

# Apoptosis effect on cells



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**Abstract**

Apoptosis is an active biochemical process associated with limited inflammation and disruption of tissues of the body. This research is carried with the aim of providing an overview of issues related with apoptosis particularly in the natural death of cells. This is driven by the fact that the living cell plays an intrinsic role in the various physiological processes of a multicellular organism especially during embryogenesis and metamorphosis (Cohen, & Cidlowski, 1995, 296). Programmed cell death was introduced as early as 1964 through a proposal that the death of cells during development is not accidental but rather through a sequential controlled steps that lead to the local and temporary defined self-destruction (Burnside, 2008). This research will identify the successes and failures for the researches being carried in this field of study. Additionally, it is through this research that other functions of the cell can be identified besides analysis of the good bad outcomes from this study (Matsumaru, & Kaplowitz, 2003, pp 1429). The suitable research question that will assure the achievement of results for this study will be: from the definition of apoptosis, what are the functions identified and what are the pros and cons of research in this field? The possible hypothesis developed for this study will be: apoptosis is important because facilitates natural growth through the elimination of old cells.

**Introduction**

Apoptosis is a process that takes place in the body of a living organism resulting in the natural death of cells. It is a genetically controlled mechanism of the cell involved in the regulation of tissue homeostasis involving two major pathways namely the extrinsic and intrinsic all found in

the cytoplasm. The intrinsic pathway for instance is triggered by cell receptor engagement initiating a signal cascade (Cohen, J. & Cidlowski, 1995, 296). This in effect activates the caspase-8 that later feeds on caspase-3, which stimulates the release of cytochrome C by the mitochondria. The caspase-3 is responsible for the cellular degradation of proteins thus enhancing the survival of the cell and its integrity. The intrinsic pathway on the other hand takes place when various apoptotic stimuli trigger release of the cytochrome C of the mitochondria. This will interact with Apaf-1 and caspase-9 that activates caspase-3 and leads to a subsequent apoptotic execution (Burnside, 2008).

The term of apoptosis has been used to describe the morphological processes that lead to the controlled cellular self-destruction. With its origin in Greek, the term literally means “ falling off or drooping off” thereby placing a great emphasis on death of living matter which later propels the growth of multicellular organisms (Yin, 2003). This process is also important in the regulation of cell population in tissues whenever there is pathological condition. It is important to note that apoptosis is the most recurrent form of programmed cell death though other forms of non-apoptotic cell death occur and may be of great importance to the body. This includes necrosis. At the end of this study, we will also be able to identify the good and bad outcomes of this research besides identifying then functions of the cell (Hale, et al 1996, pp 17).

## **Aims and objectives**

The nature of apoptosis as a naturally programmed death of cells forms a basis of this research and creates many questions that need to be

understood. This becomes relevant because the death of cells in most cases occur due to physiological or pathological discomforts. These conditions perpetuate necrosis, which was sometimes confused with apoptosis. The purpose of this research will be to identify the functions of the cell identified by carrying apoptotic studies. Additionally, it will point out some of the successes of failures that have been encountered through apoptotic researches that have been carried out. The positive and negative outcomes of this research will also be identified.

## **Literature review**

The definite provision of solutions and successful completion of this research dwelt on the facts and writings of various authors relating to this topic. A number of them have shared the valuable thoughts about this topic thereby making a colossal contribution towards the success of this research. Xiao-Ming Yin in his book, “ Essentials of apoptosis: a guide for basic and clinical research”, for instance provides us with a concise and systematic investigation in this field of apoptosis (Yin, 2003). The author gives us clear-cut concepts regarding the molecular architecture, the human biochemical pathways, and the resultant pathophysiological significance. Additionally, the author gives us the major biologic approaches to a research in apoptosis and their consequent clinical applications. It is through this book that we can be able to decipher other cell functions beside apoptosis (Yin, 2003).

Calvin Burnside in his book “ Cell Apoptosis Research Progress,” gives an insight that apoptosis, as an active biochemical process is associated with minimal inflammation and destruction of neighboring tissues. The author has taken a great deal studying the role of apoptosis in the repair of the normal

airways of the lungs. Moreover, the author provides a greater understanding of the research of apoptotic processes with the help of cytometric techniques. It is through this book that the role of apoptosis in the pathogenesis of diseases in the lungs creates an avenue for important treatment strategies. In addition, a better understanding and application of these techniques especially the dysregulated apoptotic processes paves way for the development of new therapeutic options (Burnside, 2008).

“ Cell apoptosis research advances” is a book by Carter Kettleworth that describes a brief history that led to the understanding of apoptosis. The author gives us the morphological and physiological characteristic of self-destruction cascade that brings about cell deletion during an embryonic development (Kettleworth, (2007). We are also able to link apoptosis to other diseases like cancer, and Parkinson disease. The author bring out clearly the role of apoptosis as the one involved in the removal if unnecessary cells during development of cells and homeostasis of various tissues of the body of organisms. We are also able to understand the extrinsic and intrinsic pathways involved in caspase activation pathways, which ideally forms the basis of apoptosis (Kettleworth, (2007).

Hugh Brady in his book “ Apoptosis methods and protocols” gives us some of the collected techniques that used to achieve a successful apoptotic research through a better understanding of the cell biochemistry (Brady, 2004). The author provides a stepwise detail of how proteins are analyzed, through reproducible methods that span from cytometry to other immunohistochemical procedures. It through a concise understanding of these methods that research in apoptosis bears great fruits in the

identification of cell functions, and the merits and demerits of this research (Brady, 2004).

## **Research methods**

In order to obtain the intended objectives as formulated in the research, a number of primary methods were used. The main primary research method used was the questionnaire, which was well structured to ensure that the correct answers were obtained. This method has its own merits like instant recording of results obtained without having to wait for them to be recorded later. The method also ensures that information is obtained from the correct source because suitable clients are identified. Presence of the person who administers the questionnaire also serves as an advantage because the questions which are not understood can be paraphrased to facilitate easy understanding. One of the disadvantages of this method however is the fact that it is too involving and existence of open ended questions gives room for respondent to give respondents the freedom to give answers that might be out of topic.

Some of the questions involved in the questionnaire include: What is Apoptosis? What are some of the functions of the cell identified through apoptosis? What are the possible merits and demerits of carrying out a research on apoptosis? Interviews were also carried out in order to supplement the questionnaire method used. Interviewing is advantageous because information that is more detailed can be acquired from the interviewee. This method also provides room for the correction of mistakes though client limitations cannot be avoided. Language barrier and the encounter with illiterate respondents are some of the major problems

encountered. Secondary methods of data collection were also used to supplement the two methods and are merited because of the data collected.

## **Results and Findings**

The research exercise was finalized by analyzing the findings and it was found out that apoptosis is a natural process that results in the death of cells in a somewhat programmed manner. The process of apoptosis daily in the human body and is very important in the elimination of dead cells to give room for the new ones being formed (Hale, et al 1996, pp 17). However, it is important for scholars to be careful not to confuse this term with necrosis which essentially the death of cell due to an infection. Necrosis is not programmed like apoptosis. During this study, various cell functions were identified (Cohen, J. & Cidlowski, 1995, 296). The cell is a very complex unit of life and performs different function. The apoptosome is an important feature in the process described above because it activates the death receptors. This will further stimulate development of cells that participate in this process. The cell in this case will play an important role in the inactivation of enzymes that are involved in the repair of DNA (Kettleworth, (2007). The cell also breaks down structural nuclear proteins, and fragmentation of DNA. This will lead to the process of apoptosis.

Any research has both good and bad outcomes. The good outcome in this research for instance is the fact that a study of apoptosis can lead to a better understanding of some of the diseases like lung cancer. Such a disease originates from accumulation of dead cells. Additionally, research facilitates the invention of better ways of diagnosing a disease and ultimately curing it (Yin, 2003). Pathological condition of apoptotic origin can also be understood

easily. However, carrying out an apoptotic research involves carrying out of many experiments like gel electrophoresis of DNA. This requires the skills of qualified persons to guarantee good results. This is therefore a bad outcome of carrying out a research in apoptosis (Matsumaru, & Kaplowitz, 2003, pp 1427).

## **Conclusion**

Apoptosis is a natural process in which old living cell in a manner that appears to be innately programmed. Carrying out a research in apoptosis is important because it leads to the identification of various cell functions. Additionally, one can be able to identify the positive and negative effects of this research. Having a better understanding of apoptosis is important because improved diagnostic and curing methods of diseases can be easily developed.