**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).

According to Abeer (2012), research has found it hard to provide a better health system to support the human race and suffered as a result when it reached its peak. Medical applications were designed to aide in improving health that could be used in virtual environments for training or interactive teaching. In addition, it would revolutionize the way students learn by way of touch, smell, hear physiological functions or medical procedures through the eyes of a physician.

With the expansion of nanotechnology, it is considered that extremely small surgical utensils can be used to assist a surgeon in performing microsurgeries anywhere on the body that are difficult to reach at their exact location if the task were to be performed by a surgeon handling a surgical instrument making it near to impossible in carrying out the procedure. However, with the use of a nano surgical utensil, this can be managed through a computer which is an optimal outcome. In addition, to minimize any errors that may be caused by the use of a nano sized surgical utensil, nanocameras can contribute significantly with visual enhancement during the procedure.

In a chromosome replacement therapy procedure, a medical nanorobot has the ability to carry out an in-vivo cytosurgery at a cellular level. The clinician would manage the nanorobot for an excision of the currents chromosomes withheld in a specific unhealthy cell and replace it with new chromosomes. Nanodevices are expected to make significant changes in the future with the combination of diagnostics and therapeutics called theranostics in medicine.

A crucial part of applications for nanomedicine is the biomaterials such as orthopedic implants used for tissue engineered products. For example, if a hip replacement can be performed at nanolevel then it would be possible to create a replica of the human bones mechanical properties to reduce the stress of bone density.

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