a sufficient explanation of the development of the organism; the genetic code as a meaningful message itself needs an explanation, both a final and a causal.[31,32] Christians know that the source of all meaning, also of the meaningfulness of genetic information for the living organism, resides in the creative work of God.

A danger to practice

The theoretical criticism is relevant for medical practice. To a large extent medical science is characterized by abstract scientific models about the functioning of the human body and about the deviations of normal functioning that constitute, or correspond to diseases. Yet, when dealing with actual people in practice, the limitations of the models can easily be forgotten. So, in modern medicine there is a constant danger that the objectivization that is characteristic for the scientific attitude, also comes to dominate the physician-patient relationship. This leads to practices whereby physicians treat patients as abstractions and thereby exert a control over them (compare the above paragraph on modern science).[33] The phenomenon that in modern society people have high expectations of science and technology and that science and technology to a certain extent even have become the interpretative and meaning-giving framework for many, makes that danger even bigger.[34,35,36,37,38] In other words, the medical model has been internalized by many people, not just by medical scientists and physicians. People want to control their bodies and minds and see medicine as the best instrument. To the extent that the medical model is substituted by the genetical model, people begin to understand themselves from their genes. This can lead to an elusion from responsibility and, therefore, a dehumanization of human social life. A striking example is the defense of somebody who committed a murder, that he came from a family that has a gene that would predispose to violence. (The defense was rejected).[39] In situations of alcoholism, obesity, homosexuality etcetera, people could similarly feel they can be excused by their genes.

On the other hand, the genetic explanations could be used in society as a convenient way to address, or rather to elude, difficult social questions. The model of the gene as a blueprint, as determining factor and a source of good and evil nicely fits into our pursuit for control over life and health and security. However, the consequence could be that genetic manipulation becomes manipulation of human beings. Gene technology, as technology in general, is not just a value-neutral instrument to achieve ethically valuable goals. It is a value-laden power that influences the self-understanding of people and social relationships. "In that sense all technology is a new organism that insinuates itself into living cultures through altering them irrevocably."[40]

In sum, the approach of the machine metaphor of the human body and of the central dogma to the role of genes in the body is theoretically insufficient and dangerous for medical practice. Another approach needs to be developed.

This is beyond the scope of this chapter. Suffice it to say here that in such an approach genes should be understood in the context of a view of the human being and not the other way around and that it should take into account the embodiment and its brokenness, the relatedness, the spirituality and the responsibility of the human being.

In conclusion

Today in biomedicine we often hear: Genes is the answer! But what exactly is the question? No doubt many researchers and doctors sincerely try to find therapies for people with congenital diseases. And hopefully they will find them. But I cannot help having the impression that the whole genetic enterprise is permeated by another question - or should I say quest? - to which genes are considered to be the answer. This is the quest for Paradise Restored with human technology. In their interesting book 'Bioethics in Europe' the authors write: "Once the basics of genetic engineering have been mastered, almost anything is possible in terms of manipulating the materials

to achieve a desired effect. Fish can be altered to enable them to tolerate low temperatures. Plant breeders can produce crop resistance resistance to drought or disease. Already, fruit and vegetables that stay fresh longer or ripen more slowly are appearing on supermarket shelves."[41] A famous French molecular biologist, Daniel Cohen writes in his book: "Genes of hope", about the promises of the new gene technologies. "First,.....in from now on ten to one hundred years it [will make it possible] to cure sick people. The physically and mentally sick people." Later on, he says, we will be able to "produce a human being that is more complex and complicated, a more subtle, more distinguished from the animal than lives today". He also writes: "Away with the dictatorship of natural selection, long live the lordship of mankind over everything alive."[42]

To me these quotations sound like an echo of the words of the Father of Salomon's House in Francis Bacon's utopia `New Atlantis'. Recognising the christian duty to provide help and healing for ill and invalidated people, christian eschatology teaches us not to expect a Utopia as a creation of human science and technology, but to expect Gods recreation of heaven and earth. Those wild pretensions can easily turn the new genetic technologies into a weapon against true humanity in our society. An adequate and effective ethic of genetics will require an anthropology that deals with genetic information, a philosophy of technology and a realistic understanding of (medical) genetics.

References

1. R Hubbard and E Wald, *Exploding the gene myth* (Boston: Beacon Press, 1993).
2. A Lippman, `Prenatal testing and screening', in A Clark (ed.), *Genetic Counselling - practice and principles* (London: Routledge, 1994), p. 144.
3. See note 1.
4. U Eibach, *Gentechnik - Der Griff nach dem Leben* (Wuppertal: Brockhaus Verlag, 1986), p. 54.
5. P Blokhuis, *Kennis en abstractie*. Thesis (Amsterdam: VU-uitgeverij, 1985).
6. E Schuurman, *Tussen technische onmacht en menselijke overmacht* (Kampen: Kok, 1985), esp. ch. 2.
7. H Staudinger and W Behler, *Chance und Risiko der Gegenwart* (Paderborn: F Schöningh, 1976).
8. L Foss, `The challenge to biomedicine: A foundation perspective,' *J Med Philosophy* 14 (1989), pp. 165-91.
9. See note 8, p. 170.
10. J L Finkenstein, `Biomedicine and technocratic power,' *Hastings Center report* 20 (No. 4, July/August 1990), pp. 13-6.
11. D M Levin and G F Solomon, `The discursive formation of the body in the history of medicine,' *J Med Philosophy* 15 (1990), p. 533.
12. H ten Have, `Medicine and the Cartesian image of man,' *Theoretical Medicine* 8 (1987) pp. 235-46.
13. H Belau, `Oekologie - Gesundheit - Medizin - oekologische Gesundheitsstrategie,' *Gesundh.-wesen* 54 (1992), pp. 284-96.
14. M J de Vries, *Choosing life - a new perspective on illness and healing.* Publications of the Helen Dowling Institute for Biopsychosocial Medicine 4 (Lisse: Swets & Zeitlinger, 1993).
15. D Suzuki and P Knudtson, *Genethics* (Cambridge (MA): Harvard University Press, 1989), p. 52 ff.

16. C van der Weele, `De plicht met onze talenten te woekeren,' *Filosofie & Praktijk* 9 (No. 2, 1988), pp. 57-71.
17. R Hubbard, `The theory and practice of genetic reductionism. From Mendel's laws to genetic engineering,' in S Rose (ed.), *Towards a liberatory biology* (London: Allison & Busby, 1982).
18. S Brenner, `The human genome: the nature of the enterprise,' in *Human Genetic Information: Science, law and ethics.* Ciba Foundation Symposium 149 (Chichester: Wiley, 1990) pp. 7,12.
19. A I Tauber and S Sarkar, `The human genome project: has blind reductionism gone too far?' *Persp Biol Med* 35 (No. 2, winter 1992), pp. 220-35.
20. F Jacob, quotation taken from D Suzuki and P Knudtson, *Genethics* (Cambridge (MA): Harvard University Press, 1989), p. 339.
21. *GenEthics News* (July/Aug 1995), p. 9.
22. See note 1, pp. 37, 66, 94-103 resp.
23. W Kütemeyer, `Wissenschaft, Methode und Mensch von der Medizin aus gesehen,' in *Menschenzüchtung. Das Problem der genetischen Manipulierung der Menschen* (München: Beck, 1970[2]), pp. 113-33.
24. W M Elzasser, *The chief abstractions of biology* (Amsterdam/ Oxford: North-Holland Publishing Cy, 1975), pp. 45-73.
25. See note 1.
26. H ten Have, `Ziekte als wijsgerig probleem,' *Wijsgerig Perspectief* 25 (No. 1, 1984), pp. 5-12.
27. G Glas, `Clinical practice and the complexity of medical knowledge,' Paper presented at the First World Congress organised by the European Society for the Philosophy of Medicine and Health Care, and Association Descartes (Paris, 30 May - 4 June 1994).
28. P A Weiss, `The living system: determinism stratified,' in A Koestler and JR Smythies (eds.), *The Alpbach symposium Beyond reductionism* (London: Hutchinson & Co Ltd 1972, first edition 1969), pp. 33-7.
29. B Commoner, `Failure of the Watson-Crick theory as a chemical explanation for inheritance,' *Nature* 220 (1968), pp. 334-40.
30. H Jochemsen, `Selective binding between protein and nucleic acid, and information transfer,' *Mededelingen Landbouwhogeschool Wageningen* 16 (1975).
31. M Polanyi, `Life's irreducible structure,' *Science* 160 (1968), pp. 1308-12.
32. J Seifert, `Genetischer Code und Teleologie,' *Arzt und Christ* 34 (1988), pp. 185-200.
33. E M Porto, `Social context and historical emergence: The underlying dimension of medical ethics,' *Theroretical Medicine* 11 (1990), pp. 145-56. Though, evidently, the danger to treat patients as objects is much more acute in some specialisms, e.g. transplantation surgery, than in others, e.g. general practice. Furthermore I do not want to suggest that medical geneticists have a subjective motivation to obtain control over their patients. This ethos of control is structurally present in modern medicine in as far as it is practiced as applied (natural) science.
34. See note 4.
35. K Jaspers, `The physician in the technological age,' *Theoretical Medicine* 10 (1989), pp. 261.
36. See note 6.
37. See note 7.
38. Jochemsen et al., `The medical profession in modern society: the importance of defining limits,' in J F kilner et al., *Bioethics and the future of medicine* (Carlisle, UK: Paternoster Press, 1995), ch. 2.

Fout! Verwijzingsbron niet gevonden.

39. GenEthics News (No.6, 1995), p. 9.
40. C Keith Bloom, `Bad axioms in genetic engineering' *Hastings Center report* (Aug/Sept. 1988), p. 13.
41. A Rogers and Denis D de Bousingen, *Bioethics in Europe* (Coucil of Europe Press, 1995), p. 87.
42. Quoted from a book review by L Fittkau in *Gen-ethischer Informations Dienst* 111 (april 1996), pp. 44-5.