

The Effects of Aspirin on Proliferation of Fibroblastoma Cells in Cell culture

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Abstract: Aspirin is today widely used to lessen mild pain and fever, reduce inflammation and prevent heart attacks and strokes. The reports indicate that aspirin also has anticancer effects. This study was exerted to determine the effects of aspirin on proliferation of fibroblastoma cells in cell culture. In this laboratory experimental study, fibroblastoma cells were exposed to 10mg/ml, 1mg/ml, 0.1mg/ml, 0.01mg/ml and 0.001mg/ml of aspirin in cell culture. After 48 hours, the viability of fibroblastoma cells was examined using MTT assay. The data was analyzed using ANOVA. Our findings show that viability of fibroblastoma cells decreased significantly when exposed to 0.001mg/ml of aspirin. Other doses of aspirin resulted in increased viability. Our findings show that aspirin has anti-proliferative effects against fibroblastoma cells only in lower dose.

Keywords: Aspirin, Viability, Fibroblastoma Cell.

1. Introduction

Aspirin is the common name for acetylsalicylic acid - a painkiller which can be traced back to Greek times. Aspirin was first introduced by the drug and dye firm Bayer in 1899. [1] It is classified among the nonsteroidal anti-inflammatory drugs (NSAIDs) that causes several different effects in the body, mainly the reduction of inflammation, analgesia (relief of pain), the prevention of clotting, and the reduction of fever.[2]

Aspirin is today widely used to lessen mild pain and fever, reduce inflammation and prevent heart attacks and strokes.[2] Over 100 billion aspirin tablets are swallowed each year, and it is the most successful non-prescription medicine of all time. However, much remains to be learned about the mechanisms by which aspirin helps the body.[3]

Since the 1970s, scientists have suggested that aspirin works by blocking production of hormones called prostaglandins which are involved in pain and inflammation.[4] This does not seem the whole story, The mechanism of action, efficacy, and toxicity of aspirin in rheumatic and other inflammatory disorders are reviewed here. The nonsalicylate NSAIDs, including nonspecific NSAIDs and cyclooxygenase (COX)-2 selective agents; the use of aspirin for primary and secondary prevention of cardiovascular disease; and the prevention of gastroduodenal and other toxicities from aspirin are discussed in detail elsewhere.[5]

More progress has been made in understanding how aspirin can help. Aspirin is frequently prescribed to patients with damaged arteries who have had a heart attack or stroke. It is an established treatment for heart disease patients because it makes blood less 'sticky', helping to prevent the formation of blood clots in the artery which can lead to a heart attack. [6] Regularly taking a low-dose aspirin (81 milligrams) cuts the risk of such attacks by about 25 to 30 percent, and chewing a standard aspirin tablet at the first sign of chest pain can stop an impending heart attack by preventing blood clots from growing larger. Aspirin's anti-clotting effect also protects against ischemic stroke, the most common kind.[7] Moreover, research has linked aspirin to a reduced risk of

Alzheimer's disease, certain cancers, type 2 diabetes, an enlarged prostate gland in men, and other health problems.[8] But aspirin's benefits have to be balanced against its risks. It can irritate the stomach and cause potentially dangerous internal bleeding, including, in rare cases, in the brain. That can lead to hemorrhagic stroke, the more deadly kind.[9] In some people, aspirin can trigger asthma.[10] And not everyone benefits equally from its effects. Responses differ between men and women, for example.[11]

Even if aspirin does prove to be a wonder-drug as the story unfolds, it would not be wise for everyone to take a daily dose. Some people are aspirin-resistant[12]; some so sensitive that breathing difficulties ensue[13]; children are advised against aspirin use due to a possible association with Reye's syndrome, a rare but sometimes fatal condition.[14] The most common side effect of aspirin is unwanted bleeding in the stomach and even the brain.[15] Recent studies show that aspirin has also anti-cancer effects. This study was exerted to determine the effects of aspirin on proliferation of fibroblastoma cells in cell culture.

2. Material and Methods

2.1 Aspirin Preparation

Aspirin was prepared as powder and different concentrations of diclofenac (10mg/ml, 1mg/ml, 0.1mg/ml, 0.01mg/ml and 0.001mg/ml of aspirin) were used in our study

2.2 Protocol of Study

We used MTT assay in this work to determine the effects of aspirin on fibroblastoma cells viability in cell culture. Briefly, the procedure was continued and carried out in the following steps:

- Day One: 100 μ l of cells was added into each well (96 well plate) and incubate at 37 with 5% CO_2 overnight.
- Day Two: The media was removed and extract was added and incubated at 37 with 5% CO_2 overnight. For control 10% FBS was added to media.
- Day Three: extract was removed from media. 20 μ l of 5 mg/ml MTT was added to each well and incubated for 4 hours at 37°C. 150 μ l isopropanol was added and covered with tinfoil and agitate cells on orbital shaker for 15 min. Absorbance was read at 570 nm with a reference filter of 630 nm and recorded.

2.3 Statistical Analysis

Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Differences with $P < 0.05$ were considered significant.

3. Results

Figure I shows the viability of fibroblastoma cells in response to different doses of aspirin.

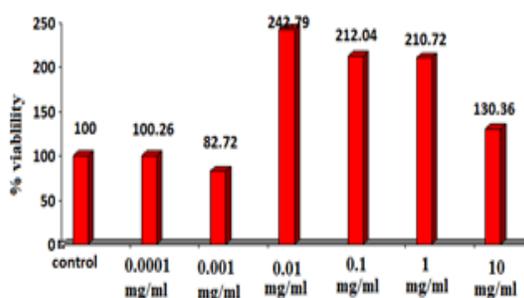


Fig.I. Viability of fibroblastoma cells in response to different doses of aspirin

Our findings show that viability of fibroblastoma cells decreased in response to 0.001 mg/ml of aspirin. However, viability of fibroblastoma cells increased in response to 0.01, 0.1, 1 and 10mg/ml of aspirin

4. Discussion

We have shown that aspirin has enhancing or reducing effects on proliferation of fibroblastoma cells according to the dose of aspirin used. New research adds to the growing evidence that daily aspirin may help prevent certain cancers from occurring. On top of that, daily aspirin may also be an effective treatment for people who already have cancer.[16] In their latest work, the researchers examined the short-term impact of aspirin therapy on cancer, finding a reduction in cancers after about three years of daily aspirin use, says University of Oxford professor of medical neurology Peter M. Rothwell, MD, PhD, who led the studies. Taking a daily aspirin for at least three years reduced cancer incidence by close to 25% in both men and women.[17] In a second study, the researchers examined the impact of daily aspirin therapy on cancer metastasis, or spread, by analyzing newly published data from five other large trials. Among the findings:[18]

- Over an average follow-up of six-and-a-half years, daily aspirin use was associated with a 36% reduced risk of cancer with distant spread.
- Colorectal cancer patients with localized disease had a 74% reduced risk for having their disease spread when they took a daily aspirin.
- Daily aspirin use was associated with a 35% reduction in cancer deaths among patients with solid tumors, but not blood cancers such as leukemia.

A third analysis of trials also showed that regular aspirin use seemed to reduce the long-term risk of developing colorectal cancer, as well as cancers of the esophagus and breast.[19]

A new study claims aspirin could be a powerful weapon against lung cancer. Scientists from New York University School of Medicine claim that the painkiller could cut the chance of developing lung cancer by 50 per cent.[20] The study, published in the British Journal of Cancer, is the first evidence to suggest that aspirin can keep lung cancer at bay - even among smokers.[21] Researchers questioned more than 14,000 women about long-term aspirin use. The researchers found that taking aspirin three or more times a week for at least six months was enough to reduce the risk of developing lung cancer by a third.[22] This latest research is just one of a flurry of studies in the past few years which have claimed that the drug may also help treat other serious illnesses - including prostate cancer, heart disease, deep vein thrombosis (DVT) and bowel cancer.[23] COX inhibitors are currently in the spotlight as a way to prevent the production of PGE2 in cancer patients. One way of inhibiting COX is through nonsteroidal anti-inflammatory drugs (NSAIDs), such as aspirin.[24]

This study found that certain types of cancer in mice were substantially slowed by combining aspirin or other COX inhibitors with immunotherapy. Plus the fact that COX inhibitors appear to reduce gastrointestinal and breast tumors as well as melanoma, the team is hopeful that aspirin and similar drugs can be effectively used alongside current immunotherapy treatments to tackle bowel, breast and skin cancer. [24]

Immunotherapy is growing in strength as a weapon against the disease, as research increasingly focuses on ways in which cancer apparently "tricks" the immune system into allowing it to develop. One way in which cancer avoids the immune system is through "befriending" T cells, which seek out unwanted elements such as bacteria and viruses in the body's fight against disease, but mysteriously, do not attack cancer cells. In the 1990s, a molecule that Japanese scientists called "Programmed Death 1" (PD-1) was found on the surface of T cells. US researchers then found that cancer tumors often produced a matching molecule, "Programmed Death Ligand 1" (PDL-1). In this way, the cancer is able to "trick" the T cells into joining, instead of fighting it, thus circumventing the immune system. This discovery led to the development of a group of drugs known as "immune checkpoint blockade therapies." Another way in which cancers appear to subvert the immune system involves prostaglandin 2 (PGE2). PGE2 normally causes inflammatory response and fever in bacterial and viral infections, but it has been known for some time to promote tumor growth in the gastrointestinal tract. PGE2 molecules "dampen down" the response of the immune system, which enables the cancer cells to "hide." If PGE2 molecules can be destroyed, they say, the immune system will "reawaken," find and kill the cancer cells.[25]

Doctors warn that long-term or high dosage use of aspirin can, in rare cases, cause irritation to the stomach lining, stomach ulcers and bleeding. For this reason you should always consult your GP before taking the drug

on a regular basis.[26] However, much more research is needed to back up the claims made for the drug in recent studies.

5. Conclusion

We have shown that aspirin has enhancing or reducing effects on proliferation of fibroblastoma cell according to the dose of aspirin used.

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