

The Progression of Studies in the Area of Basal Cell Carcinoma

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This review discusses the debates over the formation of basal cell carcinoma (BCC) and the exciting new discoveries that are taking place in the field of science in order to find new treatments for this condition. Basal cell carcinoma is a form of skin cancer. Basal cell carcinoma is the most common form of malignancy found in people of European descent (Kasper 455). Until sixteen years ago basal cell carcinoma was essentially an unknown cancer (Epstein 743). Scientists and doctors alike were unsure of the cause of this cancer. Since then scientists have been studying BCC in order to begin to understand this highly diagnosed cancer. By first understanding the formation of basal cell carcinoma scientists can begin creating different ways to approach treating the tumors. Through these studies scientists and doctors alike are striving to find new ways to treat basal cell carcinoma. This review covers how basal cell carcinoma forms and different strives scientists are taking to find treatments. Recently, studies have shown that by using a hedgehog inhibitor the growth of the basal cell carcinoma can be stopped and in some cases can reverse the growth of these tumors. With further research and testing scientists are finding a way to effectively treat the epidemic of basal cell carcinoma found in people of European decent.

Introduction

Basal cell carcinomas (BCC) are a form of skin cancer that is extremely slow growing. It is formed on the upper layer of the epidermis and is easily visible by the human eye, especially when the carcinoma is in its later stages. The basal cell carcinoma can appear in several different colors and shapes. The color of the carcinoma can appear from a waxy, pearly, white, pink, or even brown. The tumors are typically either slightly raised and flat or sunken in the middle. Basal cell carcinomas gain their name from the layer of dermis that they create their formation in, the basal layer (Epstein 743).

This form of skin cancer is increasing in the frequency of diagnoses and is the most highly diagnosed skin cancer in people of the European descent. Basal cell carcinoma is also the most commonly diagnosed form of skin cancer in the United States. This is due to the lifestyles of individuals when it applies to the amount of exposure to the sun and the lack of use in proper ultraviolet skin protective. This particular type of skin cancer is most often diagnosed in areas of the body that are regularly exposed to the sun such as the scalp, face,

and shoulders. The basal cell carcinoma qualifies as a non-melanoma type of skin cancer.

Although basal cell carcinoma is a malignant form of skin cancer it is very rare that the tumor actually spread and grows in other areas. Doctors are able to diagnose basal cell carcinomas by the size, shape, color, and texture. If the doctor finds concern they typically perform a biopsy. The basal cell carcinoma is currently treated in a variety of ways such as removing the carcinoma and then stitching skin together, cryosurgery, and photodynamic therapy. At this point in time radiation is also used if the cancer cannot be removed by surgery. If the tumor is not treated it can and will grow into surrounding tissue and possibly bone.

The research of the basal cell carcinoma is very important because it is such a commonly diagnosed type of cancer. Since it is such a highly diagnosed skin cancer it is important to advance treatment techniques and further research causes of this cancer on a molecular level. The advancements in the treatment of this particular type of carcinoma are highly important subject due to the current cost of the treatment. The basal cell carcinoma is the fifth costliest cancer in the senior citizen population. There is a

current need to improve the cost and quality of treatment for the basal cell carcinoma.

Recent Progress

For scientists to improve the cost and quality of treatment for BCC, they must first understand the development of basal cell carcinoma on a molecular level. Scientists had a difficult time understanding basal cell carcinoma until 1996 when there was a breakthrough in discovering the identification of a genetic flaw in a rare subset of patients (Epstein 743). Since this discovery scientists have continued their research in the area of basal cell carcinomas, and have gained a better understanding of what causes them to form, and be able to detect people that are predisposed to basal cell carcinoma. Scientists have linked the predisposition to human chromosome 9q22 (Epstein 744). So they have discovered that not only are people more susceptible to develop basal cell carcinoma from environmentally stressors, but they can also have a genetic predisposition for the development of this cancer. The discovery of the predisposition to chromosome 9q22 opened many doors for scientists to research more advanced treatments for basal cell carcinoma.

Recent studies have given evidence that basal cell carcinoma use hedgehog pathways during development. Hedgehog pathways give cells the information that they need in order for proper development in the embryo. In adults the hedgehog pathway also plays a role, but if it malfunctions in an adult it can cause problems such as basal cell carcinoma. Scientists are currently studying the ability to use hedgehog inhibitors in order to prevent the growth and spread of the tumor. The hope is by inhibiting the hedgehog pathway with a hedgehog inhibitor doctors can effectively treat BCC tumors.

Currently there have been successful results in a laboratory setting by using a hedgehog inhibitor in the form of a pharmaceutical that can be taken orally (Kasper 458). This research included two phases of a study. Phase 1 was a study that was done on patients that were locally advanced or metastatic. In phase 2 the patients were locally advanced or metastatic and had multiple basal cell carcinomas. In both studies the results were so promising that the Data Safety Monitoring Board recommended ending the placebo arm of the study because the study clearly showed that the treatment was effective in both of the non placebo phases (Kasper 458-460). Another study is being performed researching the effects of vitamin D3 on the basal cell carcinomas. It has been noticed that the in vitro application and possibly topical application of vitamin D3 can effectively decrease the size and growth of the tumor. The studies concerning vitamin D3 need to

be continued and further research needs to be completed (Kasper 461).

Discussion

The current studies of the hedgehog inhibitors are proving to be a very effective method of treatment. The hedgehog inhibitors appear to be highly effective on basal cell carcinoma, but the treatment does come with a variety of side effects. The inhibitors taken through oral pharmaceuticals are affecting other parts of the body that use hedgehog pathways, such as hair growth and loss of taste.. There are other adverse side effects such as nausea and fatigue. Outside of the adverse side effects there are two things that have to be considered about the hedgehog therapy. One is that there could be cells present in the tumor that are resistant to the treatment and therefore the tumor will not be completely eradicated in the end of treatment. Unlike the option of surgical removal there could be some basal cell carcinoma cells remaining at the site of the tumor.

Another concern is that a patient could build up a resistance to the therapy, therefore making the treatment ineffective. The development of resistance is thought to be due to a mutation in SMO (Kasper 461). Further research could be completed to come up with alternatives that do not have as many side effects.

Another area of research would be to determine how the hedgehog therapy can completely eliminate the basal cell carcinoma tumor cells. In order to continue to develop new therapies we need to further the research on the molecular level of the basal cell carcinomas. The more information that is obtained about the basal cell carcinoma on the molecular level the better we can understand what causes them, and how to best develop new treatments. Another thing that should be considered is the application of information gained from the studies in the area of basal cell carcinoma to other types of cancer. The approach of using hedgehog inhibitors could possibly be successful when applied to other types of cancer.

References

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