

Neuroethics; Neuroscience for Ethics and/or Ethics for Neuroscience New Challenge for Third Millennium

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1. Introduction

During the late decades of second millennium an explosive growth happened in certain areas of science. Modern life science including stem cell research, assisted reproductive technology, human cloning, genetics, biotechnology, neuroscience and also related science domains such as nanotechnology, computational technology, robotics, and artificial intelligence are the most important research fields among other branches of science. Valuable massive findings in the mentioned area led to the necessity of controlling and monitoring the application and impact of the results of these fields on societal, economic, moral, legal, judicial and ethical issues. In response to this necessity, a new field of philosophical and moral enquiry began to grow in the late 1960s. Bioethics, as it soon came to be called, was the new field of challenge for scientists that quickly expanded and developed its own association, journals, professional, conferences, degree

programs and experts (1). Bioethics, as its name suggests, mainly emphasizes ethical aspects of biological research and its findings, and has a broad application in science. However, due to the inherent differences among different branches of science, "Bioethics" is not able to answer all ethical issues concerning certain research realms such as neuroscience. Although the interest of human beings on 'the Brain' dates back to many years BC, it was only in the recent three to four hundred years that neuroscience education and research rapidly spread all around the world. Many questions and ambiguities about human brain have been answered, many arisen, and the story still continues. As "Neuroscience" is concerned with the human brain, the masterpiece of creation, especially with its higher cortical functions and finally wants to interpret and explain the human behavior, the results of the research in this field have the potential to influence many aspects of social, ethical and legal rules. So, the concept of

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ethics has different uses and meanings for neuroscience. In this relation, a more recent field of the intersection between bioethics and neuroscience called "Neuroethics" was founded over the decades of challenges of ethical items related to the mind and behavior (2). Historically, the first use and attention to Neuroethics goes back to an international meeting entitled "Neuroethics: Mapping the Field" held at San Francisco, CA, May 13-14, 2002 (3). However, the meeting was only a turning point in neuroscience; in fact, neuroethics had its own root many years earlier. Eugenetic research by German physicians before and during World War II on prisoners of war, Jews, twins, and ill people with genetic and congenital diseases and the results of lobotomy surgery on psychotic patients firstly presented by 1949 Nobel Prize winner, Egas Moniz, seem was the starting point for future thinking on the ethical aspects of biological research (2). Nuremberg trials following World War II in 1940s highlighted the importance of the consideration of ethics in research for the world. Around twenty years later, international brain research organization (IBRO) and soon after, in 1969, Society for Neuroscience (SfN) was formed. In 1972 SfN established a committee on social responsibility, and in 1993 UNESCO founded international bioethics committee (IBC). Three years later IBC developed a report on the ethical implications of developments in neuroscience (2). All these efforts finally led to the meeting of "Neuroethics: Mapping the Field" in 2002. After that Neuroethics and its implications in society received much more attention by neuroscientists, lawyers, ethicists, philosophers, journalists, government and social policy makers (4). Different medical and non-medical disciplines and neuroscience local societies in different countries started hard work on the ethical concepts of their research (3, 5, 6). The priority and relation between ethical issues and neuroscience findings seem to be ambiguous. However by a simple glance, it comes clear that neuroethics in one aspect is similar to ethical implication for other branches of science and research and also overlaps with customary items in biomedical ethics. In another aspect, neuroscience has a different and unique application for ethical issues. According to Roskies (2002) and Fuchs (2006), there are two main subdivisions of neuroethics including "ethics for neuroscience" and "neuroscience for ethics" (7, 8). The former one itself could be divided into two streams of issues and the latter one has an especial application for neuroscience that gets close to neurophilosophy. By looking at "ethics for neuroscience", we could recognize two different separated streams; the first one is the ethical issues and considerations that should receive enough attention in the course of writing the proposal, designing and executing neuroscientific studies, and the second one is concern about the evaluation of the ethical and social impacts that the results of neuroscientific studies might have or should have on existing social, ethical and legal structures (7). Roskies in his paper named these

two issues: "ethics of practice" and "ethical implications of neuroscience" respectively (7). The 'ethics of practice' is traditionally very close to bioethical items that simply could be applied to neuroscience studies too. Paying attention to animal rights in animal experimental research, using certain methods and materials, using fetal tissues, stem cell and cloning and considering the importance of informed consent in human clinical trial research are some examples for this side of neuroethics. The "ethical implications of neuroscience" is a really novel area that is involved with the investigation of the implications of our findings and understanding of the human brain for society. In other words, "ethical implications of neuroscience" show us redlines in using, not using or how to use the results of our studies. There are many challenges in this field; our findings regarding social issues like homosexuality, addiction, using neuroimaging techniques or "Transparent Brain" that is able to cross our "cognitive liberty", brain enhancement or "Brain /Mind Doping" by using certain drugs that influence normal competition in society and computer-brain interface by using chip-set or "brain implantation" are just a few examples (9). The findings and concepts of this side of neuroethics certainly interfere with society's routine laws, judgment and policy making. So the responsibility of neuroscience is to give appropriate answers and solutions to them (10). The other side of the coin is the "neuroscience for ethics". Certain concepts such as free-will, self, self-control, personal identity, personality, religious beliefs, soul, mind and the relation between the mind and the body are some examples that neuroscientists try to explain (8, 9, 11). These notions can be investigated from brain function point of view. Neurodeterminism and neuroessentialism are two other terms recently used by neuroscientists and ethicists to describe basic concepts of human beings like free will, autonomy and moral cognition which are essential for juridical systems of different societies (7, 8). Although this part of neuroethics is not developed as much as the "ethics for neuroscience", and may not progress quickly, it will be the area with important applications in society.

2. Concluding Remarks

Although neuroscience knowledge is rapidly increasing, our understanding of human brain is still far from the reality of its functions and potentials. Based on our knowledge, in addition to research and education, neuroscience has also a dual extra responsibility; the first is to prevent any misuse and abuse of its findings and the second is giving appropriate scientifically-based ethical advice and get strongly involved in ethical decision making or planning in society. In turn, the policy makers and other related disciplines ought to accept the role of neuroscience in giving consultations and solutions for ethical problems in society. How we use our knowledge and how we learn about how the human brain controls our behavior not only shape our society but also help us to

deal better with social structures and allow the society to run more or less smoothly. As Neuroscience is almost a young science in our country, and its history academically dates back to the last two decades, it seems necessary for Iranian neuroscience disciplines to consider neuroethics in education and research strongly. Undoubtedly, any neglecting this necessity keeps neuroscience limited behind laboratory walls. As the final word, neuroscientists are more responsible to their society compared with the other scientists because they study the masterpiece of creation; 'the Brain'.

Authors' Contribution

None declared.

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