Opening Declaration: I promise to do this assignment authentically

Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_

Analysis Of FAP

FAP is an abbreviated form of the genetic disorder, familial adenomatous polyposis. This genetic disorder leads to cancer of the large intestine and rectum by the time people have reached their late 30s to early 40s. There are numerous subsets of classical FAP, such as attenuated FAP or AFAP (later onset of colon cancer), Gardner syndrome (tumors of other soft tissue and bone tumors), and Turcot syndrome (increased risk of brain cancer). FAP should not be considered a single genetic disorder but rather a spectrum.

FAP is an autosomal dominant genetic disorder. According to statistics provided in *Genetics in Medicine*, "Approximately 15 percent of colorectal cancer is familial, including FAP and hereditary nonpolyposis colorectal cancer. It has a prevalence of 2 to 3 per 100,000 and acounts for less than 1 percent of colon cancer. APC mutations also occur in more than 80 percent of sporadic rectal tumors," (Nussbaum, McInnes, and Willard).

The phenotype of classical FAP is non cancerous growths, or polyps, from an early teenage age in the large intestine and rectum, which develops into cancer if left untreated. These polyps have a possibility of bleeding, which causes blood to appear in a person's stool. According to Mayo Clinic, other complications that might arise are polyps growing in the upper part of the small intestine and the place where the bile and pancreas ducts meet the duodenum. In addition, non cancerous masses or desmoids, may also develop in the abdomen. Cancers may also occur in other organs. Noncancerous tumors may also develop in the skin or inside bones. Pigment changes in the eyes and dental abnormalities have also been reported.

FAP is caused by mutations in the APC gene. The National Library of Health's online Genetics Home Reference website says that the APC gene occurs on in the fifth chromosome from base pair 112,707,505 to base pair 112,846,239. This gene regulates transcription, cell adhesion, microtubular cytoskeleton, cell migration, crypt fission (formation of the folds in the intestine), apoptosis, and the spreading of cells. The APC protein interacts with several proteins, one of which is β-caatenin. With the mutated APC gene, the APC protein is usually shorter, causing higher levels of unbounded β-caatenin molecules. These free molecules migrate to the nucleus where they bind to T cell factor 4. This activates gene expression at the wrong time and place. In " T-cell Factor 4 Functions as a Tumor Suppressor whose Disruption Modulates Colon Cell proliferation and Tumorigenesis," it states, " Data from Tcf4 mutant mice show a loss of proliferative cells, suggesting that Tcf4 is important for stem cell renewal in the small intestine and the general assumption that the formation of the Tcf4/β-catenin complex is cancer-promoting," (Angus-Hill, Elbert, Hidalgo, and Capechchi 4914). Since the Tcf4/ β-catenin complex is involved in cell proliferation and differentiation, it means that cells containing this complex will have abnormal cell growth in intestinal crypts. Normal people would not have this complex form at the magnitude found with people with the APC gene mutation. Normal people would just have normal intestinal crypt formation that result in no polyps.  
 This alone is not enough to cause cancer. The cancer is acquired from subsequent mutations. These abnormal cells are not genetically stable. Sometimes chunks of chromosomal segments fall off. Some ocnogenes or genes that cause a cell to be predisposed to cancer, such as Ki-ras and N-ras, will be activated, while some tumor suppressing genes, such as one on eighteenth chromosome or the TP53 gene, will be inactive. As these abnormal cells proliferate, these defects accumulate into a lethal cancer if left untreated.

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Closing Declaration: At the close of this assignment, I can attest to having done it by my own hand. If I received help from peers or from tutors in doing it, this was purely to understand the material, and I did not knowingly transfer the information from or to other sources (my peers or otherwise) in the process of doing this work

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