**What is nanomedicine opportunity?**

Nanomedicine is an ongoing project that is driven by medical research in modern society that has a focus on non-infectious diseases such as cancer. The health-care society are consistently looking for opportunities on how to enhance the healthcare services that introduces new diseases, being mindful of the costs involved and how effective a new technology will be with the initiative based on the healthcare demand (Tibbals, 2010). This allows the doctor to be able to monitor patient care through a remote setting which has changed remarkably with medical nanotechnology. This opportunity gives the patient the ability of being seen by a doctor without having to physically attend their appointment in hospital or a clinic.

**What are the risks?**

Prior to any clinical trial being carried out, a patient must be given an informed consent about the possible risks that are associated with the research before they are granted a place to take part in a study (Resnik & Tinkle, 2007). Therefore, these are a few of the possible risks:

1. Through gene transfer and nanomedicine there are potential risks to others such as close contacts of study volunteers and workers (Kimmelman, 2010). On the odd occasion, nanomedicines pose a risk of unintentionally exposing staff during administration. This is a risk as it does not provide insurance for bystanders who might be affected by the exposure from nanomedicine.
2. Inhaling nanoparticle can result in pulmonary inflammation.
3. Nanoparticles that have assembled in the liver can leave a lasting effect such as damaging the excessive immune response for oral drug delivery.
4. Nanomaterials can enter the body through the lung which can then be transferred through the bloodstream to other organs of the body. However, this is a risk in itself which can cause diseases when they are not being discharged and are instead piling up in the cells and tissues. (Riehemann et al., 2009).
5. There is a risk of nanoparticles having the ability to carry a substantial amount of toxic substances to body different parts of the body that can enter the organs and tissues due to its tiny size which provides more reason to be concerned. There are various ways on how nanoparticles can enter the body. It can be through inhalation, consumption or it is possible that it can enter through the skin. It can also be disguised in drug form that enters your body. However, there is caution when a new drug is initialized. Risks come with it and there is a certain organ of the body that requires extra attention to it, which is the brain. If nanoparticle invaded the brain, it may result into a neurodegenerative disease such as Alzheimer’s or Parkinson’s (Hett et al., 2004, as cited in, Andorno & Biller-Andorno, 2014). A nanoparticle can cause an allergic reaction which causes inflammation of the brain and spinal cord.
6. **What is the blood-brain barrier?** The blood-brain barrier protects the brain from unwanted chemicals that could be harmful to the brain as the drug has the potential to enter the blood stream which is then circulated in the body to the organs and tissues. The argument portrays that with risks there will be questions to any new drug being introduced into the body. Such questions would include: What if a nanoparticle was aimed towards a certain part of the body but got re-directed to the brain? What if the nanoparticles were building up inside of the brain that could potentially be a life changing effect?
7. The white blood cells (phagocytes), which is accountable for dismantling the micro-organisms, would not be as effective to protect the body from nanodevices and as a result could harm the body’s immune response from functioning properly. The surrounding tissue would swell when the phagocyte has overflown. In hindsight, this would cause the body to debilitate and as a result the body will not be able to fight against the disease.

**What could be an ethical issue?**

Health information of patients comes with great importance as it raises an ethical concern in relation to nanomedicine. Nanotechnology has the ability to store a large quantity of data which it records the results within body organs, tissues or individual cells which can then be transferred electronically in todays society (Bawa & Johnson, 2007, as cited in Andorno & Biller-Andorno, 2014). In addition, it would become a mission and quite complex to store personal information and at the same time protect personal data which can be shared through technology. This will only enhance the clinician’s awareness to have a fail-safe system put into practice to protect health data that would exclude the use of nanotechnology devices.

A disease can be identified through the use of molecular imaging, if it is detected early, such as cancer. This allows for the image to be manipulated by increasing the resolution to get a clearer view of where the markers lay which provides a diagnosis. Furthermore, it is beneficial for future clinical applications in therapy which will be more affordable. (Riehemann et al., 2009).

**What are the choices?**

Technology has provided hope and change in which the public health is able to provide the best care for the human race in comparison to the past. For example, vaccines were a success in minimizing the death rate with its infectious diseases. Through the vaccines, only then it was known what type of side effects it would implicate and the health risks. Nanotechnology was used to improve the hepatitis B vaccine in modern medical practice which has influenced the population health (Pautler & Brenner, 2010). Nanomedicine has the ability to have a substantial effect on the chronic disease battle.

Due to nanomedicine applications materializing within the healthcare system, it is advisable that the public health workers would need to know more about the contents of nanotechnology and how this can be incorporated within the health environment through training and education. Health professionals would need to learn about the increasing benefits of nanotechnology and its effect on population health to assist in delivering informative contents of its purpose to researchers and medical professionals. In addition, it can provide better patient care by partnering up with other health sectors in the future. New age scientists will provide a wealth of knowledge on how nanotechnology and medicine can be used by implementing nanomedicine for change (Pautler & Brenner, 2010).

**Recommendation?**

During this project it has given me the opportunity to do some research on what some of the risks could be in nanotechnology in medicine. I've never heard of Nanotechnology and was a bit intimidated by the name once we chose this as our group topic, however, I was determined to explore what the world of nanotechnology had to teach me.

I found that an ethical issue in nanomedicine is protecting patients private information where medical records of body organs are stored electronically of the patients results. In addition, it has been revealed that when clinicians have a consultation remotely with their patients to discuss test results or diagnosis that has recently been discovered, this data is already stored in the system which is allocated against the patients file. The quantity of the storage is quite large, therefore it is recommended to have a highly sourced secure system to protect patient information from a cyber-attack.

# 

# References

Andorno, R., & Biller-Andorno, N., (2014). In pursuit of nanoethics. *The Risks of Nanomedicine and* *the Precautionary Principle. 10,* 131–145. <https://doi.org/10.1007/978-1-4020-6817-1_9>

Kimmelman, J. (2012). Beyond human subjects: Risk, Ethics, and Clinical development of nanomedicines. *The Journal of Law, Medicine & Ethics,40*(4), 841–847. <https://doi-org.ezproxy.aut.ac.nz/10.1111%2Fj.1748-720X.2012.00712.x>

Paulter, M. & Brenner, S., (2010). Nanomedicine: promises and challenges for the future of public health. *International Journal Nanomedicine* 803–809. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2962275/>

Resnik, D. B., & Tinkle, S. S. (2007). Ethical issues in Clinical trials involving nanomedicine*.* *Contemporary Clinical Trials*, *4*(28), 433–441. <https://doi.org/10.1016/j.cct.2006.11.001>

Riehemann, K., Schneider, S. W., Luger, T. A., Godin, B., Ferrari, M. & Fuchs, H. (2009). Angewandte Chemie. *Nanomedicine – Challenge and Perspectives.* Pp 872–897. <https://doi.org/10.1002/anie.200802585>

Singer, T. (2016). News at Northeastern. *Northeastern faculty spark a sea change in the nanomedicine field* [image]*.* <https://news.northeastern.edu/2016/01/04/northeastern-faculty-spark-a-sea-change-in-the-nanomedicine-field/>

Tibbals, F. H. (2010). *Medical nanotechnology and nanomedicine.* Taylor & Francis Group.