

The Treatment of HPV-Induced Cervical Cancers

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Abstract. HPV causes cancer is a topic of discussion in the contemporary medical community, and there are many papers and scientific experiments published on this topic. This review focused on what HPV is, what cancers it causes, how we should treat those cancers and the right way to work with them, as well as some of the side effects and disadvantages of therapy. In addition, this article introduced some specialized HPV introductory therapies, including LEEP (Loop electrosurgical excision procedure) uses a wire loop heated by an electrical current to get rid of cells and tissue during a woman's lower genital tract, chemotherapy that the simplest thanks to treating cervical cancer and HPV. Chemotherapy may be a treatment that uses chemicals to damage fast-growing cells in the body, and the powerful new antibiotic Doxycycline. This review is focused on "What HPV and its reduced cervical cancer are" and "limitation and development of LEEP, chemotherapy, hormone therapy etc."

Keywords: HPV, Cancer, Treatment.

1. Introduction

Cervical cancer may be a prevalent disease among women globally, with an estimated 604 000 new cases and 342 000 deaths in 2020. Behind the high rate of infection, the majority of cervical cancer is caused by HPV (human papillomavirus). Cervical cancer can affect various parts of the body, including varying degrees of pain in the legs, waist and abdomen. HPV 6 and 11 are liable for around 90% of all genital warts." High-risk strains are people who can cause abnormal changes in cells (lead to cancer). In specific, HPV 16 and 18 usually cause cervical cancer [1]. Moreover, HPV 16 is also a pathogen of anal cancers. There are some causes of HPV that supported our way of life. Multiple sex partners have the very best chance to infect HPV Cervical cancer can be spread by having sex with more than one person, and condom use during sex can reduce the risk of transmission, but the virus can still be transmitted to another person through a large area of skin." All in all, there are three basic rationales for HPV and induced disease.

In contemporary society, HPV is a disease mainly for women. There were about 43 million infections in 2020. The majority of them were around 20s. The symptoms for them were different. Some of them had genital warts. Some had cancers. The death rate of HPV is high, simply because 62% of cancer will cause cervical cancer. HPV can be spread by vaginal, oral sex with someone who has the virus. A series of health problems can be caused by the HPV virus. A genital wart usually appears as a small bump or group of bumps in the genital area. Some of them are small but some of them are large. People who have weak immune systems may not be able to against virus. There are some special treatments for cancers that are induced by HPV virus such as chemotherapy and LEEP. Each of the have strong side effects. Chemotherapy will use tons of chemical substances to fight with the disease. LEEP may cause fertility or any other problems that relate to vaginal [2].

There's research to point out how HPV causes those induced cancers. Cervical cancer viruses affect cell communication and are difficult to identify in infected patients because they can disguise themselves as other cells and secretly alter a cell's DNA replication system without being detected by the white blood cells and lymphatic system.

This review focused on several potential problems of treatments and the way to enhance them. As mentioned in the problems part, LEEP and chemotherapy both are a good way to treat cancer induced by HPV. At the same time, horrible side effects can be caused during treatment. If these conditions are not regulated, they are likely to lead to an inevitable disaster. The psychological and physical

suffering of patients that no one wants to see. In the last section of this review, there will be some new treatments that scientists are still developing.

2. Relationship between cancer and HPV virus

Human papilloma virus (HPV) is serious in the treatment of cervical cancer. The HPV vaccine provides a basic antibody to the body's cells, allowing the immune system to quickly identify them and destroy them before DNA can replicate. In the latest study, the cervical cancer vaccine was most effective in girls ages 9 to 12, providing the greatest protection against the virus later in life estimated to stop up to 90% of HPV-related cancers. Although the vaccine doesn't directly treat HPV patients, it can reduce the prospect that HPV causes other related cancers. Screening for HPV and cell change caused by HPV is the second treatment. this is often different from the last one Screening is usually to check for no symptom's disease. The cervical cancer screening is to look for precancerous cell changes at cancer early stage, and to do so when treatments can prevent cancer from developing [3]. Currently, cervical cancer is the only FDA-approved cancer caused by HPV. Cervical cancer screening is an important part of routine health care for those who have cervix. This includes women who still have a cervix and transgender men. In detail, HPV screening may be divided into several types consistent with the function Currently, there aren't any standard screening tests for carcinoma because the present evidence is insufficient to assess the balance of advantages and harms of screening for carcinoma in asymptomatic adults. quite that, scientists also develop many special treatments for cell changes caused by HPV infections. Most girls who have precancerous cervical cell changes are treated with the LEEP, which may be a method to get rid of the abnormal tissue [4]. However, there are several issues with LEEP treatments.

3. Special treatment – LEEP

In LEEP, doctors use an electrically heated metal to remove cells from a woman's reproductive organs. With modern technology, doctors can use the heated metal to take samples for later research and patient analysis. In addition, the heated wires can still be used as a tool to remove diseased cells. In the treatment of HPV, the cervix is a very thin part of the female genital organ, and the tissue cells in this part are very fragile, so it makes the treatment more difficult LEEP t is employed for Genital warts.” In the most situation, indicating infection with HPV, which could be a risk factor for developing cervical cancer [5]. The foremost common risk within the first three weeks after a LEEP is heavy bleeding. LEEP is also related to an increased risk of future pregnancy problems.

Although most ladies haven't any problems, there's a little increase in the risk of premature births and having a neonate. This narrowing is extremely likely to cause problems with menstruation. The infection could be a common phenomenon within the medical process, In LEEP treatment instruments to avoid wasting the value medical instruments, and scratching the cervix is additionally very likely side effect [6]. The patient's well-being during the examination and also the doctor's proficiency will affect the chance. But LEEP damages the uterus when it's far away from the cervix, which may reduce the pregnancy rate, affect the formation of fertilized eggs, or perhaps cause local infections. Molestation is additionally common in some local hospitals. There are some ways to assist you to endure LEEP treatment. Take pain medication (like Tylenol) for any pain or cramping you have got.” Wearing a sanitary pad for any vaginal spotting and. This discharge is normal for one to 3 weeks after a LEEP [7]. Avoiding sex behavior or placing anything, including tampons in your vagina for 3 to four weeks. Avoid strenuous activity for 48 hours.”7 cardiopulmonary exercise and work should be avoided for extended (at least one to 2 weeks after your LEEP).

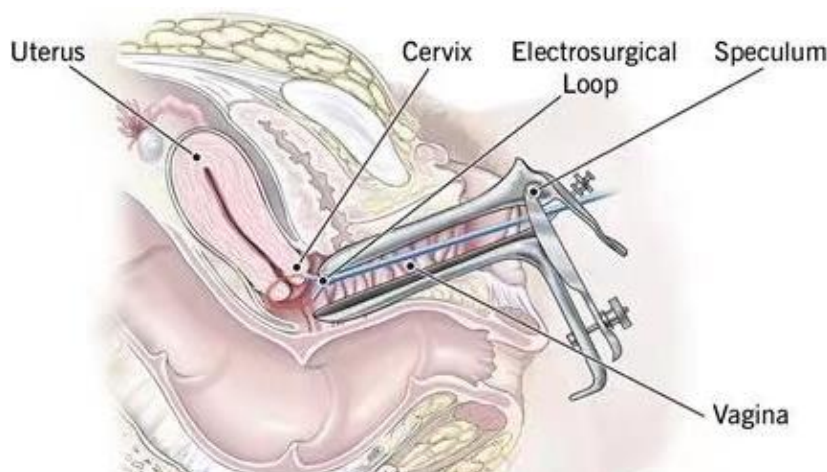


Figure 1. Structure of uterus [10].

4. Another special treatment for HPV virus- Chemotherapy

Chemotherapy is the simplest thanks to treating cervical cancer and HPV. Many alternative chemotherapy drugs are available. Chemotherapy drugs are often used alone or together to treat a good style of cancer. While chemotherapy can treat many types of cancer, there is also a risk of side effects. Chemotherapy has several main goals. At first there was a lack of other treatments to cure cancer. Chemotherapy is considered the main or only treatment for cancer. Can kill hidden cancer cells. But chemotherapy is often used after other treatments, because there are still some raw cancer cells left after surgery kills them [8]. Consider scheduling other treatments, such as neoadjuvant therapy. Most importantly, relieve signs and symptoms. Or palliative chemotherapy, which can help with cancer by killing some of the cancer cells.

Different drugs can have different side effects. Different types of chemotherapy often have specific side effects depending on the person's experience. The most common pain is in the mouth or throat. Canker sores are highly infectious and usually appear 5 to 14 days after treatment. Keeping your mouth and teeth clean at all times through a healthy diet can help reduce your risk of canker ulcers. Since chemotherapy can cause nausea and vomiting, appropriate medication before and after each chemotherapy can usually be prevented. It can also cause constipation [9]. Resulting in infrequent or difficult defecation.

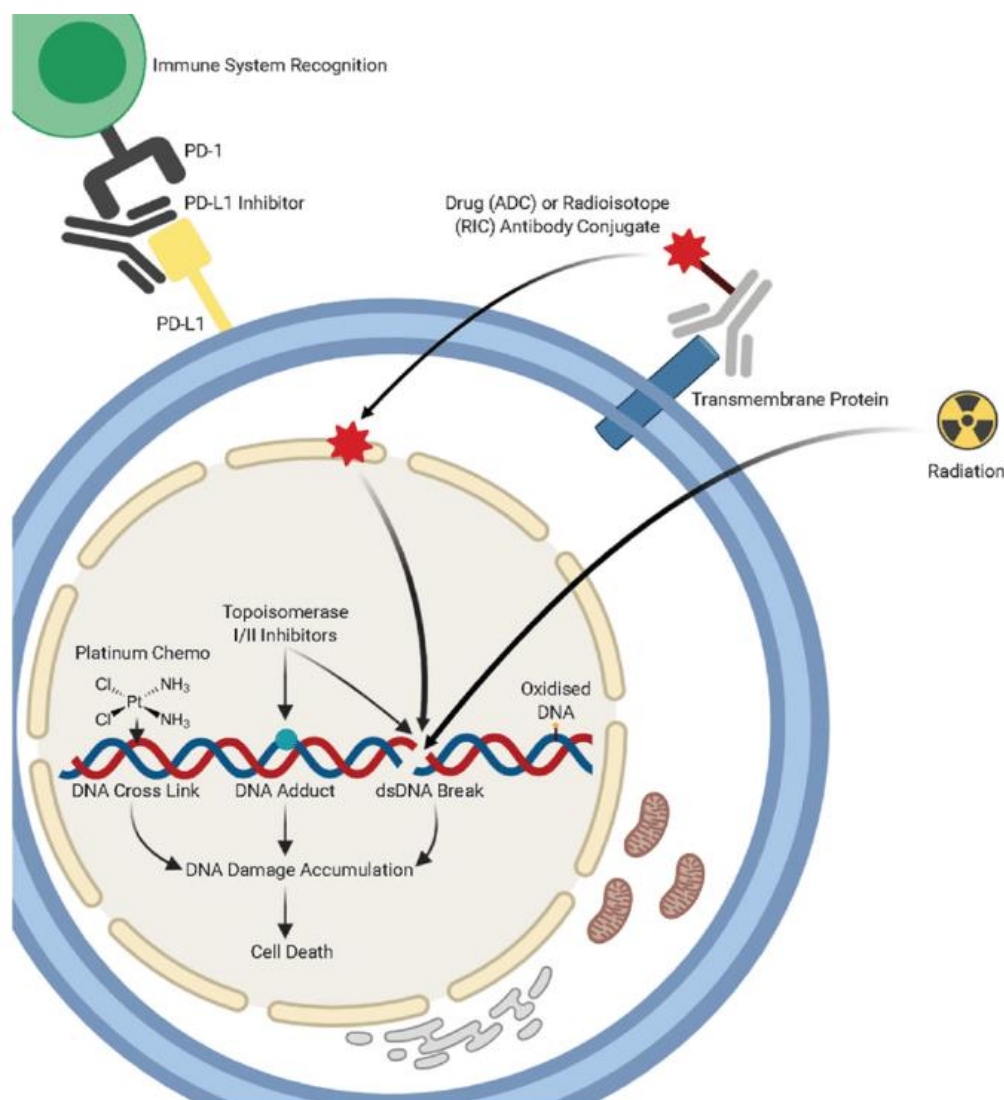


Figure 2. Mechanism of immune system recognition [12].

5. New Treatment – Doxycycline

The latest treatment strategy events deserve attention, cervical cancer clinical research remains a challenge. However, the discovery and development of new compounds is a long and difficult process. Drag and drop positioning can bypass this process and facilitate rapid conversion of a hypothesis science clinic. In the study, doxycycline, an FDA-approved antibiotic, was effective against both human papillomavirus (HPV) positive and negative cervical cancer cells in vitro and in vivo [10]. Doxycycline inhibited the proliferation of cervical somatic cells. It is time - and dose-dependent and induces apoptosis of cervical cancer cells. In addition, doxycycline induces apoptosis through a Caspase-dependent pathway. Studies on the mechanism showed that doxycycline affects oxygen consumption, glycolysis and ATP level of cervical cancer cells, suggesting that doxycycline is a therapeutic xenograft mouse model that can significantly inhibit tumor proliferation [11].

6. limitation of chemotherapy

In general, chemotherapy is a nonspecific treatment that uses reagents to destroy all dividing cells. Different chemicals occur in different ways during the cell cycle. Major drug categories include antimetabolites, plant alkaloids, alkylating agents, antitumor antibiotics and steroid hormones.

Chemotherapy is usually administered through a vein, mouth or muscle [12]. Prolonged dosing is a common chemotherapy strategy.

The rationale for chemotherapy is that the first rapidly dividing cells are the most vulnerable to the drug. For example, methotrexate is commonly used to treat cancer. "Methotrexate is a high-dose folate antagonist. It can be fatal if not carefully monitored. Methotrexate is used in DNA synthesis by competing with folic acid for the synthesis of thymine in uracil. Cancer cells are most vulnerable to methylphenidate. They will be "fastest in the body. Cancer cells, which are one of the four bases, attack them because they are most needed for DNA synthesis. Inhibits dihydrofolate reductase, an important folate-activating enzyme. Methotrexate binds to DHFR in dihydrofolate and can lead to incorrect fusion of bases to tumor DNA, which can lead to cell death. Other drugs (such as sate) are in studies with the drug of interest such as methotrexate, tumors are often evidence of this treatment. Due to incomplete inhibition of DHFR by MTX, tumor cells can be replenished by producing large amounts of DHFR. The mechanism of action of a drug that often proves to have no effect on the tumor, the doctor can determine if this is a potentially treatment. You can check this decision, which is important because the drug is potentially toxic [13].

An important advantage of chemotherapy is that it can spread throughout the body, allowing it to attack many types of cancer, whereas surgery and radiation therapy can only treat one area. Disadvantages of chemotherapy include toxic side effects, the development of resistance to chemotherapy, and the need for other types of treatments in combination with chemotherapy to treat patients. These shortcomings make molecular-based therapies increasingly valuable. Finally, a better understanding of the molecular basis of cancer could advance molecular therapies. Unfortunately, molecular therapy cannot work effectively without involving other types of therapy.

7. Limitation of radiation

Like chemotherapy, the main effect of radiation therapy is to kill more cancer cells than normal cells. Unlike chemotherapy, however, radiation targets tumors by irradiating specific parts of the body. Chemotherapy mainly targets cancer cells because they replicate faster. Radiation therapy involves targeting the tumor with high-energy radiation particles. Radiation therapy considers the support of the tumor and whether the surrounding organs are affected by radiation. Side effects include damage when the beam enters.

Radiation therapy consists of two methods: external beam and internal beam. The former focuses a beam of high-energy wavelengths on the tumour (using x-rays and protons). In the latter, radioactive particles are implanted directly into the tumor. The particles are small and made up of the radioactive isotope iodine-125.

8. Limitation of surgery

New surgery using laser and laparoscopic techniques is a more mature treatment. Allowing doctors to operate on patients without trauma. Surgery is important to diagnose the patient (i.e., biopsy). While surgery seems to be the most effective treatment, it does have some drawbacks [14]. For example, surgery can only treat local tumors. In other words, surgery is not very effective if a patient's cancer has spread widely. Another drawback of surgery is that it can leave cancer cells in the body or escape by destroying the tumor. Therefore, additional treatment is required. The most effective treatment is to kill any remaining cancer cells. Usually, radiation and/or chemotherapy are the preferred treatment. With the development of molecular-based treatments, any remaining cancer cells can be killed with fewer side effects. Therefore, a better understanding of the molecular basis of cancer is important.

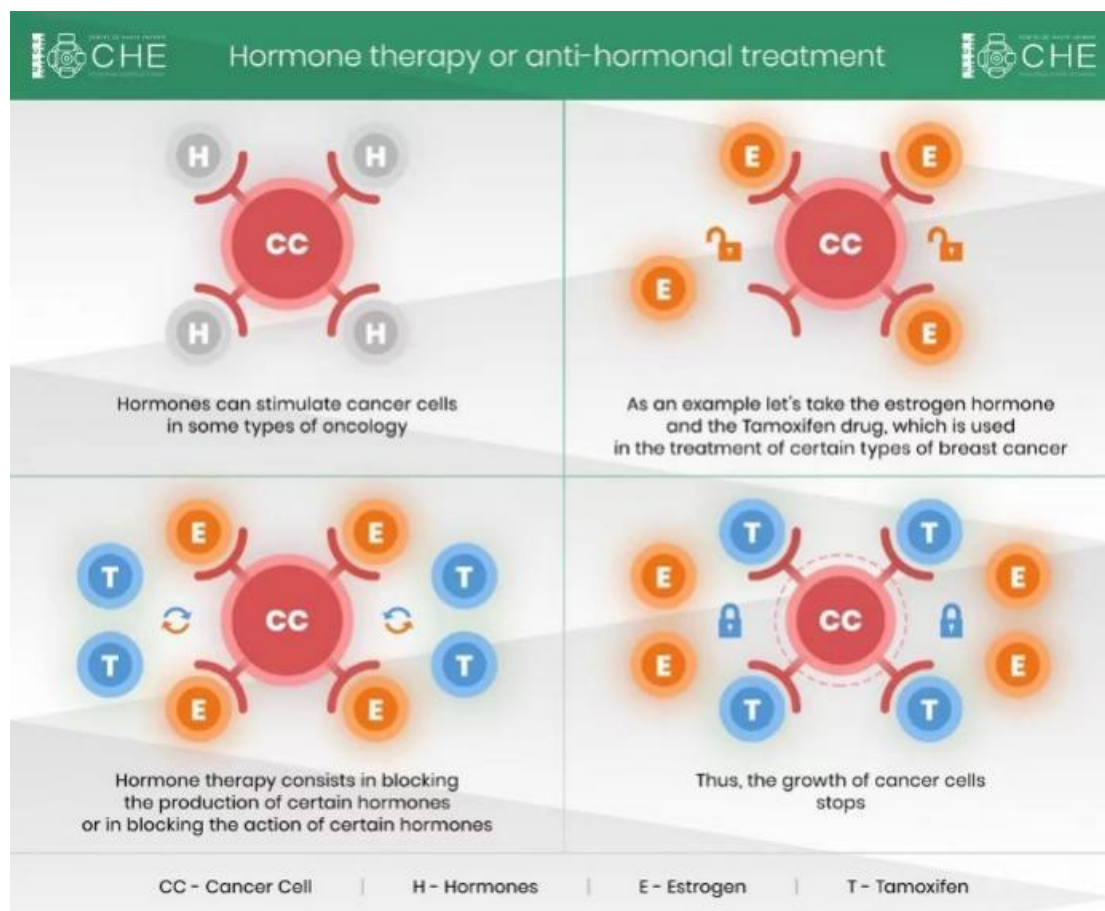


Figure 3. Hormone therapy or anti-hormonal treatment [14].

9. Limitation and development of hormone therapy

Hormone therapy, also known as endocrine therapy, has three conditions that need to be addressed in advance. This method firstly interferes with the expansion of normal cells, secondly over time there are many side effects such as the development of more cancer cells because of this, and thirdly the blocking of nutrients can affect the absorption of nutrients by normal cells, leading to more rare complications. Prostate treatment is the first major type of hormone therapy, mainly by removing testosterone from the testes. To do this, enough luteum needs to be released each month to inhibit testosterone growth without removing the testes. In contrast, there are treatments for estrogen, and tamoxifen and interferon are very important treatments for women. In clinical practice, interferon directly attacks white blood cells, making it possible to treat leukemia and cervical cancer [15]. One of the biggest controversies of hormone therapy is that it is not clear how much side effect hormone therapy has on human immunotherapy, and reduced immunity may lead to complications that are more difficult to cure.

10. Conclusion

There are many ways to get infected by HPV. HPV 16 is a pathogen of anal cancers. There are some causes of HPV that supported our way of life. Multiple sex partners have the very best chance to infect HPV. Because HPV is spread from one person to a different by sexual contact, people increase their risk of getting a case of HPV after they jazz with multiple partners, whether people use a condom. There is still no direct answer to the question of HPV inducing cancer. But it can be approached in many ways. LEEP and chemotherapy, for example, will establish treatments. In some cases, there is no direct treatment or many side effects. Brain damage and nerve damage caused by high doses of antibiotics are issues that scientist should discuss. There are also many treatments in

the pipeline, such as a powerful antibiotic called Doxycycline. This antibiotic can induce cervical cancer cell death in a dose-dependent manner. The principle is to affect the oxygen consumption rate of viral cells and produce ATP levels. Like the figure above, Native Virion can affect epithelial cells so easy. The reverse polymerase can transcribe RNA to DNA so that somatic cells will transcribe and translate viral DNA structure.

References

- [1] Berman, T. A., & Schiller, J. T. Human papillomavirus in cervical cancer and oropharyngeal cancer: One cause, two diseases. *Cancer*, 2017, pp. 2219 – 2229.
- [2] Gupta, S. M., & Mania-Pramanik, J. Molecular mechanisms in progression of HPV-associated cervical carcinogenesis. *Journal of biomedical science*, 2019, p. 28.
- [3] Schiffman, M., Castle, P. E., Jeronimo, J., Rodriguez, A. C., & Wacholder, S. Human papillomavirus and cervical cancer. *Lancet (London, England)*, 2007, pp. 890 – 907.
- [4] Castle, P. E., Einstein, M. H., & Sahasrabudhe, V. V. Cervical cancer prevention and control in women living with human immunodeficiency virus. *CA: a cancer journal for clinicians*, 2021, pp. 505 – 526.
- [5] Wang, R., Pan, W., Jin, L., Huang, W., Li, Y., Wu, D., Gao, C., Ma, D., & Liao, S. Human papillomavirus vaccine against cervical cancer: Opportunity and challenge. *Cancer letters*, 2020, pp. 88 – 102.
- [6] Bogani, G., DI Donato, V., Sopracordevole, F., Ciavattini, A., Ghelardi, A., Lopez, S., Simoncini, T., Plotti, F., Casarin, J., Serati, M., Pinelli, C., Valenti, G., Bergamini, A., Gardella, B., Dell'acqua, A., Monti, E., Vercellini, P., Fischetti, M., D'Ippolito, G., Aguzzoli, L., ... Raspagliesi, F. Recurrence rate after loop electrosurgical excision procedure (LEEP) and laser Conization: A 5-year follow-up study. *Gynecologic oncology*, 2020, pp. 636 – 641.
- [7] Mishra, G. A., Pimple, S. A., & Shastri, S. S. An overview of prevention and early detection of cervical cancers. *Indian journal of medical and paediatric oncology: official journal of Indian Society of Medical & Paediatric Oncology*, 2011, 125 – 132.
- [8] Hauner, K., Maisch, P., & Retz, M. Nebenwirkungen der Chemotherapie [Side effects of chemotherapy]. *Der Urologe. Ausg. A*, 2017, pp. 472 – 479.
- [9] Types of Chemotherapy Drugs | SEER Training. *Training.seer.cancer.gov*. (2022). Retrieved 2022, <https://training.seer.cancer.gov/treatment/chemotherapy/types.html>.
- [10] Xu, R. F., Zhang, J., Han, Z. Y., Zhang, B. S., Liu, H., Li, X. M., Ge, H. L., & Dong, X. J. (2016). Variables associated with vaginal discharge after ultrasound-guided percutaneous microwave ablation for adenomyosis. *International journal of hyperthermia: the official journal of European Society for Hyperthermic Oncology, North American Hyperthermia Group*, 2016, pp. 504 – 510.
- [11] Zhao, Y., Wang, X., Li, L., & Li, C. Doxycycline inhibits proliferation and induces apoptosis of both human papillomavirus positive and negative cervical cancer cell lines. *Canadian journal of physiology and pharmacology*, 2016, pp. 526 – 533. <https://doi.org/10.1139/cjpp-2015-0481>.
- [12] Rajagopalan, P. T., Zhang, Z., McCourt, L., Dwyer, M., Benkovic, S. J., & Hammes, G. G. Interaction of dihydrofolate reductase with methotrexate: ensemble and single-molecule kinetics. *Proceedings of the National Academy of Sciences of the United States of America*, 2002, pp. 13481 – 13486.
- [13] Yun, J. H., Diaz, R., & Orman, A. G. Breast Reconstruction and Radiation Therapy. *Cancer control: journal of the Moffitt Cancer Center*, 2018, 25 (1), 1073274818795489.
- [14] Wildguzzi.com. 2022. NGC Fever, Chills, every two weeks. [online] Available at: <<https://wildguzzi.com/forum/index.php?topic=104232.0>> [Accessed 28 April 2022].
- [15] McKinnell, Robert, et al. *The Biological Basis of Cancer*. Cambridge: Cambridge UP, 1998.