**Technology, Medicine and Ethics revisited – The Imperative of Responsibility in the 21. Century**

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In 1985 Hans Jonas published a collection of essays entitled „Technik, Medizin und Ethik – Zur Praxis des Prinzips Verantwortung“ (Technique, Medicine and Ethics – On the Practical Application of the Imperative of Responsibility). Although some of the essays were originally published in English, no English translation of the complete collection appeared. The essays discuss the practical application of the principles developed in Jonas’ main work “The Imperative of Responsibility”. The first essays of the collection recapitulate the ethical basis, while further essays address technological topics with a focus on human biology and medicine. Most of the essays were published in the early ‘80s; however, some of them appeared much earlier.

The late Hans Jonas was considered a visionary. He was among the first philosophers who recognized the new dimensions of human technological action and considered it for the ethical theory. It was particularly the risk of the self-destruction of man – may it be by a technological catastrophe, by a war with modern weapons of mass destruction or by the accumulation of pollution – which led Jonas to a new categorical imperative which demanded to “act so that the effects of your action are compatible with the permanence of genuine human life.” Jonas was also up-to-date when applying ethical principles. For example, experiments that enabled transfer of genetic material from one species to another, published in 1973, can be considered as the hour of birth of molecular biology and gene technology. It was only one year later that he published the assay “Biological Engineering – A Preview”.

More than 30 years after publication of the essay collection, an update of the casuistic studies is inevitable. While the ethical principles remained untouched, recent technological developments have opened new ethical issues that need to be discussed in the light of Jonas’ ethical principles. Here, I will focus on biomedical topics. Many technologies, which Jonas considered as futuristic have become absolute routine. Cloning of mammals by somatic cell nuclear transfer, which seemed out of reach when Jonas’ essays were published, was first achieved in 1996 when the clone sheep Dolly was generated by this procedure and was only recently carried out in non-human primates for the first time. This makes the possibility of cloning humans very real, a procedure that Jonas discussed as a futuristic vision. The distinction between therapeutic and reproductive cloning is a new element in the ethical debate.

Jonas laid out the philosophical basis for the *right not to know*, which he used as an argument against cloning. It is also relevant to genetic testing; however, the ethical issues in this field have changed in the last few decades. It can be considered a success of the ethical debates that applicants for jobs or insurance have been protected by laws in many countries to prevent unnecessary knowledge of genetic predisposition, but technological developments in recent years have opened new ethical questions. In Jonas’ lifetime it seemed impossible to sequence the 3 billion base pairs of the human genome. Nowadays, the genome of a human individual can easily be sequenced within a matter of days for less than $1,000 and the results can be used for personalized therapy, e.g. to treat tumors. However, this procedure may reveal information about genetic predisposition which the patient may not want to know. It will also generate data whose relevance may only become obvious in the future when new knowledge has been acquired about genetic causes of diseases. Clarification is required regarding how deal with such information. In addition, conflicts of interest between relatives need to be considered. Whenever a person obtains knowledge about his or her genetic constitution, this will also be of relevance for parents and other relatives whose right not to know might be violated. Furthermore, the handling of genetic information of minors that may be required for adequate treatment of a disease needs to be regulated. In this case, information may be discovered which the patient might not want to know when he or she reaches the age of majority.

Finally, recent years have seen major progress in genome editing, i.e. the directed modification of the human genome. In 2012, the CRISPR/Cas technology was described for the first time. While application of this method to adult cells is considered uncontroversial, gene editing in gametes needs to be critically questioned on the basis of Jonas’ ethical theory.

Taken together, it becomes clear that Hans Jonas‘ ethical principles are as relevant today as they were during his lifetime. However, the applied fields of ethics have changed dramatically with the technological developments of recent years. This requires an update of the casuistic studies.