Journal of the

Minority Science Apprentice

Viruses, Obesity, Health Disparities & Cancer Drugs

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In the US and its associated islands, close to one in three people are diagnosed with cancer in their lifetime [HealthPeople.gov]. Roughly 50% are over the age of 55 and are minorities, yet of those, less than 10% under the age of 30 actually eat a health conscious diet. One of the goals of the Hampton University Undergraduate Cancer Research Program (HUUCRP) is to raise cancer awareness in the minority community for those who are at extreme risk and to educate those individuals in prevention. HUUCRP is a volunteer-college student-operated activity and can be used as a portfolio builder for a host of professional school and/or employment requirements during the summer and academic year(s).

Aims and Scope

The Journal of Minority Science Apprentice (JMSA) is a National peer-reviewed journal sponsored by the Hampton University Undergraduate Cancer Research Program and published under the auspices of the U.S. ISSN Center at the Library of Congress. The journal publishes mini reviews, short communications, and short research articles. The main focus is to understand the biological shortcomings that lead to the development of cancer and mechanisms that can prevent this disease. Priority will be given to observations that clearly enunciate observations relevant to the cancer research community. Focal areas include: molecular analysis, animal models, pharmacology, toxicology, nutraceuticals, preventive medicine, pharmacogenomics and on innovative cancer research. Submitted articles must clearly emphasize the cancer process.

Manuscripts in the area of technological advances in cancer research will be expedited for acceptance if they involve medical imaging, radiobiology, molecular techniques, transgenics or medical physics. The Editors will also accept manuscripts (under 7500 characters total) on scientific discovery that may be of interest of the Journal. JMSA does not charge for pages. Students at HBCU, TC, HSI, or APIs are encouraged to submit articles.

Format for submission

Figures (2 max limit)

Tables (1 max limit)

12-point Arial, 0.5-inch margins

Color (max size 3x3 inches) (max size 2x2 inches)

Title, author, address, body (7500 Characters total), references

Works cited in the body (example →) (Yang et. al., 2013)


Submit all inquiries and manuscripts to Editor-in-Chief, JMSA at michael.druitt@hamptonu.edu

Allow up to 6 weeks for a response
Protein Localization in RNA Viruses

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Rotavirus (Reoviridae) is a diarrhea-causing virus, which leads to numerous fatalities among children and infants in many developing countries. According to the Pediatric Infectious Disease Journal, nearly every child in the world has been affected by Rotavirus at least once by the age of 5 (Bernstein, 2009). Therefore, it is not a shock that nearly half a million children under the age of 5 die in one year alone due to infection by this virus (Bernstein, 2009). This virus is transmitted via the fecal-oral route, however, speculation remains whether or not the respiratory route also plays a role in transmission. Since its discovery in 1973, scientists were able to develop two vaccines that are now available in US markets, but still no antivirals, which means Rotavirus continues to pose a liable threat; especially in countries that have little or no access to vaccines (Centers for Disease Control and Prevention [CDC], 2011). Through investigation of particular reactions and residues that are present during the Rotavirus replication cycle, we can understand how to inhibit these factors and how to ultimately put an end to the progression of Rotavirus overall.

The viral polymerase (VP1) is a core protein in the rotavirus virion that mediates RNA synthesis and therefore is a key factor in the progression of the virus's replication cycle. VP1 has become an important protein of interest because it localizes to viroplasms, which are the sites of replication, in infected cells. Its mechanism of localization and expression are important in understanding not just Rotavirus but other double stranded RNA viruses as well. In a recent investigation, scientists were able to successfully clone the VP1 sequence from rotavirus strain PO-13 into a pEGFP-N1 plasmid. Through the process of Polymerase Chain Reaction (PCR), PCR Purification, and CIP treatment experiments, DNA sequences were amplified and purified to in order to accumulate large amounts in the most pure form. With the use of Restriction Enzyme Digestion and Ligation, the newly designed and amplified DNA sequence was inserted and sealed into the pEGFP-N1 plasmid. In this study, a transformation reaction experiment subsequently was done in order to introduce the plasmid into E. Coli bacteria. Finally, the DNA construct was introduced into mammalian cells to study its localization during infection with a divergent rotavirus strain (SA11). Green Fluorescent Proteins (GFP's) are often a fundamental aspect in studying localization in cells due to the fact that they enhance the properties in cells without disrupting their proper function or structure of the cell.

Using the results and techniques from this study, scientists can conclude that the residues shared between different rotavirus strains (SA11 and PO-13) are key in recognizing the particular residues associated with its viral replication. By understanding the method of localization and therefore replication of this rotavirus strain scientists can develop new ways to prevent infections by this virus and others. Studying the biology of RNA viruses in general is important for gaining information that can be used to design interventions against viral pathogenesis. Future investigations in this research area should be aimed at investigating what particularly is responsible for the movement of these proteins into the viroplasm. We know through other studies
that a viral infection is required for movement into the viroplasm. Therefore, future investigations should also examine what particular viral or viral-induced factors play a role in the replication and infection of this disease. In conclusion, research in this area of science is so essential in the longevity and sustainability of the human race.

References


Obesity and Cancer-related Mortality

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According to the National Cancer Institute, obesity is a medical condition in which a person excess body fat has accumulated to an extent that it has a negative effect on health. Consequently, this increasing epidemic is becoming a global health issue amongst adult's and children's. Obesity has lead to much disease such as metabolic syndrome, diabetes, cardiovascular disease, hypertension, and other chronic diseases (Obesity and Cancer Risk - National Cancer Institute.). Epidemiological studies have shown that obesity is also associated with increased risk of several cancer types, including prostate cancer, pancreas, colon and rectum, breast (typically after menopause), endometrium (lining of the uterus), thyroid, kidney, esophagus, gastric, gallbladder, and possibly others as well can also lead to poorer treatment and increased cancer-related death (Obesity and Cancer Risk - National Cancer Institute). Therefore, researchers argue that obesity can lead to increased mortality rates and, if current trends continue, life expectancy in the future will decrease for the first time in history (Vucenik and Stains, 2012). Like obesity, cancer is a major health problem in the United States and in other countries as well. Based on the American Cancer Society's 2002 estimates for cancer incidence, cancers linked to obesity amongst women comprise approximately 51% of all new cancers diagnosed among women and approximately 14% among men (Prostate Cancer). In terms of mortality rates, for women, obesity-related cancers are estimated to contain 28% of cancer-related deaths in 2002. Whereas in men, obesity-related cancers are estimated to contain 13% of cancer-related deaths in 2002 (Prostate Cancer).

Besides the abovementioned obesity and cancer-related mortalities, there are correlations in the occurrence of race, high body mass index (BMI), incidence, and mortality rates of Prostate Cancer. I hypothesize that obesity is linked to increased cancer-related mortality. Also, this may lead to differences in mortality rates among race, with African Americans having more aggressive types of cancers, such a prostate cancer.

Prostate Cancer (Pca) is the most common non-skin malignancy and leading cause of cancer death among American men in the United States. According to The American Cancer Society's estimates for prostate cancer in the United States for 2014 are about 233,000 new cases of prostate cancer will be diagnosed and about 29,480 men will die of prostate cancer (Prostate Cancer). The relationship between obesity and Pca is less clear, however, obesity has been associated with increased risk of several aggressive cancers, such as prostate cancer, breast cancer, and colon cancer ("Mind/Body Health: Obesity"). A large prospective cohort study in the United States, from the Cancer Prevention Study II, suggested that obesity is positively associated with prostate cancer mortality (Freeland and William, 2004). More recently, study results from the Shared Equal Access Regional Cancer Hospital (SEARCH) database found that obesity is a risk factor for aggressive prostate cancer regardless of race (Freeland and William, 2004). Therefore, I decided to observe a study that will look at all potential risk factors such as race, BMI, PSA testing, incidence, and mortality rates of Pca. Eventually, this lead me to research and interpret "Correlation between Race, High BMI, Incidence, and Mortality Rates of Prostate Cancer in the Hampton Health District, Virginia". A brief study conducted by Mofoluwaso Ibikunle-Salami, Nicholas J Kenney, Ph.D, and Luisel Ricks-Santi, Ph.D.
In this particular study, the objective was to establish the incidence and mortality rates of prostate cancer among health districts in Virginia, to confirm the high incidence rates of prostate cancer in Hampton health district, and identify the risk factors for prostate cancer in Virginia. Body mass index (BMI), race, and screening, were a few of the risk factors that underwent statistical correlation analysis with prostate cancer incidence and mortality. The data acquired for this study was from the Virginia Cancer Registry; this data underwent statistical analysis to conclude the incidence and mortality rates between the Virginia health districts.

Based on the data accumulated, the results verified that the Hampton health district has the highest PCa incidence rate which may be due to the large population of AA men and men with high BMIs. Even larger studies, notably the Cancer Prevention Studies of the American Cancer Society, have consistently demonstrated that obese men have a significantly greater chance of dying of prostate cancer than non-obese men (Prostate Cancer.). Nevertheless, the relationship among obesity, its physiologic sequelae, and the risk of prostate cancer is unclear. What is clear is that obese men are at significantly greater risk for dying of prostate cancer, especially if you’re a minority.

Therefore, an attempt to reduce obesity amongst the general population is important; so possible solutions to this problem is to start by increasing physical and healthy activities to decrease BMI in the minority communities, which in return may help decrease the incidence rate of PCa in the Hampton health district, and possible elsewhere. Whether lifestyle alterations after the diagnosis of prostate cancer can alter the natural history of the disease remains to be determined (Vucenik and Stains, 2012). Conversely, further studies are needed to determine the molecular basis for increased prostate cancer mortality among obese men.

References


Is There a Disadvantage? Skin Cancer Disparities in African Americans

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Abstract

The skin, the body's largest organ, comprises a variety of cells and layers. The three major layers: Epidermis, Dermis, and Subcutaneous, each play an essential role in the skin's function. From protecting internal organs to its role in the nervous and vascular system, skin is very complex; hence, why there are so many components that can be affected by neoplasm, more commonly known as cancerous conditions. In regard to skin of color, specifically of those of African American descent, there are three pertinent nonmelanoma cancerous conditions that are seen, which include Cutaneous T-Cell Lymphoma (CTCL) and Basal Cell Carcinoma (BCC) and most importantly Squamous Cell Carcinoma (SCC), which are both primary carcinomas of the skin. Melanoma, despite its popularity in media and public service campaigns, is not the neoplasm that affects people of color in the greatest magnitude. In fact primary skin carcinomas are most commonly seen in the United States. Although Basal Cell Carcinoma (BCC) has the largest occurrence in the United States and internationally, Squamous Cell Carcinoma (SCC) has the largest incidence in people of color. It is important to keep in mind, however, that skin cancer in people of color is reported as rare, which can be attributed to various factors relating to the size and aggregation of melanosomes (where melanin is found). Nevertheless, it is surprising that SCC's occurrence in people of color is most common in non-sun exposed skin. This study will explore whether there are disparities that affect African Americans in regard to Squamous Cell Carcinoma. It will also investigate whether its prevalence in African Americans is due to preexisting skin conditions, such as chronic scarring and chronic inflammation. Statistics can verify the connection and determine whether in fact inherent damages put people of color at a higher risk for skin cancer.

Introduction

Structure, Function and Anatomy

In understanding skin conditions, it is first important to fully comprehend the anatomy of the skin. The thin, somewhat simple appearance of the skin can mislead the general public about its function. Nevertheless, the skin is actually the largest organ of the body, covering its entirety and spanning close to 4 cm in thickness and making up about 16% of total body weight. Skin consists of three major layers including the Epidermis layer, Dermis layer and finally the Subcutis layer, also called the subcutaneous layer. Even within these layers are several other layers, adding to the complexity of the skin.

The Epidermis, outermost layer surprisingly performs the most significant characteristic of the skin and is made up of the largest variety of differing cell types in the skin. This thin layer is responsible for creating a barrier against bacteria and other microorganisms in the outside world that may harm the body. The first layer of Epidermis is made up of Keratinocytes, cells that make up the greatest amount of the Epidermis. Deprived of their nucleus, these cells are full of a protein called Keratin, which makes them hard and link together to form a protective, waterproof barrier. Because Keratinocytes are always shedding, Squamous cells, the next cell type in the Epidermis, replace them. Squamous cells, or living Keratinocytes, have not yet lost their nucleus. They are also primarily made up of Keratin, an essential protein the skin.

According to the National Cancer Institute, “Keratinocytes from the squamous layer are then pushed up through two thin epidermal layers called the stratum granulosum and the stratum lucidum.” The next layer in the Epidermis, the innermost layer is made up Basal cells, which create the Basal layer. Basal cells are the only cells that rapidly divided to
create new Keratinocytes and are also known as the “...stratum germinativum due to the fact that it is constantly germinating (producing) new cells.” Intertwined with the basal cells in this layer are specialized cells called Melanocytes. Melanocytes produce pigment in the hair and skin, as well as provide protection against ultraviolet light.

Beneath the Epidermis is the second major layer of the skin, the Dermis. Composed of blood, lymph vessels, nerve endings, muscle fibers, oils, sweat glands, and hair follicles, this layer is much thicker than the Epidermis. There are two secondary layers in the Dermis: the upper layer, Papillary dermis and the lower layer, Reticular dermis. The papillary dermis is composed of loose connective tissue, blood vessels, and nerves. Papillae, “fingerlike” projections, which are also found in the papillary dermis, connect the Dermis to the Epidermis. The thicker lower level, the reticular dermis, consists of collagen fibers that make up a more condensed connective tissue. This layer gives skin its flexibility and profound strength. It is also where the blood vessels and nerves, as well as lymph vessels, glands, and hair follicles are found.

Lastly, is the Subcutis, also know as the hypodermis or subcutaneous layer. Consisting of mainly fats and connective tissue, this layer is also thick and found directly underneath the Dermis layer. In the Subcutis blood and lymph vessels are also found, along with its ability to insulates and saves body heat. It acts as a shock absorber to protect underlying tissues and organs from injury, and is a source of reserve energy.

Apart from the skin’s various layers and cell types (as seen in Figure 1 above), there are also external structures that are apart of the skin. Two major structures are hair and nails. Hair is found all over the surface of the skin; however, it is exempt from the certain skin areas including the hand palms, feet soles, glans penis and intritus. These kinds of skin are referred to the ‘glaborus skin’ as stated in Common Skin Disorders. Nails, found on the hands and feet, consist of a hard plate of keratin and are responsible for providing protection and “fine touch sensitivity”. Sweat glands, another one of the skin’s structures, are found in the Dermis layer and are responsible for the secretion of water. It is also important to remember that the skin is composed of many nerves, “especially on the hands, face and genitalia. It also contains many blood vessels and lymphatic vessels.” (Mitchell and Kennedy, 2006)

**Conditions of the Skin**

Due to the skin’s diverse and complex composition, skin diseases and disorders are very common because there are several components that can be infected. There is such a plethora of skin disorders and variation thereof that they are usually categorized in the following groups: Acne, Atopic eczema, Psoriasis, Viral warts, Infective Skin disorders, Benign tumors and vascular lesions, Leg ulcers, contact dermatitis and most devastating Skin Cancer. According to Mitchell and Kennedy (2006), “Many skin diseases are chronic and relapsing and can produce a surprising amount of disability. Various quality of life studies have looked at the commonest chronic skin diseases such as eczema, psoriasis and acne shown that they can produce disability levels similar to: angina, arthritis, asthma, back pain, chronic bronchitis, diabetes, and hypertension.”


**Skin Conditions Prevalent in People of African Descent**

In particular to people with skin of color, there are very distinct cutaneous disorders and reaction patterns to disorders as well as to cutaneous stimuli. The term of “skin of color” generally refers to “individuals of racial groups with darker skin than Caucasians, such as Asians, Africans, Native Americans, and Pacific Islanders.” Skin conditions that are especially prevalent in people of color are acne and eczematous dermatitis. More specifically, in regard to people of African descent in the United States, Acne, Eczematous dermatitis and Pigmentary disorders are the most commonly seen skin conditions. Nevertheless, despite the prevalence of skin nuances in individuals of color, they are not always readily recognized by physicians and are mistaken for abnormalities. (Kelly and Taylor, 2009)

**Hypothesis**

Besides the aforementioned skin condition, there are differences in the prevalence of malignant skin neoplasms, specifically squamous cell carcinoma, between African Americans and Caucasians. We hypothesize that these differences may lead to differences in mortality with African Americans having more aggressive types of skin cancers.

**Skin Neoplasm (Cancer)**

Melanoma is an increasingly common malignancy of melanocytes, most often arising in the skin. Although, it can be curable if detected early; Melanoma, if it detected in a late stage, it is likely to carry a poor prognosis.

In addition to melanoma, there are three types of nonmelanoma cancerous conditions that affect African Americans most, and include Cutaneous T-Cell Lymphoma (CTCL), Basal Cell Carcinoma (BCC) and most importantly Squamous Cell Carcinoma (SCC), which are primary carcinomas of the skin. Primary carcinoma of the skin is the most common type of cancer found in the United States.

Cutaneous T-Cell Lymphoma (CTCL), also known are mycosis fungoides (MF), refers to a group of lymphomas that primarily involve the skin and may later involve the lymph nodes, peripheral blood, and other internal organs. This disease most often evolves through several stages: from early or pre-mycosis fungoides, patch, plaque, and tumor stages. (Habif, 2005)

Basal Cell Carcinoma (BCC), which affects the basal cell layer, is locally invasive and destructive, and usually slow-growing, but rarely metastasizes. (Habif, 2005)

SCC affects the top most layer of the skin, occurring in sun-exposed skin has its origin in loss of the organized control of the epidermal keratinocytes differentiation secondary to DNA damage as a direct result of ultra-violet (UV) light.

**Epidemiology**

**Distribution**

Even though skin cancer is considered the most common form of cancer, the incidence in people of color is reported as rare. According to Gloster and Neal in "Skin cancer in skin of color", “In 1978 the annual age-adjusted incidence of skin cancer was 232 per 100,000 population in Caucasians and 3.4 per 100,000 in blacks, indicating that Caucasians are approximately 70 times more likely to develop skin cancer.” (Gloster & Neal, 2006) Although the rate of occurrence in Caucasians and Asians, especially, tend to increase at a rate of 5%-8% annually, the rates of occurrence in African Americans remain the same. This reduced rate can be attributed to a variety of factors. Authors, Montagne and Carlisle state that “racial differences in melanin activity, fibroblast activity, and hair distribution on skin that may help to account for the reduced frequency of skin cancer in people of color.” Melanin, which is produced by keratinocytes associated with basal layer
melanocytes, is a “photoprotector” in animals and humans. It acts as a shield against the harmful ultraviolet light from the sun. Although there is no racial difference in the amount of melanin present, there are structural differences in people of color attributed to size and aggregation of melanosomes (where Melanin is produced) in the keratinocytes and melanocytes. Also, there is an increase stage IV melanosomes, which provide a elevated level of protection. (Kelly and Taylor, 2009) Along with increased melanocyte activity, darker skin tones have larger and more dispersed melanosomes, opposed to less melanocyte activity and smaller, more grouped melanosomes in Caucasians. (Gloster & Neal, 2006) Such factors contribute to the low rate of skin cancer seen in African Americans, however, they are not necessarily immune to sun damage.

Incidence

Melanoma, although representing a significant disease burden in the United States, with an estimated 55,000 invasive cases occurring in 2004, is a predominately cancer of white populations. Because Caucasians make up the greatest population in the United States, 77.9% in 2012, is perhaps the reason Melanoma is granted the most clinical research and public campaigns. (U.S. Census Bureau, 2014). When detected in African Americans, Acral Melanoma and Subungual Melanoma have the highest prevalence, and are mostly found in the palms, soles, and nail beds. (Kelly and Taylor, 2009)

As a whole, SCC account for about 20 % of all skin cancer diagnosed, and excluding Melanoma, it is responsible for 75% of all skin cancer deaths. Aside from being the most common skin cancer among blacks, it is the second most common skin cancer in Caucasians, Asians, and Hispanics. Most SCCs in people of color occur in non-sun-exposed areas. However, when SCC does occur in sun-exposed areas, the anatomic distribution is similar to that in Caucasians. Surprisingly, the factors that are responsible for developing skin cancers in non-sun-exposed areas are still unknown. It is known, however, that chronic predisposed conditions, inflammation, and scarring do represent a significant risk for SCC and result in a higher rate of mortality. (Kelly and Taylor, 2009) SCC is most commonly found on the head, neck, and hands of elderly patients. (Habif, 2005)

According to Medscape, “Predisposing factors for SCC in people of color include scars from thermal and chemical burns (Copcu, Aktas, Sisman, & Oztan, 2003), chronic leg ulcers (Kong, Jogia, Nayyar, Berrington, & Jackson, 2008), and previous sites of radiation. Immunosuppressed patients, such as those with organ transplants or the human papillomavirus, are also at increased risk for SCC (Harwood et al, 2000). Patients with chronic inflammation, such as osteomyelitis, hidradenitis suppurativa, or lupus vulgaris, are also at increased risk for SCC.” (Bradford, 2009) In Table 1, below, features as well as comparisons between people of color and Caucasians are seen.

In accordance with the results in Table 1, a study reported that chronic scarring processes were evident in 20%-40% of SCC cases in African Americans. (Gloster & Neal, 2006)

Mortality

It has already been established that African-American patients with SCC usually acquire this disease in non-sun exposed skin and in places that are impaired prior to diagnosis. In combination to these risk factors, elderly age, an overall risk factor for SCC patients, also plays a role, especially in women. According to Dr. Heather Woolery-Lloyd, “One study examined the distribution of SCC in African-Americans and found that 16 of 35 patients diagnosed with SCC had lesions on the legs that exhibited atypical features. All these patients were elderly African-American women. The authors concluded that SCC is not rare in elderly African-American women.”
(Woolery Lloyd, 2006-2010) Nevertheless, it is no surprise that African Americans that tend to present with more advanced disease and have increased mortality. It is important to keep in mind that despite the lower risk to this patient population, African-American patients who develop skin cancers are faced with an increased morbidity and mortality, which is often a result of delayed diagnosis in this patient population. (Woolery Lloyd, 2006-2010)

**Conclusion**

Based in the data compiled over the course of this research, it is clear that African American accommodate fewer incidences of skin cancers in general. Nevertheless, they are not immune to the skin neoplasm. The reduced rate seen in African Americans is due to the composition of more evenly distributed melanin, the essential photo-protective protein. Individuals who are not of color, most often Caucasians, also encompass melanin; however, it is not as evenly distributed over their skin, ultimately leading to an increase occurrence of skin cancers. When most African Americans are diagnosed with Squamous Cell Carcinoma, occurrence is in places that are not typically exposed to the UV light from the sun, as well as, places that are previously atypical or damaged. In general, most patients diagnosed with SCC are elderly, another risk factor placing SCC as the second most skin cancer in the U.S. There is in fact a disparity that African Americans face when diagnosed with skin cancer. When African-American SCC patients have similar anatomical distribution along the skin as Caucasians, which include not chronic damages, the mortality and morbidity rates of African Americans are similar to the rates of Caucasians. A disparity is not present here; however, the common increased morbidity and mortality rates seen in African Americans with Squamous Cell Carcinoma is due to continual trauma placed on already damaged skin. The impaired skin does not simply lack evenly distributed melanosomes (melanin-containing molecules) like Caucasians, but rather lacks any kind of photo-protective activity. The chronic damages done to these areas of the skin deprive it of carrying out its essential, protective functions.

**Bibliography**


cancerous/layers-of-the-skin.html. [2014, February 3].

Gender Differences in Health Service Use among Ethnically Diverse Black Adolescents: Findings from the National Survey of Life

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Abstract

Most gender difference and within-group ethnic studies of use of health services have been conducted on adults and children (Marcell et al., 2002) and few on black adolescents (Marcell et al., 2002, Ziv, Boulet, & Slap, 1999). The purpose of this study is to examine gender differences in health service use among ethnically diverse black adolescents. The NSAL, adolescent survey portion was used to calculate descriptive statistics and estimate logistic regression models, via SPSS. A series of Chi-square models were tested for each variable used in this study with service use as the dependent variable. Percentages within service use in the past year were used to further determine any numerical significance. Anything that was significant in these models, binary linear regression models were then used to determine how the variables interacted with each other. The linear regression model was only significant for females, with ethnicity approaching significance (-.611, p<.057) indicating that African American females used more health care services than Caribbean Black females. Also, women who rated their physical health worse, used health services more (.367, p<.01). Hypothesis 3 for gender serving as a moderator was supported, with gender being important for service use. The only variable that remained significant in all models, was the overall self-rating of physical health (OPH) in relationship to health service use.

Introduction

Background/Known Information

What is known about the disease/topic? Adolescent depression is a serious public health concern. In a survey conducted in 2008, approximately 7% of African American adolescents, ages 12-17 experienced a major depressive disorder, and about 70% of them did not receive mental health treatment (Substance Abuse and Mental Health Services Administration, 2009). This is troubling, seeing that early intervention and treatment during adolescent years can help prevent recurrent psychological issues through adulthood. Also, young people from ethnic minorities, specifically African American males, are those most reluctant to seek help (Deane, Rickwood, Wilson, 2007).

Why is it an important topic? Furthermore, within-group ethnic variation studies among black adolescents, are very important, to get a better understanding of health disparities and the factors that influence them. The National Survey of American Life has addressed the issue of ethnic variation among African Americans and Caribbean Blacks within the United States. Few studies on help seeking in Caribbean blacks have been conducted in the United Kingdom (Jackson et. al, 2007). Delving deeper into ethnic variations may uncover hidden factors that usually go unnoticed when clumping one race together. A review of studies showed that younger adolescents rely more on their parents, than older adolescents who have a greater capacity for reliance on self, but parents continue to play a significant role (Deane, Rickwood,
Wilson, 2007; Flamini .L et. al, 2013; Logan & King, 2001 ). Most gender difference studies of use of health services have been conducted on adults and children (Marcell et al., 2002) and few on black adolescents (Marcell et al., 2002, Ziv, Boulet, & Slap 1999). These studies have distinct study populations and cannot be generalized. Studies focusing on adolescent health care use is important as it is seen as a transition period with implications for adult health and wellbeing.

Purpose

It is important to note that help-seeking towards health service use (HSU) is a multi-step process, with a plethora of determinants that influence awareness, intention, and action. The purpose of this study is to examine gender differences in health service use among ethnically diverse black adolescents. Our conceptual model is derived from The Behavioral Model of Health Services Use, by Ronald Andersen (Figure 1) (Andersen, 1995). The model suggests that service use depends on predisposing, enabling, and need factors. This study’s variated model can be seen in (Figure 2). The predisposing factors, ethnicity and gender moderate the use of health services. Family support, helpfulness, and parental conflict are the enabling resources. There is some evidence that show negative interactions with family may be more important than supportive ones for health service use among African Americans (Aneshensel & Villatoro 2014).

Hypothesis 1: Adolescents with positive parental support will use health services less than those without.

Hypothesis 2: Those with parental conflict will be associated with more health service use, among black youth.

Hypothesis 3: Gender will moderate the relationship between family relations and health service use.

Methods

Sample and Data Collection
The National Survey of American Life was conducted with a national household probability sample, supplementary interviews were conducted with (N=810) African American and (N=360) Caribbean Black adolescents, 13-17 year olds, attached to NSAL adult households. (total 1,170).

Measures

Health Service Utilization
The dependent variable is defined as using health services within the past year. These included: hospital clinic for health care, public health department, planned parenthood, private doctor office, emergency room, community mental health center, other health care clinic/type, doctor for check-up, doctor
for sports physical, doctor for cold, doctor for fight injuries, doctor for accident injuries, doctor for immunizations, doctor for drugs, alcohol, doctor for emotional problems, doctor for asthma attack, doctor for birth control, doctor for STD test, and doctor for STD treatment. The variable was dichotomized to those who used services and those who did not.

**Enabling Resources**

The enabling resources to health care utilization were family support, family helpfulness, and parental conflict. Family support was measured by five items, measuring if parent and adolescent: “tell each other everything”, “share problems”, “share feelings”, “closeness”, and “have a good relationship”, with response codes ranging from 1= strongly agree to 5 strongly disagree. Family helpfulness was measured by 1 question “How often does your family help you?” with 1= never to 4= very often. Parental Conflict was measured by three items: how often adolescent was critical of parent(s), if they fight, and if their relationship was tense at times, with response codes ranging from 1= strongly agree to 5 strongly disagree.

**Need Factors**

The participants had to rate their own present mental and physical health status. Due to the low number of adolescents rating their overall physical health (OPH) as poor or fair, these two categories were combined creating a four-point, ordinal scale, with codes ranging from 1=poor to 4=excellent. Self-rated mental health had response codes ranging from 1=poor to 5=excellent. Symptoms of depression were based on answers to several questions about how often they felt: “depressed, restless, cried in the past week etc.” 0=rarely (less than 1 day) to 3=most/all of the time (5-7 days). Based on the results, the participants were rated either low risk or high risk for depression. Age also served as a need factor. The sample age ranged from 13-17 years old, with the majority of the adolescents being 14 years old.

**Predisposing Factors**

Ethnicity and Gender served as possible moderators. African Americans were coded as 0 and Caribbean Blacks as 1. Females were coded 1 and Males were 0.

**Data Analysis Procedures**

The NSAL, adolescent survey portion was used to calculate frequencies, and estimate logistic regression models via SPSS software package for analysis. Correlation Analysis was ran along with a series of Chi-square models. Linear regression models were then used to determine how the variables interacted with each other.

**Results**

Table 1 shows descriptive characteristics of the sample. Participants were age 14 on average and there were considerably more African Americans than Black Caribbean’s in the sample. Collectively, males and females had lower symptoms of depression and higher rates self-rated poor mental health.
Chi square models produced several results (Table not shown). Females with lower symptoms of depression, used services more (84.4%) versus females with high symptoms of depression (15.6%), with a significance of (.049, p<.05). 81% of females who rated their physical health as poor used general health services, versus 19% who did not. There was significance among female respondents to general service use in the past year and their self-report of physical health. Out of the participants who rated their overall physical health as excellent, only 21.5% of females did not use services, whereas 47.0% of males did not use general services. In terms of service utilization, 12.6% of females who rated their overall physical health as poor used services, versus 8.9% of males. Overall, the females almost approached significance at (.016 p<.01) which further shows that females use more general health services than males. This shows possible gender differences in attitudes about one’s own personal health status and its impact on utilizing health services.

Table 2 shows the results for the correlation matrix. None of the variables correlated with service use, but they interacted with each other. Gender differences was prevalent among self-rated OPH, where females were significant in the ratings of their OPH. Ethnicity and parental support had an inverse effect. With Caribbean Blacks valued at 1, and African Americans as 0; African Americans had lower rates of parental support than Caribbean Blacks. This was an unexpected result, which was also significant in the t test (graph not shown), but lost significance once other variables were taken into account. Family helpfulness, parental support, and OPH all had an inverse relationship with depression, which is consistent with literature. Family helpfulness had an inverse effect on age. This means that the younger you were, your family was perceived as more helpful. This was consistent with literature which showed that younger adolescents rely more on their parents, than older adolescents who have a greater capacity for reliance on self (Deane, Rickwood, Wilson, 2007; Flamini .L et. al, 2013; Logan & King, 2001 ).
At the multivariate level, we conducted a logistic regression analysis by gender to determine if gender moderated the selected models. We ran two separate models for males and females, predicting service use with depressive symptoms, ethnicity, family helpfulness, age, and physical health as predictors (See Table 3). The model was only significant for females, with ethnicity approaching significance (-.611, p<.057) indicating that African American females used more health care services than Caribbean Black females. Also, women who rated their physical health worse, used health services more (.367, p<.01).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Odds Ratio</th>
<th>Sig. (2-tailed)</th>
<th>95 % CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>.555</td>
<td>.082</td>
<td>.332-3.257</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Caribbean Black (Reference)</td>
<td>-.011</td>
<td>.057</td>
<td>.290-1.017</td>
</tr>
<tr>
<td>Family Helpfulness</td>
<td>.111</td>
<td>.580</td>
<td>.752-1.659</td>
</tr>
<tr>
<td>Age</td>
<td>.023</td>
<td>.814</td>
<td>.847-1.236</td>
</tr>
<tr>
<td>OverAllPhysicalHealth</td>
<td>.367</td>
<td>.004***</td>
<td>.752-1.659</td>
</tr>
</tbody>
</table>

CF= confidence interval  
***Correlation is significant at the 0.001 level (2-tailed)  
**Correlation is significant at the 0.01 level (2-tailed).  
*Correlation is significant at the 0.05 level (2-tailed).

Discussion

Contrary to other studies, parental support, conflict, and helpfulness did not predict general health service use, once other factors were considered. Based on the results of this study, Hypothesis 1 for parental support and Hypothesis 2 for parental conflict were both rejected. However, Hypothesis 3 for gender serving as a moderator was supported, with gender being important for service use. The only variable that remained significant in all models, was the overall self-rating of physical health (OPH) in relationship to health service use. Self-rated mental health was significant in the descriptive frequencies and t test (not shown, sig .035*) but none of the multivariate models.

Summary/Limitations/Future Implications

This study has several limitations. The general health service use variable, combined several different variables to create a dichotomous variable instead, which did not allow us to distinguish between specific types of health service use. Previous research (Marcell et al) kept the service use variable separate and found more significant findings. Female reproductive services (Planned Parenthood and birth control...
services) were included in the dependent variable. However, even if we were to remove those two factors, studies show that females would still be more likely to seek care more often than males (Marcell et al., 2002). Family helpfulness was only measured by one broad question “how often does your family help you?” Using a qualitative approach or the follow up question (how much help is your family and provide examples) may have produced more significant results. Questions about proximity to general health care providers was not accounted for. This information may have been important, to further understand predisposing factors such as proximity and lack of transportation to health service providers. Individual determinants such as mental health literacy, attitudes towards general health services, and perceived stigma about depression among adolescents and their parents were also unaccounted for. These measures may be important factors in using health services. Future research should look at these determinants through a cultural perspective. Other factors that may be important for male adolescent health service use should be considered as well. Health care practitioners should make efforts to relay the importance of preventative care and maintaining overall healthiness to adolescent males. Marcell et. al 2002, suggests that evaluating existing programs that target adolescent males, such as male involvement programs and male teen clinics, can identify successful program components that reach males and engage them in health care use.

References


Marcell, A., Klein, J., Fischer, I., Allan, M., & Kokotailo, P. (2002). Male adolescent use of health care services: Where are the boys?


Amplification and purification of mAP-18

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Abstract

mAP-18 is a recently discovered pre-adipocyte cell line found in the subcutaneous fat of the humans. In this experiment, mitochondrial DNA derived from the AP-18 adipocyte cell is amplified, insertion into PREX-plasmid DNA and transformed using competent E. coli cells from the DB 3.1 strain. A total of 16 colonies were obtained from transformation of mAP-18 with DB3.1. Colonies 1-3, 5, 8, and 10 did not produce visible bands. Colonies 11-16 produced visible bands on the DNA gels indicating successful transformation of the mAP-18 at 64 kD.

Introduction

mAP-18 is a pre-adipocyte cell line found in the subcutaneous fat of humans. Up to this point few pre-adipocyte cell lines have been discovered to take part in the differentiation process of adipocytes. (1) However, the precursors within the adipocyte differentiation process provide insight into proposed differences in the adipogenetic potentials of various adipose tissues. That is, different adipose tissues will present different clinical consequences (i.e. visceral adipose tissue has a stronger link to insulin resistance, type 2 diabetes, etc. than subcutaneous adipose tissue). (1,2) In order to further understand and analyze these differences, it is necessary to establish a pre-adipocyte cell line derived from normal adult adipose tissues. (3) In this experiment mAP-18 is amplified using PGEX-plasmid DNA and transformed into competent DB 3.1 E. coli cells, and plated on an ampicillin agar plate. E. coli cells quickly transform plasmid DNA, taking no more than 24 hours to produce colonies expected to contain solely the insert of interest. (4) Furthermore, PGEX- plasmid DNA exhibits high-efficiency transformation of mammalian cells allowing for greater product yields. (5) The transformation medium, LB, has ampicillin added to the solution. Therefore, upon plating, only the ampicillin-resistant plasmid DNA (PGEX plasmid with mAP-18) will survive and form colonies; the bacterial DNA in the E. coli cells will die off.

Methods

To begin, mAP-18 was amplified via PCR using BamHI and XhoI oligase primers. A positive control PCR product (mAP-18) and negative control PCR product (without mAP-18) were obtained, and the products were run on a gel. The positive control band was excised from the gel and the DNA extracted. The eluted DNA concentration was 54 ng/ µl.  The vector, PGEX, was restriction digested using BamHI and XhoI restriction enzymes to produce sites for the ligation of the insert with the vector. A ligation was performed to insert the target DNA, mAP-18, into the PGEX-plasmid at the restriction enzyme sites. Ligation products were then transformed in DB3.1 bacteria and spun in an LB-ampicillin bacterial nutrient medium, then plated and incubated overnight at 37°C. Colonies were then harvested and the DNA isolated from each colony via a Quick and Dirty Mini prep. Mini prep products were then restriction digested and ran on a gel to determine successful transformation products.
Results and Discussion

The gels for the restriction digest of ligation products can be seen below in Figures 1-3. As shown in Figure 1, colonies 1-3, 5, 8, and 10 did not produce visible bands. Figure 2 shows clear bands for colonies 11-13 at a size of 64 kD. Colonies 13 and 11 produced bands that ran similar distance to colonies 9, 7, 6, and 4. In Figure 3 it is clear that colonies 14-16 produced bands at the same distance those in Figure 1 and 2.

The failure of colonies 1-3, 5,8, and 10 to run down indicated a failed transformation i.e. colonies with no bacteria. Bands were obtained from colonies 4, 6, 7, 9, and 11-16, indicating successful transformations. The band for colony 12 ran longer than the bands for the other competent colonies, likely due to recombination. Successful amplification of more specific and purified mAP-18 could then allow researchers to further study the differentiation process of adipocytes. Specifically, researchers would be able to study specific signal cascades that lead to cell differentiation and are induced by gene products or proteins of mAP-18.

Figure 1: Mini prep gel #1, load order: skip, colony 10, colony 9, skip, colony 8, colony 7, skip, colony 6, colony 5, skip, colony 4, colony 3, skip, colony 2, colony 1, skip, ladder

Figure 2: Mini prep gel #2, load order: skip, skip, skip, colony 13, skip, colony 12, skip, colony 11

Figure 3: Mini prep gel #2, load order: ladder, colony 14, colony 15, colony 16
Works Cited


Testing the Effects of Novel Anti-cancer Drugs on T-cell Alloreactivity in a Bioluminescent Mixed Lymphocyte Reaction

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Allogeneic bone marrow transplant can eradicate chemorefractory leukemia. The graft-versus-leukemia (GVL) activity of a bone marrow graft, as well as the graft-versus-host disease (GVHD) activity of the graft are both a result of the activation status of donor T-cells. It has been found that administering certain substances, such as vasoactive intestinal peptide, can optimize GVL while limiting the GVHD activity by modulating T-cell proliferation. The focus of this study was to perform preliminary screenings of novel anti-tumor and anti-inflammatory substances to determine their effects on the proliferation of T-cells in vitro. The primary aims were: (1) to determine if T-cell proliferation increases or decreases when treated with one dose of drug; and (2) to determine how time of treatment and culture reaction length effect T-cell alloreactive response. In order to measure T-cell proliferation we used bioluminescent imaging (BLI) and one-way mixed lymphocyte reactions (MLR) in conjunction with Annexin V apoptosis staining. Mixed lymphocyte reactions consist of a culture of immune cells from two donor strains. The one-way MLR in this project was created using splenocytes retrieved from B6 and FBV Luciferase mice. Because the transgenic luciferase mice produce oxidative enzymes that emit light when reacted with luciferin, the splenocytes extracted from this strain were T-cell enriched and used as responder cells, whereas the wild type B6 mice splenocytes were irradiated to 20 Gy and used as responder cells in this assay. The cells were cultured at a 1:1 ratio at 37 °C for 1, 2, and 3 days, with drugs being added on days 1 and 3. After three days, bioluminescent imaging would be used to analyze the proliferation of the T-cells. Immediately preceding imaging the cells would be treated with luciferin, and then luminescence was recorded using Xenogen IVIS Spectrum imaging system. Annexin V apoptosis staining would then done on a culture that possessed the exact conditions of the culture used for IVIS imaging in order to ensure that a decreased luminescence signal compared to a control was caused by a immunological effect of the drug and not toxicity. Using these methods it has been found that administering the drugs at varying time points in the MLR is useful in showing whether a substance will slightly increase T-cell proliferation before suppression occurs. Using bioluminescent one-way MLR and Annexin V apoptosis staining it was also shown that when treated with one of the four substances in question, Honokiol, T-cell luminescence was suppressed without an increase in the incidence of cell death. Figure 1 shows this decrease proliferation when the cells are treated with different concentration of honokiol, while figure two shows that at annexin V staining shows a non-significant amount of cell death compared to the MLR alone. Because of this, it is thought that Honokiol suppresses T-cell alloreactivity and may be a candidate for further GVL and GVHD testing.
Figure 1: Average radiance of mixed lymphocyte reaction after three days of culture with various doses of honokiol.

Figure 2: Percent of necrotic cells determined using annexin V apoptosis stainine and flow cvtometrv.

References

The Role of CXCR4 in Prostate Cancer Migration to the Bone

Brianne Jennings, Department of Biochemistry and Molecular Biology, University of Nebraska Medical Center

Introduction

Prostate cancer is the most common cancer in American men, affecting 1 in 7 men during their lifetime. One man in every 38 affected with the disease will die. Prostate cancer usually occurs in men at the ages of 65 and older, with African American men being 56% more likely to develop prostate cancer compared to Caucasian men. Many of the patients that die from prostate cancer do not die from the cancer in the prostate itself, but from its complications when metastasizing to other areas of the body, particularly the bone. Metastases to the bone can cause severe pain in patients resulting from fractures, pressure on nerves around the bone and pressure on the spinal cord. In many cases metastasis increases the risk of mortality.

Areas of research being conducted on prostate cancer include the reasons behind metastases of prostate cancer to bone and solutions for its prevention. CXCR4, a G-protein involved in physiological processes in the hematopoietic and immune system, is observed to play a role in prostate cancer metastases to the bone. Research and observations have shown a relationship between CXCR4, the signaling protein stromal derived factor 1 (SDF-1), and the migration of cancer cells. The presence of stromal cell derived factor 1 (SDF-1), a chemokine protein ligand (signaling protein), attracts the migration of CXCR4 cells. Organs and different tissues around the body that have higher levels of SDF-1 will have higher instances of migration of CXCR4 protein expressing cancer cells. The presence of Extracellular signal-regulated kinases (ERK) allows the SDF-1 ligand signal that has attached to the receptor on the cell from CXCR4 to enter the cell by way of a chain of proteins that allow the signal to reach the DNA in the nucleus. This allows for changes to take place within the cell including cell growth and migration on the gradient of the chemokine protein SDF-1 signal. Thus, the hypothesis is that CXCR4 in cancerous cells are signaled and attracted by the ligand SDF-1, causing their migration to different areas around the body.

Hypothesis

CXCR-4 in cancerous cells are signaled and attracted by the ligand SDF-1, causing their migration to different areas around the body.

Experimental Approach

PC3 cancer cells that have metastasized to bone marrow from the prostate were used.

- The cells were treated with Gentamicin to keep bacteria from growing in cell
- The cells were starved and transfected. Adding siRNA which causes mRNA to be broken down so that translation cannot take place after transcription, allows different pathways that may be causing the migration of cancer cells to be observed.
- The cells were treated every 30 minutes with the chemokine signaling ligand SDF-1 for detection of the signaling protein that causes migration.
Western Blot

- The Western Blot was used for detection of phospho ERK and total ERK; chain of proteins that allow signals from the SDF-1 to be taken from the CXCR4 receptor to the nucleus.
- 1-1,000 dilution of primary antibody was used.
- 1-10,000 dilution of secondary was used.
- Dry non-fat milk and BSA were used for the blocking of the membrane.

Invasion Assay

- PC3 cells, which were starved, were put in Boyden Chambers to observe their invasion through Matrigel. The non-invasive cells remain above the Matrigel while the invasive cells migrate into the buffer containing SDF-1.
- Ten wells were used to observe PC3 cell invasion through Matrigel.

Results of Western Blot

<table>
<thead>
<tr>
<th></th>
<th>0’</th>
<th>10’</th>
<th>20’</th>
<th>30’</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhosphoERK</td>
<td></td>
<td></td>
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</table>

PhosphoERK was more prominent at the 10-minute time interval, as shown with the more prominent, darker and thicker band. There was activation of PhosphoERK at the 0 time interval because of stress.

Results of Cell Migration in Invasion Assay

The x-axis represents the number of cells that invaded the Matrigel.

PC3 cells not treated with SDF-1

PC3 cells treated with SDF-1
References


A Tribute to the Founder:
Dr. Nicholas Kenney, Editor Emeritus

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