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Science for Human or Science for Avatar*?

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Abstract In biological science, the accumulation of knowledge can develop at rates never before dreamed of. The diagnosis and treatment of diseases have improved because of a greater availability of biological knowledge. Sometimes, materials of modern biomedical investigation are manipulated by the researcher, hence not representing the properties of natural cells. The validity of data produced from artificial biomaterial is met with incredulity in the natural world. Therefore, the results of modified research material should be scrutinized for the benefit of natural life in the World.

Keywords Manipulated Cell, Artificial Biomaterial, Science Benefit

Scientific knowledge has tremendously expanded due to improved scientific methods. In biological science, besides whole body and cell examination, the functions of cellular proteins and molecule-to-molecule interaction can be examined by advance instruments. Furthermore, modified cells, tissues or organisms (mutated, protein-expressed, over-expressed, knock-out, knock-in, etc…) are extensively studied in order to examine their activity and responsiveness as a research material.

However, these custom-made biomaterials do not reflect the structural and functional properties of natural cells. Under the cell culture conditions, the composition of genes, protein expression, and then function/structure of cell, are changed. Primary cultures of mural granulose cells and cumulus oocyte complexes expressed different genes when compared to the intact follicle[1]. The architecture of contractile cytoskeletal proteins proved different in the in situ and cultured corneal keratocytes[2]. Cell-matrix and cell-to-cell interactions and running functions, in turn, affect differentiation, survival and even apoptosis. When cultured adult feline cardiomyocytes have high level intercellular contact and beating activity, they survived for a long time and developed myofibrillar integrity[3]. Functions of protein would be changed by the environment. HCN2 and HCN4 channels were activated more positively in neonatal cardiomyocytes than in HEK293 cells[4]. Culture medium and plate species also affected cell properties[5]. In the skeletal muscle cell culture, the method of inducing differentiation modified cells development and agonist-dependent signal transduction[6].

There is much conflicting data about the protein expression in various cell types. Different cultivation protocols to raise T cells have influence on the expression of cell markers and receptors[7]. Clonal variation of genes and protein expression was also reported in a certain culture condition[8]. This discrepancy is explained by several factors such as technique sensitivity, mRNA or protein detection and preparation. It has been suggested that comparative and quantitative analysis of protein and mRNA level and functional assay of proteins are needed in order to understand the real view of protein expression in the cell[9].

In addition, over-expression techniques are used for functional and structural characterization of protein that is expressed in low levels in natural cells. Protein over-expression influenced the regulation of other cellular proteins[10] and the quantity of expression may determine diverse responses[11].

On the other hand, functional studies on unnatural biomaterials have many more problems. In the artificial condition, it is not known which protein is coupled with which others and what amount of the protein is required for activity and effectors stimulation. Critical amounts of G proteins could be activated by a different threshold density of the receptors for coupling with particular effectors[12]. MCP-1 receptors coupled with different G-proteins in the COS-7 and HEK293 cells[13]. Integrated response of the cells was regulated by various functional proteins. If you change the quality or quantity of one of them, some genes and proteins expression and then integration would be altered[7-9, 13]. Scientists have no idea about the new profiles of the proteins and genes expression after all those manipulations. Furthermore, no body knows which composition of the genes and proteins expression in the modified cells represents the natural cell properties.

Of course, modified biomaterials are obligatory tools for molecular and cellular investigation. They make our experiments easily and quickly for many research applications, but their unnatural properties should be taken into consideration. Using the biomaterials that closely mimic the natural condition could be suggested. In addition,

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testing simulated data in a natural environment with careful assessment are needed for physiological validity. On the other hand, the curiosity of scientists is not restricted, and there is no limit for creative thinking. That considered, if the scientist would invent a new and completely different cellular-molecular planet (e.g. that seen on "Pandora") and create the newly designed working area, and then evaluates data as a case of the natural world - it would be real "science fiction". Such information would only be valid in the fictional world since biology on the Earth is absolutely different. It would be better that scientist should answer this question: does science discover biology for creature on the world or for "Avatar" on the "Pandora"?

[+] The main character of a science fiction film named Avatar written and directed by James Cameron. Avatar" is genetically engineered Navi-human hybrid body used for interaction with Navi who is the natives of Pandora.

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