Engineering and ethical constraints

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Received: 2 December 2010 / Accepted: 4 December 2010 / Published online: 24 December 2010
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Written publications of scientific research are by necessity unambiguous and objective. Even the format of the manuscripts conforms to globally accepted standards. It is dry reading, devoid of subjectivity and emotion. Yet, among the hundreds of manuscripts received by the Editors of a scientific Journal like MBEC, some manuscripts are encountered that do evoke a subjective response. This editorial deals with the ethical boundaries of engineering research, encountered in one of those manuscripts.

Pain research is an important field in Medicine. Many diseases cause pain. Many patients suffer from unbearable pain of unknown origin and require analgesics, such as opiates, or neurosurgery for its suppression. Therefore, non-invasive engineering solutions to quantify the severity of pain may appear useful. Of course, the careful scientific approach to such an application is that the method is validated and this requires comparison of the subjective pain to the objective measure of it. There are various ways to achieve this. One may be to ask a patient who is in pain to subject himself to the novel method before being treated (with the least possible delay of treatment guaranteed) and to compare the outcome to a person not in pain, or even to the same person after pain relief. Of course, this can only be

done after obtaining full informed and written consent of the patients, after approval of the protocol by the Medical Ethical Committee, by adhering to Good Clinical Practice rules, and by conforming to the declaration of Helsinki.

Alternative approaches to address the above research question are also possible and may involve application of unbearable pain to healthy ‘volunteers’. This is where we are treading unethical territory, because how can a normal person volunteer to undergo unbearable pain? How can a doctor induce unbearable pain in a subject that she would normally anaesthetize before the intervention? Is it ethical to withhold treatment for the prevention of pain? If a healthy subject tells (or shows) the doctor that the pain is unbearable why should we need a scientific quantification other than for the purpose of torture?

All manuscripts submitted to MBEC dealing with human experimentation must state that the described work conforms to the rules mentioned above. For animal research similar regulations apply. But even if all ethical standards are met, one still needs to ask oneself whether the approach conforms to global and individual moral standards.

History has taught us that in times of international conflict ethical standards are under duress. Horrible examples are the gruesome Nazi-experiments in the World War II concentration camps [1] and the horrendous Unit 731 experiments of Japan [3]. The question whether these data should be used or referred to is dealt with by David Bogod [2] and Kristine Moe [4]. Apart from this question, the engineering society has to be vigilant to prevent present or future transgressions of moral and ethical standards, particularly of work from countries in areas of conflict. One of us (H.V.) has commented on the Bill of Rights of Scientists and Engineers as defined by Henlee [5]. The last article of this Bill states: ‘At all times a [*Scientist/Engineer*] shall adhere to universal ethical and moral standards’.

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It is this universal and permanent duty of all scientific workers that we wish to underscore.

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