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Nanotechnology: the ethical challenge

ABSTRACT. The technical innovation of nanotechnology arises in the encounter of knowledge across the scientific disciplines, especially biology, chemistry and physics, but also encompassing the cognitive sciences and information technology. The ethical challenge of nanotechnology arises particularly in a further encounter: the meeting of these many scientific disciplines with medicine and engineering, and also with business. These professions deal directly with persons in the world, greatly influencing their lives, and hence operating in an ethical framework that is very different to that of pure science. This leads to an ethical challenge to nanotechnologists: can the great technical innovation of nanotechnology be matched by a corresponding innovation in the expression and acceptance of ethical responsibility? The exploration of this challenge begins with a description of some important fundamental ethical principles. Salient features of ethics in medicine, engineering and business are then summarized. This leads to the proposal of an aspirational approach to the ethics of nanotechnology based on the philosophical work of Amartya Sen. An example of an ethical opportunity realised in nanotechnology is described: the development of synthetic membrane processes. The article concludes with ideas for future ethical aspirations in the promotion of sustainable security, in the reduction of infrastructural poverty and in nanotechnology with a human face.

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