Presidenza del Consiglio dei Ministri

NATIONAL BIOETHICS COMMITTEE

NANOSCIENCES AND NANOTECHNOLOGIES

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abstract

The opinion examines the bioethical problems arising from the spread of nanosciences and the consequent establishment of new nanotechnologies. The NBC, after illustrating the scientific profiles of these technologies (defined as horizontal or enabling, as they can permeate every technological sector depending on their operative dimension – the nanometre, equivalent to one billionth of a metre) and the incredibly vast range of possible applications, provides a broad overview of identifiable bioethical issues. The areas taken into examination in the document concern, first and foremost, the relationship between nanotechnologies and health, and, in particular, the possible uses of so-called nanobiotechnologies, nanomedicine and the interaction between nanoparticles and the human body (with emphasis on prevention in the workplace) and the potential risks for the environment. Also taken into consideration are the additional profiles of nanobiotechnologies which concern: the combination of inorganic and organic molecules (the problematic aspects of self-replication); the social and economic consequences (nanopoverty); the control of the individual and the protection of privacy; the military or terrorist uses; the repercussions on human identity. A horizontal issue in relation to the applications mentioned concerns the adequacy of existing methodologies in assessing the risks associated with the products of nanotechnologies and especially the toxicological hazards for man arising from exposure, contact or inhalation of nanoparticles.

The NBC highlights the ambivalence of nanoscience and nanotechnologies, emphasising the critical profiles described above which raise questions of a bioethical nature, such as: the manipulation of matter and the danger of an “autonomous”, autopoietic development; the possibility of combining “living matter” with inorganic matter (with particular reference to the profile of consensus and origin of living matter); the “social” consequences of nanotechnologies and the problem of sharing the benefits; the possible uses in nanomedicine and the profiles of human enhancement (as regards the benefits for the sick person); the evaluation of the risk associated with experimentation and the use of various nanotechnologies; and lastly, the possible interference with private life.