The running head appears at the top of each page. Only the cover page has the words "Running head".

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Page #, top, right in the header.

Title in sentence case.

A new way out of cancer: Nanotechnology

Your name

Alexander Mackenzie

Alexander College

Name of the Institutions. Only include the course name & # or your professor's name if your professor requires it.

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Abstract

- The Abstract appears on the first page immediately following your title page.
- An abstract is a concise summary of your research.
  - i.e., it is the short answer to the question, "what is your paper about?"
  - Your abstract should contain your
    - research topic
    - key research questions
    - the participants and methods of research (if applicable)
    - results, data analysis, ***and*** conclusions
  - The abstract is **one, double-spaced paragraph** (some instructors may request single-spaced).
    - It should be 150-250 words long depending on your instructor's guidelines
  - The word "Abstract" should be centred at the top of the page in regular 12 pt. type

Paragraph Settings:
1st line indent 1.27 cm (1/2 inch)

Title centred above the essay in sentence case.

A new way out of cancer: Nanotechnology

In the United States there were an estimated 595,690 fatalit (Siegel, Miller, & Jemal, 2016), meaning that there were an average of 1632 deaths per day just in the US. For an extended period of time, modern medicine has been trying to find a cure for cancer. However, it has not been one hundred percent successful and many people are still dying or suffering from cancer. Nanotechno quickly detect and target the tissues and cells of cancers. It is a romolecular level, allowing the alteration of matter at a range of 1 nanometer to 100 nanometers (Capon, Gillespie, Rolfe, Smith, 2015). Many devices based on nanotechnology have been developed in order to combat cancer including nanotubes, which can trace and pinpoint regions that have suffered mutations in the DNA (Martis, Badve, Degwekar, 2012). In addition, nanotechnology has developed drugs and methods to combat cancer such as drug immunoconjugates which can increase the efficacy of modern cancer medicine (Alam, Naim, Aziz, Yadav, 2014). Therefore, nanotechnology is an efficient way to save the large number of people dying and suffering from cancer. However, nanotechnology is an unexplored field and its safety may be a concern for ple because the side-effects, such as the toxicity level of nanomaterials, can be s. Society must find a cure for cancer and nanotechnology is a viable solution because it ed to increase the efficacy and lower the levels of toxicity of cancer treatment through drugs, devices, and methods developed based on this technology.

Paraphrases, direct quotes and summaries from all research sources correctly cited in-text

Body Paragraphs double – spaced; no extra space between paragraphs

First of all, many people perceive nanotechnology as a risk to their lives, a study published in 2015 by Capon et al. states that the "Australian public perceives greater risks from manufactured nanomaterials" (11). Nanomaterials and their collateral damage are not yet fully known, and this is why many people do not feel safe using treatments based on nanotechnology.

In addition, for a long period of time chemotherapy has been used to treat cancer, and patients are already familiar with how it alters their bodies. Even though there are many disadvantages of using chemotherapy, the side-effects are well-known and this is the reason why many people feel safe using this method. Consequently, a great number of people do not accept nanotechnology because they are afraid. Moreover, it is true that nanotechnology is not completely safe because nanoparticles can be toxic to organs. Even though cancer can be cured, many organs might be damaged by this method. That is to say, nanotechnology is still underdeveloped and it is not safe for use in human beings because it can cause serious side-effects such as lung inflammation (Alam et al. 2014). Therefore, it might be safe to say that this treatment should not be allowed into the public since the aftereffects of this technology may be dangerous for patients.

Nevertheless, Nanotechnology is a promising alternative to improve the efficacy of cancer treatment and reduce its side-effects. Firstly, a more appropriate way to eliminate tumor cells is by using Photodynamic therapy because it has low rates of aftereffects. This method uses laser light with a specific wavelength in order to cause a phenomenon known as photo-damage, which transfers energy to an oxygen, inducing the production of a singlet oxygen. This method causes a microvascular injury and blood vessel blockage in a cancer tumor and it eradicates specific tumor cells (Portilho et al. 2013). This process, known as Photodynamic therapy, allows doctors to eliminate parts of the tumor leaving behind the undamaged tissues. In other words, eliminating tumor cells by using this method is more efficient be
caused in other parts of the body. Secondly, one of the difficultie
such as chemotherapy is that it not only targets and eliminates cancer cells, but also it causes the elimination of many regular cells in these procedures. The *Iranian Journal of Pharmaceutical Research*, claims that "Common anticancer drugs also influence normal cells and cause severe

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side effects" (Jafari, Heidari, Ebrahimnejad, 2016, p. 449). However, nanotechnology has already found a way to overcome this issue. There are many devices based on nanotechnology that can precisely target only cancer cells. One such device to treat cancer is known as a nanotube, which can transform light energy into heat and is able to precisely eliminate cancer cells (Dotan, Roche, Paliouras, Mitmaker, Trifiro, 2016) and accurately identify anomalies in the DNA (Martis at al.). It means that devices such as nanotubes can faster diagnose cancer and precisely eliminate the root of the illness. Lastly, there are classes of drugs based on nanotechnology that have higher cancer treatment efficacy. One promising development is drug immunoconjugates, which can increase antitumor effects and decrease the level of toxicity of therapy (Trail, King, Dubowchik, 2003). The accomplishments achieved through the use of nanotechnology show that it has already made huge progress and surpassed current conventional cancer treatment options.

↔ It is important to understand that a large number of people are concerned with the consequences that nanotechnology can have because it is a new technology and side-effects might still be discovered. Nanotechnology still unknown to many people and it is not a surprise that they are not well-informed about the topic. The article "Current research on public perceptions of nanotechnology", published in *Emerging Health Threats Journal*, shows that a great number of people do not have any familiarity with nanotechnology (Besley, 2013). It is challenging to have positive public perception if the public is expected to accept a science that is not fully understood. In other words, it is clear that many people do not know how nanotechnology could positively affect their health so they assume it could have negative side-effects on their bodies. However, a study shows that public perception about nanotechnology is more positive when people are more knowledgeable (George, Kaptan, Lee, Frewer, 2014). A

survey study by Saji George et al. (2014) claims that "Higher levels of familiarity with nanotechnology were associated with higher benefit perception in general" (p. 9). In other words, the lack of knowledge may influence their perception of its safety. It means that if those people acquire a better understanding of nanotechnology their minds may change to a positive perception of it and they will feel safer.

↔ The concern about toxicity is not completely misplaced because nanotechnology does have toxic properties. Even though it might be toxic, the side-effects seem to be lower than those from other methods already being used. For example, chemotherapy is less beneficial than nanomaterials because its side-effects are more dangerous than those from nanotechnology. It is true that nanomaterial can be toxic but its efficacy has developed to a level that it can precisely target and treat just the unhealthy part of the body, while the healthy parts of the body remain intact, meaning that nanotechnology has already reduced the level of toxicity of treatments. This proves that the toxicity of nanomaterials is continuing to be reduced and, in the future, it can get to a point where nanotechnology is not going to be toxic at all. This can lead to an effective treatment of cancer that does not have any side-effects, which is exactly the goal of many cancer treatments. Therefore, the advantages of nanotechnology are much higher than the disadvantages, which means that nanotechnology is the key to saving more lives from cancer.

↔ Many people are suffering from cancer, and modern medicines, such as chemotherapy, which are already being used have not been able to save the 595,690 American lives lost in 2016 (Siegel et al. 9). The large number of people dying from cancer is a medical issue that must be solved, and a promising way to find a solution is by using nanotechnology because it has already improved modern medicine by efficiently decreasing the severe side-effects caused by cancer treatment. This is because nanotechnology successfully treats cancer without damaging the

healthy cells of the body while minimizing the toxicity level of the therapy. Therefore, it is safe to say that one way to preserve the life of cancer patients is to use treatments based on nanotechnology because the results are better and the damage is much lower than those from established conventional treatments.

References

Alam, F., Naim, M., Aziz, M. and Yadav, N. (2014). Unique roles of nanotechnology in ncer. *Indian Journal of Cancer*, *51*(4), 506-510. Retrieved from .254/login?url=http://search.ebscohost.com/login.aspx?direct=tr sgcl.442756825&site=eds-live&scope=site.

Besley, J. (2015). Current research on public perception of nanotechnology. *Emerging I Threats*, 1-25. DOI 10.3134/ehtj.10.164

Capon, A., Gillespie, J., Rolfe, M., and Smith, W. (2015). om nanotechnologies and trust in stakeholders: A cross sectional study of public, aca government and business attitudes. *BMC Public Health*, *15*(1), 1-13. DOI10.1186/s12889-015-1795-1.

Dotan, I., Roche, P.J.R., Paliouras, M., Mitmaker, E.J., multi-walled carbon nanotube therapeutic biona thyroid cancer cells. *Plos ONE*, *11*(2), 1-18. DOI:10.1371/journal.pone.0149723.

, Kaptan, G., Lee, J., and Frewer, L. (2014). Awareness on adverse effects of nanotechnology increases negative perception among public: Survey study from Singapore. *Journal of Nanoparticle Research*, *16*(12): 1-11. DOI 10.1007/s11051-014-2751-1.

Jafari, M., Heidari, D., and Ebrahimnejad, P. (2016). Synthesizing and characterizing functionalized short multiwall carbon nanotubes with folate, magnetite and polyethylene glycol as multitargeted nanocarrier of anti-cancer drugs. *Iranian Journal of Pharmaceutical Research*, *15*(2), 449-456. Retrieved from

Authors are listed by their last name; all given names are converted into initials. E.g. George Brown becomes Brown, G. (p. 10 in the guide)

The References page is listed alphabetically according to the last (family) name of the first author listed on a source (p. 10 in the APA Style Guide). It is a separate page.

All online sources must have a doi *OR* stable URL.

Paragraph Settings: Hanging indent 1.27 cm (1/2 inch)

Titles of books, journals, films, newspapers, magazines and website names are *italicised*.

Titles of articles in sentence case, no quotation marks.

The entire page is double-spaced; hanging indent 1.27 cm (1 in.). Do not leave extra space between entries.

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Martis, E.A., Badve, R.R., and Degwekar, M.D. (2012). Nanotechnology based devices and applications in medicine: An overview. *Chronicles of Young Scientists*, *3*(1), 68-73. DOI10.4103/2229-5186.94320.

Portilho, F.A., Cavalcanti, C.E., Miranda-Vilela, A.L., Estevanato, L.L., Longo, J.P., Santos, M.L., … & Lacava, A.G. (2013). Antitumor activity of photodynamic therapy performed with nanospheres containing zinc-phthalocyanine. *Journal of Nanobiotechnology*, *11*(1), 3-31. Retrieved from DOI 10.1186/1477-3155-11-41.

Siegel, R.L., Miller, K.D., and Jemal, A. (2016). Cancer statistics, 2016. *CA: A Cancer Journal for Clinicians*, *66*(1), 7-30. Retrieved from DOI 10.3322/caac.21332.

Trail, P.A., King, H.D., and Dubowchik, G.M. (2003). Monoclonal antibody drug immunoconjugates for targeted treatment of cancer. *Cancer Immunology, Immunotherapy, 52*(5), 328-337. Retrieved from http://184.71.180.254/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cmedm&AN=12700948&site=ehost-live&scope=site.