

DNA Repair and Aging

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DNA repair is a very important interest in many research fields because DNA problems come up thousands of times daily in a cell and many problems route from it. DNA repair refers to a sequence of processes by which a cell identifies and corrects damage to DNA molecules that encode its genome. The major question is to see if aging has any correlation with DNA repair efficiency. There have been a lot of studies about the correlation of DNA repair with the central nervous system, and cancer. It is very important to keep on having experiments and studies performed on DNA repair so we can learn more about the subject. It is getting easier and easier to get more in depth due to many recent advances in technology where the scientists can get a better look at the DNA repair system. The problem that is still puzzling people in this field of research is trying to find different pathways for DNA repair mechanisms to fix mutations that lead to cancer. The more information they obtain the better understanding we have of the subject.

Introduction

DNA repair is vital in maintaining the body physiologically. We have seen in studies that as people get older they are more susceptible to diseases such as cancer. If we take a closer look we can see that it all comes down to the cell. The cell is comprised of many components such as mitochondria, nucleus, cytosol, and cellular membrane. You have to have a good working cell in order to stay healthy; everything in the cell needs to be working efficiently to achieve maximum results. The protein in the cell supports the microtubules that stabilize the cell integrity. Lipids support the external cellular membrane. Vitamins and minerals support the cytosol. These help the cell have good cellular communication. When there is a decline in cellular communication problems in the cell will take longer to fix or go unnoticed. For example, if there is a mismatch in a DNA strand, the cell identifies and corrects the damage to the DNA strand that encodes its genome. DNA repair depends on many factors including age of the cell. The time a younger cell takes to have its DNA strand fixed is quicker than the time an older cell takes.

Recent Progress

Recent progress has been made in trying to shed light on how scientists/medical doctors can fix this to hopefully stop cancer from being so prevalent in the elderly. If people could live long enough we would all eventually develop cancer due to the limitations of DNA repair. They are also trying to find a way to make DNA repair pathways the targets for cancer therapy. They believe that if they could find inhibitors for DNA repair pathways it would lessen the harming effect that chemotherapy has on the body. Another recent finding is trying to see how DNA repair deficiency causes neurological disease. Thinking that the DNA repair deficiency is the root of some neurological diseases and trying to see how DNA repair deficiency affects the nervous system. Also, there have been studies showing how prevalent DNA damage and repair are found in central nervous system injuries. They are finding that the central nervous system injuries are where DNA damage and repair is present. The majority of disorders are caused by mutations in the DNA strand that has had a lack of DNA repair, so it is being passed on from generation to generation. Our body has naturally tried to have new pathways for DNA repair in the battle of maintaining our genomes. It seems that whatever the problem is, the older you are the more susceptible you become to these disorders, diseases, or

central nervous system problems due to DNA repair system not being able to fix mutations fast enough.

Discussion

First let's start on the recent progress that has been made with the ongoing battle of cancer and DNA repair efficiency. There has been a ton of progress made in that study but there is still plenty more that can be answered. What new DNA pathways could be used for DNA repair in mutations? How can we replace aging DNA repair mechanisms and make the DNA repair pathways much more efficient? These are vital questions in trying to find a way to stop cancer being so common in the elderly. Recent studies are trying to find a way to look for new pathways for DNA repair and trying to counteract these pathways with the negative effects of chemotherapy. Others are trying to use the excision pathway in the brain as a good site for some therapeutic targeting. We could also maybe look into how certain minerals and vitamins ingested by the patient could improve the homeostasis in the body; thus increasing the efficiency of the DNA repair mechanisms. With cancer, the body is searching for nutrients to begin the healing process of the disease because the cancer is "stealing" the nutrients from other parts of the body. With the elderly not being able to break down food as easily due to age, giving them minerals and vitamins directly will make it easier on their body and they can go straight to the infected site.

Second let's take a glance at how the DNA repair pathways and nervous system injuries can be improved upon. A few questions that still remain unanswered with this are how can we channel different pathways to speed up the repair process of these nervous system injuries. A therapy that is common involves using reverse imagery to treat these nervous system injuries. For example, a patient had a stroke and cannot move the right side of his upper body. They would put a mirror in front of his right arm and tell him to look at the mirror and move his left arm. The patient would be seeing his left arm move in the mirror but it looks like his right arm is moving. This stimulates the vision centers in the cerebellum to find new pathways to carry out this function.

Lastly to answer the question that we went about with this paper, what is the correlation with aging and DNA repair efficiency? There is definitely a very strong correlation between these two. All of these disorders, diseases, and problems with the DNA repair pathways are heavily dependent on the fact that the older you get the less efficient your DNA repair mechanisms become. Some ways to go about fixing this could be some type of therapies where you try to use other pathways to help it out. Or maybe inhibitors that block less important mutations and focus on the main threats such as cancer and some central nervous system disorders. The problem with these mutations in the DNA strand is that they are

being passed down through generations, which makes the mutations more extreme and more resistant to previous medication or treatments.

References

[References here. Include all authors and titles of the references. Layout example provided below.]

Shroeder, Insa S. "Potential of Pluripotent Stem Cells for Diabetes Therapy". *Current Diabetes Reports*. 5 (2012): 490-498.