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The Impact of Cell Culture on Medicine

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ABSTRACT

Cell culture technology is used *in vitro* method to culture cell, this method was broadly used for medical, Cell culture, also known as tissue culture and Cell culture plays a crucial role in biomedical research, stem cell industry, and tissue engineering. It allows scientists to explore cellular behaviour, responses, and protein production in a controlled environment. Cell culture application are Stem Cell Biology, *In Vitro* Fertilization (IVF) Technology, Cancer Cell Biology, Monoclonal Antibody Production, Recombinant Protein Production, Cell Therapy Gene Therapy, tissue cell culture also a common skill in laboratory, like Cell Biology Studies, Drug Screening, Cancer Research, Vaccine Development, Cell therapy (also known as cellular therapy, cell transplantation, or cytotherapy) is a medical treatment in which viable cells are injected, grafted, or implanted into a patient to achieve a therapeutic effect. Types of Cell Therapy are Adoptive T-cell Therapy and Stem Cell Therapy, Stem cells are used to regenerate diseased tissues. There are different types of stem cells, including: Human Embryonic Stem Cells, Neural Stem Cell Therapy, Mesenchymal Stem Cell Therapy, Hematopoietic Stem Cell Transplantation, Differentiated or Mature Cell Transplantation, Researchers continue to explore cell therapy as a potential strategy for a wide range of diseases, particularly degenerative and immunogenic conditions. Cell culture is a promising technology in both biology and molecular biology.

Keywords: Cell transplantation; T-cell; Stem cell

INTRODUCTION

Cell culture has a long history, in ancient times, the Aristotelian doctrine of spontaneous generation posited that life could arise spontaneously from non-living matter. Even with the invention of microscopes by Leeuwenhoek and Hook, this belief persisted. in the 18th century, Louis Pasteur finally disproved spontaneous generation, laying the groundwork for modern biology [1-5]. In the early 12th century, biologist Ross Harrison made significant strides in cell culture. He developed the first techniques for *in vitro* cell culture. Around the same time, scientists like Virchow recognized that cells arise from the division of pre-existing cells. This concept led to the understanding that cells are fundamental units of life [6-10]. Harrison's hanging drop culture method allowed cells to be cultured outside the body, a pivotal development.

DESCRIPTION

In the mid-20th century, researchers established the basic principles for plant and animal cell cultures *in vitro*, human diploid cell lines were also established during this period, enabling further research and medical applications [11-15]. Primary cell culture was widely used for biology experiment, the history of cell culture techniques has evolved significantly, with contributions from researchers like Carrel and Lindbergh in the 1930s, leading to the explosion of knowledge in cell culture techniques in subsequent decades, the origins of cell therapy can be traced back to the 19th century. Charles-Edouard Brown-Sequard (1817-1894) experimented with animal testicle extracts in an attempt to counter the effects of aging [16-20]. Although this specific attempt failed, it sparked discussions about using cells as therapeutic agents, Paul Niehans (1882-1971), often considered the inventor of cell

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therapy, attempted to treat patients by injecting material from calf embryos [21-24]. He claimed success in treating cancer using this technique, although scientific validation remains elusive, in 1953, researchers discovered that laboratory animals could be pre-inoculated with cells from donor animals to prevent organ transplant rejection [25-30]. In 1968, the first successful human bone marrow transplantation took place in Minnesota, marking a significant milestone in cell therapy, recently stem cell and cell transplantation gained interest as potential therapeutic strategies for various diseases, especially degenerative and immunogenic conditions. When stem cells were first discovered, the consensus is that Canadian biologists Ernest McCulloch and James Till played a crucial role in rigorously defining the key properties of stem cells in the 1960s. 1958: French oncologist Georges Mathé performed the first successful hematopoietic stem cell transplantation [31-35]. 1998: Human Embryonic Stem Cells (ESCs) were cultured and differentiated *in vitro*, sparking both excitement and controversy. primary cell culture technique was usually employed for soft tissues (e.g., spleen, brain, embryonic liver, soft tumours). It is also can use mouse tissue to culture, before cell culture, you need to prepare experiment tool like medium (**Figure 1**), culture cell about 3 days-4 days, do not culture too long until cells dead, then you have to subculture, then you can count how many cells live (**Figure 2**), ensure this process is performed in a clean environment to avoid contamination [36-50].

Figure 1: Cell culture medium (Lab Manager)

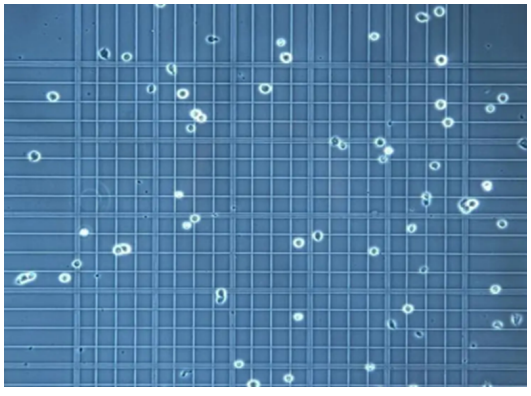

Figure 2: White shining is living cell, blue is dead, count how many white shining cells (Allevi)

CONCLUSION

In medical, many disease makes patient unable to move, spine injury is a serious damage, scientist development stem cell therapy, hope can cure this disease, in ancient time, many diseases couldn't found cure method, as time goes by, now we can use cell culture, this kind of technology to cure disease, but cell culture needs very clean environment, without this, cell could dead, although this technology just beginning, maybe one day, it's became mature technology then cure many disease.

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CONFLICT OF INTEREST

The author declares there is no conflict of interest.

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