Are nano drug delivery and telehealth solutions a deadly combo for disease?

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Incorporating telehealth solutions into new drug delivery technologies like nanomedicines can potentially give pharmaceuticals the edge they need to win the fight against disease.

Creating drug delivery systems that utilise telehealth solutions like smartphone technologies, Bluetooth, IoT, wearable technologies, and AI would help pharmaceutical companies save money in clinical trials by reducing the financial burden caused by poor medical adherence and provide better patient outcomes through real-time data analysis. Telehealth solutions provide physicians and clinical trial scientists direct access to their patient, and can provide them with valuable data that will improve their performance and the patient's health. Access to real-time patient health data is an opportunity for pharmaceutical companies to develop a range of smart drug delivery systems that could

potentially change the way an estimated 50% of the population deal with their chronic diseases.

With large numbers living with some form of chronic disease, pharmaceutical companies must incorporate telehealth tech into their drug delivery systems to collect real-time data and use the data to improve patient treatment, clinical trial outcomes and apply the data for further research.

The drug delivery systems available in today's market are honestly not that impressive. A Bluetooth-enabled inhaler, smart automatic injectors, and smart pills are definitely technologies that benefit patient care but lack innovative pizzazz. Bluetooth technology was first introduced in mobile phones in 2000. It has taken 17 years to implement the data-gathering technology into an inhaler/auto injector, often at times requiring user actions like downloading from an SD card. I am surprised it has taken this long for pharma to get where it is today, but there is truly hope on the horizon, with recent advancements in nanotechnology.

The future of pharmaceuticals and population health lies in the utilisation of telehealth solutions like the Internet of Nano Things (IoNT), wearables, smartphones and the latest drug delivery tech like smart nanoplatforms, nanoparticles/nanomedicines, and nanosensors. These recent technological advancements in drug delivery should change the way we understand and cure diseases.

Northwestern University has developed a nanoplatform that can assess the effectiveness of nanomaterials in regulating gene expression. The nanoplatform allows scientists to observe nanomedicines and particle behaviour in an in vivo setting. There's no doubt that the relationship between nanomedicines and IoNT is inevitable however there are issues like patient health risks and security that must be taken into account.

Whenever the internet is involved, the issue of security should be raised. Are nanomedicines saving patients' lives, while also putting them at risk of 'body hacking'? Although programmable particles are sending signals from within the patient's body and providing beneficial information for the doctor/scientist, the idea that a signal can be hacked is a horrific reality. Nanoparticle manipulation is possible by gaining access to the particles using ultrasound and electromagnetic field waves making hacking feasible but extremely difficult and complex. The next question is what happens to the nanoparticles after treatment? Will they pose a later threat and become an access point for hackers?

Nanomedicines, after entering the human body, travel throughout reaching the organs, the bloodstream, the lungs and even crossing the semi-permeable membranes into cells delivering the drugs to exactly the right place at the right time. Their disbursement

depends on size and programming. Nanoparticles are metal-based, carbon-based, composites, and dendrimers, and are excreted from the body via faeces and urine. The liver and spleen can also decompose them, however up to 30% can remain in the body for an extended period of time and potentially become an access point for hacking.

Combining telehealth solutions and nanomedicines will benefit the population's health by presenting effective treatments for chronic and deadly pathologies and provide scientists and doctors previously unattainable data for analysis. This previously elusive data has become available thanks to Northwestern University's Nanoplatform, which successfully provides imaging of the nanomedicines' effectiveness on the MGMT gene, a chemo-resistant cancer gene. This data has already provided a better understanding of the nanomedicine's mechanics and provided researchers with the best time, after treatment with nanomedicines, to administer chemotherapy.

Nanoparticles appear to be a solution that can improve the health of the population, however there are still potential risks for patients. Although most nanoparticles are tested in labs and in vitro, a few potential health risks have been observed. Risks like the creation of a protein "corona" (a shifting population of different molecules) can influence the immune defence system and mistakenly allow the corona to penetrate good non-targeted tissues. The clumping of protein molecules can also be linked to multiple pathologies, including amyloidosis. Some nanoparticles have also been linked to genetic mutations, DNA damage, and chromosomal alterations, however they are rarely attributed to all three at once. It is quite clear that more research and testing is required to truly understand the future of nanomedicine and its effects on the human body.

Nanomedicines target a specific area within the body, can delay activation and have the potential to relay real-time data for analysis. Scientists and doctors can finally have a real-time view of their treatments and understand the pathology and its interaction with the medicines, leading to data that will help the healthcare industry save lives, defeat disease, and save money. The benefits in combining telehealth solutions with nano drug delivery systems is evident and it is the colossal leap forward that the industry has been looking for in the never-ending fight with diseases like cancer.

Original article can be found here:

https://www.epmmagazine.com/analysis/are-nano-drug-delivery-and-telehealth-solutions-a-deadly-com/