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Article 6-2. The Experiment Procedure for Blood Cell Cultivation in Biophysical Simulation/生物物理实验中血细胞培养方法

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Abstract

Research protocol of cultivation procedure for blood cells is designed to test the effects of biophysical electromagnetism on immunology.

Key words: Blood Cell Cultivation, Biophysical Electromagnetism, Metabolomics, Environmental Adaptiveness, Immunology.

Method 1.

The blood samples of a rat is abstracted and divided into two samples for the bio-signal simulation:

1. There are two kinds of cultivation conditions simulated in Lab for cell cultivation: one is the 'comfortable' condition (Sample 1); the other is under electromagnetism simulation for cell cultivation (Sample 2). For the simulation of moderate electromagnetism condition, cells are cultivated in electrophoresis pipe for cell electrophoresis, in which the external electric field is added. Subsequently, the electrophoresis pipe is horizontally placed under external vertical magnetism field imposed by magnetic instrument.

2. After sufficient cell cultivation process (for example, the immune cells of T lymphocytes and natural killer (NK) cells may be cultivated for approximately 10 generations or two weeks), the electromagnetism simulation stops. Then both sample 1 and sample 2 are separately transferred into the simulation process of physiological saline: cells are cultivated individually in different concentrations of physiological saline in Lab, and different cell environment (salinity stress of cell environment or 'thirsty' simulation) are labeled as T1, T2, ...,Tn.

3. Metabolomics tests are conducted in cell samples after simulation process of physiological saline, T1, T2, ..., Tn, respectively, resulting in different zymograms as: M1, M2, ..., Mn. The procedure of the zymograms analysis is described by another

article of metabolomics in this journal [1].

Both data processing methods and the underlying theory are designed and discussed in my previous articles [2].

However, for the comprehensive assessment of immunology in host cells, the simulation process of physiological saline is replaced by the invasion simulation caused by different families of bacteria (or virus) or different phenotypes of the same genetic pathogen species:

Method 2.

The blood samples of a rat is abstracted and divided into two samples for the bio-signal simulation:

1. There are two kinds of cultivation conditions simulated in Lab for cell cultivation: one is the 'comfortable' condition (Sample 1); the other is under electromagnetism simulation for cell cultivation (Sample 2). For the simulation of moderate electromagnetism condition, cells are cultivated in electrophoresis pipe for cell electrophoresis, in which the external electric field is added. Subsequently, the electrophoresis pipe is horizontally placed under external vertical magnetism field imposed by magnetic instrument.

2. After sufficient cell cultivation process (for example, the immune cells of T lymphocytes and natural killer (NK) cells may be cultivated for approximately 10 generations or two weeks), the electromagnetism simulation stops. Then both sample 1 and sample 2 are separately transferred into the simulation process of bacteria (or virus) invasion: cells are cultivated individually and independently during the pathogen invasion simulation by inoculation of different families of bacteria (or virus) in Lab, and the invasion simulation process of different bacteria (or virus) families are labeled as T1, T2, ..., Tn. After pathogen invasion simulation, centrifuge is used to separate the host cells from the pathogens.

3. Metabolomics tests are conducted in host cell samples after simulation process of bacteria (or virus) invasion, T1, T2, ..., Tn, respectively, resulting in different zymograms as: M1, M2, ..., Mn. The procedure of the zymograms analysis is described by another article of metabolomics in this journal [1].

Both data processing methods and the underlying theory are designed and discussed in my previous articles [2].

This comprehensive assessment of immunology is closer to the real situation of disease caused by multiple species of bacteria. Even if the pathology of host cells (such as cancerous blood cells of rat) is not caused by multiple species of invasive

virus or bacteria but by one species only, the invasive virus or bacteria of the same genetic strain may also evolve into various phenotypes in host body, which reflects the significance of comprehensive assessment of immunology.

Please note: if all the blood cells have been 'eaten' up (or no cell division rate) by a strain of bacteria during invasion simulation, then the value of this zymogram can be counted as zero for subsequent matrix calculation.

Discussion:

The comprehensive assessment of immunology in host cells also provides indicators of training host cells by adjusting the parameters of biophysical simulation, once the specific zymograms of host cells, indicating the immunology against the specific invasive bacteria or virus (or the specific phenotype of an invasive pathogen), are identified by this method. For the method 1, the higher biochemistry dynamics (indicated by the sum VCR), the better environmental adaptiveness (in terms of salinity stress tolerance) in host cells; for the method 2, the higher biochemistry dynamics (indicated by the sum VCR), the better immunology against various pathogen species (or various phenotypes of a pathogen genotype). It is hypothesized that Sample 2 shows better immunology or environmental adaptiveness than Sample 1 due to the biophysical stimulus on Sample 2.

References:

[1]. Liu Huan. Metabolomics (1) --- The Systematic Chemistry Fingerprints Between Genotype and Phenotype and its Application on the Conservation Genetics. Feb. 2021. Journal of Environment and Health Science. https://doi.org/10.58473/JBS0005
[2]. Liu Huan. (2021). Metebolomics and Immunology Cultivation. Journal of Environment and Health Science (ISSN 2314-1628), 2021(02). https://doi.org/10.58473/JBS0008