Normal cells vs transformed cells

The purpose of the experiment is to compare and contrast normal cell and transformed cell. Students compare and contrast normal and transformed cell after viewing it under the microscope. The goal of the experiment is to find the characteristics between normal and transformed cell. Each student will observe the morphological differences, as well as the differing growth patterns of these cell types when grown in culture. Normal cells have a shape of normal pattern and you can find some irregularity (1). When you perform to prepare a normal cell, when a cell grows and when cell touches then the growth stops by contact inhibition. Transform cells (Cancer or Tumor cells) have a shape that is irregular and in the nucleus it has multiple nuclei that cause it to be abnormal (1). In abnormal cells there is no contact inhibition and the cells grow multiple layer which leads to tumor or cancer cell (2). In abnormal cells, Metastasis has cancer cells transfer to other part of the body and you see long membrane extension. Abnormal cell has “ giant cells” which has a cell that has multiple nuclei and it looks swollen (1). There are few things that cause normal cells to go to tumor cells. The first thing is Environmental Carcinogens which release chemicals in the air. The second is UV radiation. The third is Retroviruses which has Hepatitis C that develops liver cancer. The fourth is HPV virsus which causes Cervical cancer.

The staining procedures were the same for normal and transformed cell. The group received one coverslip with each cell type attached. The coverslips contained markings which when oriented correctly by the group it indicates the slip of the coverslip to which the cell is attached. The group handled the coverslip very carefully because the coverslips were fragile. The group then grasped the coverslip with a forcep and dipped it into stain one for only one

second. The group dipped the coverslip into stain one once more. The group then transferred the coverslip immediately into stain two for only one second and repeated this step once more. The group avoided overstaining of the coverslips. The group then rinsed the coverslip with distilled water for few seconds to wash off any residual stain. The coverslip was then air dried completely. The group blowed the coverslip gently to speed up the process for permount to be added to the microscope slide. After the coverslip was completely dried the group took a wooden stick to add one to two drops of permount to the middle of the microscope slide. The group then placed the coverslip cell side down onto the permount. After the coverslip was added the group applied gently pressure to the coverslip to evenly distribute the permount between the slip and coverslip. The group avoided air bubbles and later allowed the permount to dry on the slide. The group observed the cells under a microscope with low and high power. In the low power the group was able to see the shape, growth patterns, and cell distribution. In high power the group was able to view the nuclear, nucleolar shapes, chromosomes, and cytological aberrations.

RESULTS:

In L929 of the transform cell it has various cell shapes characteristics. Due to the migration across the coverslip during growth, the cell membrane extends in various directions. The membrane “ ruffling” is characteristics of migratory cells and cells internalizing droplets of medium by pinocytosis. Note the giant cell in the center of the photograph on low power. This abnormality may result from the fact that the cells are grown on artificial environment (plastic). The presence of the giant cell is an indication of problems in the

cell culture environment unless the frequency of the cells rises above normal level. The multiple nuclei result from the loss of coordination between karyokinesis and cytokinesis, thereby resulting in an increased number of nuclei per cell. The cell in the center of the photograph of high power which has long membrane extension shows that it probably was undergoing migration when it was fixed. You can also note the variety of the cell shapes in the photograph. You can also note the binucleated cell on the lower right corner of low power. This is not rare for that particular cell type.

In IMR 90 the growth patterns of the cells were noted. IMR 90 is much larger than the L929 cell and also you can see the orientated growth pattern. As shown in high power the nucleus was spotted in each cell. The nucleus is elliptical. The difference is size probably represents the difference in cell cycle positions. When a confluent monolayer of cells is formed in the culture flask they will cease growing and migrating. On the other hand, most but not all transformed cells are not contact inhibition and will continue to pile up on each other when confluency is reached. L929 usually does not continue to grow once confluency is reached. Contact inhibition is the cessation of cellular division when the cells have covered the entire surface of the growing vessel. This is a property common to all normal cells and some transformed cell. An example of an agent (biological or environmental) which can result in the formation of a transformed cell is In vitro (plastic). The abnormality may result from the fact that the cells are grown on an artificial environment (plastic) which is also known as giant cell. Two distinct morphological differences between the IMR-90 cells and the L-929 cells, one is growth pattern; the diploid human lung fibroblast cell, IMR 90, is much

larger than the L929 cell. The second is the difference in size probably represents differences in cell cycle positions. “ Giant” cells are a common anomaly present in some cell lines when growth in culture and that causes it to form. Giant cells form because when the cell growth continues in the absence of cell division. Giant cells are reproductively dead and metabolically alive. The purpose and action of trypsin is proteolytic enzyme which digests various extracellular proteins which bind cells to each other as well as binding cells to the tissue culture flask. Over trypsinization can result in the destruction of cells as it begins to digest the plasma membrane proteins. The action of trypsin can be inhibited by adding serum following trypsinization. The serum contains an anti-trypsin agent which inactivates the enzyme. Aneuploidy is the situation which exist when the nucleus of a cell does not contain an exact multiple of the haploid number of chromosomes; one or more chromosomes being represented more or less times than the rest. The chromosomes may or may not show rearrangements. I would expect IMR 90 to have this condition because IMR 90 does not have exact multiple of haploid number of chromosomes and other characteristics. In vivo mean existing or carried out inside a living organism, e. g. in a test or experiment. In vitro means in an artificial environment rather than inside a living organism, e. g. in a test tube. When one examines a specimen with a microscope low power should be used first because you can see the cells better and you can identify few things. In high power you are zoomed into the cell and you go into more depth of the picture. It is important to do cell culture work using aseptic technique because cell culture is used to denote the growing of cells in vitro including the culture of single cells and aseptic technique performs laboratory

manipulation in the absence of fungi, bacteria, viruses, or other microorganisms. When a researcher isolated a population of cells many years ago and has continued to maintain that cell line through subculturing, I would expect this cell line to be normal because cell line is a cell culture from a single cell and subculturing is a secondary biological culture. The contamination rate is low and you keep taking the culture from a pure one so you would have normal cells.

CONCLUSION:

Tumor cells vary from normal cells in several basic ways. The first is the separation of normal cells that is tightly regulated by special cell signals. With tumor cells the signals are no longer produced or perhaps they are no longer received. Research cells are often able of removing the cells from an individual and growing them in a sterile dish with the nutrients required for their survival (2). Growing cells is termed as “ cell culture”. The normal cells grow until the bottom of their dish is covered with the cell in culture. If the density is reached, they stop dividing because there is no more space (2). If one cell dies the next one divides to fill the space. Normal cells will divide a certain number of times after the division process stops (2). There are a certain programmed number of generations that may be produced and then there is no more dividing (1). Finally, the entire culture will die.

Tumor cells will divide over and over again and in culture it will become a piled up mess of cells. It is as though tumor cells lose the capacity to follow the rules and they divide (proliferate) out of control (2). A second major difference between normal cells and tumor cells is that normal cells perform a special function for the body. Normal cells have specialized behaviors and

serve as a purpose. Normal cells taken from different tissues have different appearances. Tumor cells have a different appearance than normal cells taken from the tissue they are derived from. This is due to the fact that they have lost their specialized function (2).

CITATION PAGE:

Gershman, H., Drumm, J., and Culp, L. Sorting out of normal and virus-transformed cells in cellular aggregates. The Journal of Cell Biology. 1976; 68: 276-286.

Woynarowska, B., and Woynarowski, J. Preferential targeting of apoptosis in tumor versus normal cells. Biochimica et Biophysica Acta. 2002; 1587: 309-317.