

Research and Reviews: Journal of Pharmaceutics and Nanotechnology

mHealth Sensors: Innovation in the Pharmaceutical & Health Care Therapy

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Review Article

Received: 01/10/2016

Accepted: 04/11/2016

Published: 11/11/2016

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2. Keywords: mHealth, Biosensors, Wearable technology, Health care, Monitoring system, Markets, Sensors.

ABSTRACT

mHealth sensors are well known as mobile health sensors, which are used in the practice of medicine and public health supported by mobile devices. For easy understanding of mHealth, we need to have an overlook on to biosensors which are well established in the medical field. Biosensors are the analytical devices which will convert the biological response to the electrical signals. Biosensors are also said to be analytical devices which are intended to use as an analyte, which pools the biological component with a physicochemical detector. mHealth sensors are categorized into 4 types, those are wireless sensor networks, eHealth, wearable technology and Wban technology. mHealth sensors are useful for the patients to get monitored with the health data and physiological data without visiting to the doctor and can access from the devices from home. mHealth sensors are emerging in the current modern technology and this may be getting boom in the near future, so that we can operate and get the physiological testing data from home and as per our feasible time.

INTRODUCTION

Health care access, quality and affordability are problems having around the world and for a maximum number of individuals aren't receiving the quality care that they need. Now a days, Mobile technology offering many ways to avail the applications towards the health care [1-3]. Through mobile health applications, sensors, medical devices, and remote monitoring products, there are approaches where the health care delivery can get enhanced or increased. Modern technologies will help in lowering the costs by expediting or enhancing the drug delivery and connecting the people to the organizations and institutes which are offering the health care [2,4-8]. An application allows the benefit to both patients and health care providers to have a mutual approach towards the reference sources or data, medical records using lab testings and mobile devices [9-13].

The Recent developments like in telecommunications [12], sensor manufacturing and data analysis techniques have made promising effect for using well adopted technology in the digital health to reach the positive effects [14-16]. In previously, the vast size of sensors and front-end electronics were too difficult to handle so as to gather physiological and movement data. Chemical sensors are made up of carbon nanotubes. In the mean period like miniature circuits, microcontroller operations, front-end amplifier and transmitters, adoptable sensors can now be placed in "digital health monitoring systems" (Figure 1).



Figure 1: Using of mHealth technology for knowing the pulse rate by mobile device

METHODS & MATERIALS

Utilization of Nanosensors

Nanosensors are the sensors which are in the form of biological, chemical, or surgical sensory points which are applied to transfer the information about nanoparticles to the macroscopic world. Nanosensors are majorly used for the detection of presence of chemical species and nanoparticles [17], or to detect the changes in the variations in temperature. The main uses include various medicinal and as a pathways to build the other nanoproducts [17-19], such as PC chips that work on the nanoscale and nanorobots. There is a lot of requirements today to make nanosensors; these include top-down lithography, bottom-up assembly, and molecular self-assembly. Nanosensor technology is a newly emerging field, as the world projections for the sales of products incorporating nanosensors to a range of \$3billion. Nanosensors are of chemical or mechanical sensors on comparing to other applications they can be used.

Barriers in Utilization:

mHealth is well known as mobile(m) health [16,20-22], it is a term which is using for the operation of public health and medicine by the help of mobile devices. The term mHealth is most commonly used in reference to using mobile communication devices, likewise for mobile phones, for health service providers and information, but it will also affect the emotional states [23-27]. The mHealth field has emerged as a sub-segment of eHealth as the use of information and communication technology (ICT) for health services and information [2,28-29]. mHealth applications include the use of mobile devices in collecting the data in clinical patient community and clinical health community, passing of healthcare information to practitioners and patients for real-time monitoring of patient vital signs, and direct provision of care [30-36]. There is a need for encouraging the use of mobile systems, such that monitor patient symptoms and provide real-time device in treatment and medication because they have the potential to lower the costs, reduce errors and improves the patient's experiences [15,20,37-44].

In spite of wearable and adoptable sensors (**Figure 2**), A Georgia Company is pushing into the mHealth market with a vital signs monitoring solution that slips beneath a bed or chair mattress and that requires no contact with the patient [45-55].

Wearable Sensor technology is getting serious attention in the media and for good reason. As such devices will transform medical care in unimagined ways [56-59], turns into science fiction to science fact. The upgraded wearable health care devices are of sport wear and for daily use [24,36,60-66]. Wearable flexible strips are the sensors attached to the hand and some parts of the neck for the easy access of remote sensors [65-69].

Many wearable or adoptable tech devices are using the multiple digital health sensors which are often connected into sensor networks consisting of typical body-worn sensors and ambient sensors. Some of them are required with the monitoring systems with the grouped sensor and the data to be uploaded in a remote site likewise in a hospital server for the purpose of clinical analysis [70-76].

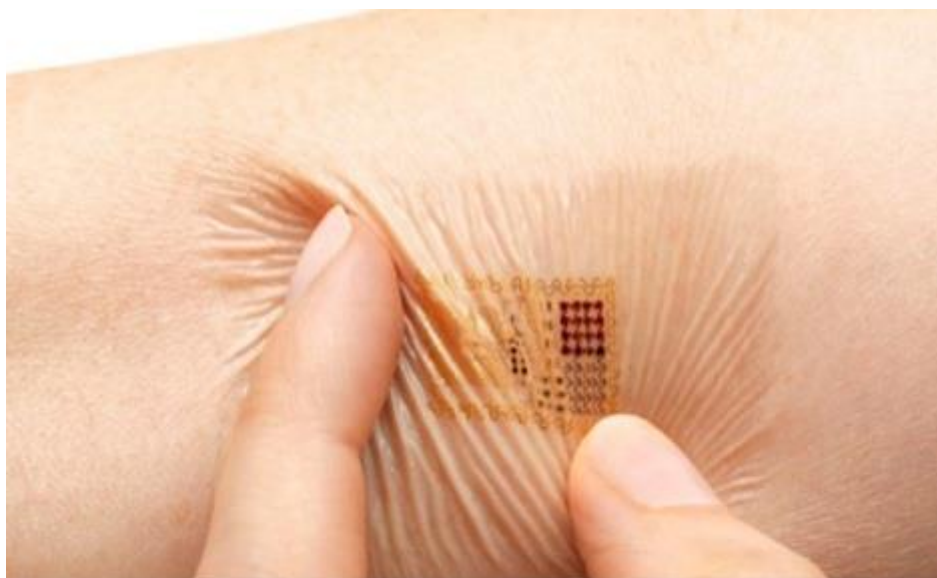


Figure 2: Wearable sensors showing the implanted flexible strip.

DISCUSSION

With the arrival of cloud-computing, many wearable sensor systems can now easily updated without the need for user software installation in the monitoring devices (**Figure 3**), which gives easier way of maintenance and cheaper to handle the health monitoring system networks [77-80].

Major fitness trackers, even the most practical ones on the market cannot be done much more than the actual count of your steps or to measure your heart rate [17,80-82]. But researchers have found a device that can do much more, built into a wristband, where it can monitor chemicals in the body's sweat, that may be used to non-invasively in order to assess medical conditions, drug abuse and trainers optimize the performance of elite athletes and many more.

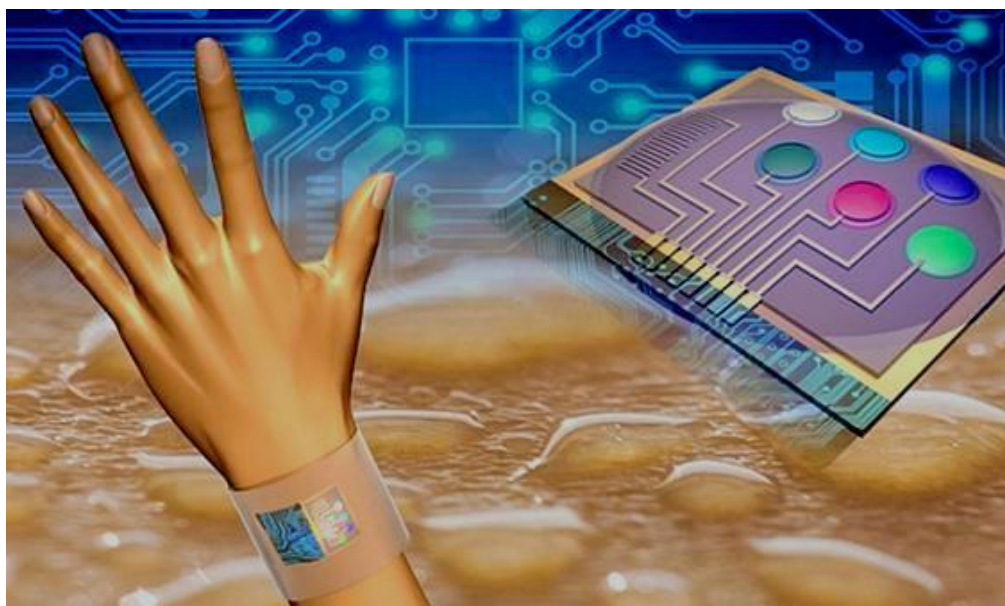


Figure 3: Wireless, flexible wristband measurement

Major application of Sensors and wearable's devices are:

Health and Wellness Monitoring: Monitoring of the physiological data will be taking place in that chronic conditions can facilitate timely clinical interventions [83-85]. Sophisticated fitness sensors and wearable's are widely used in the Cardiac and diabetic purposes.

Safety Monitoring: Sensors and wearables were developed to detect falls, epileptic seizures and heart attacks in older people and other diagnosed patients [86-88].

Home Rehabilitation: Sensor technology sometimes useful in the combination with collective gaming and virtual reality environments to promote the home-based rehabilitation for patients with heart disease and physiotherapy.

Advancements

Growth is established by three major markets, which are healthcare, consumer, and industrial. Wearable technology is getting to be a part of the IoT revolution, leading to useful information directly to the indeed in a more common and friendly way than with traditional electronic equipment. We are expecting the consumer market to be comprised of fitness bands and smart watches to grow larger in the market [44,87-90]. The healthcare market, which covers devices such as blood pressure monitors, hearing aids and back monitor sensors are expected to grow at a lower rate as since this market is getting boom for many years [91-94]. If we are comparing the industrial market, we expected slow.

CONCLUSION

Application of mHealth sensors with the pharmaceutical and Nano carbon tubes:

Nanosensors are majorly classified into nanotube sensors, nanowire sensors and cantilever array sensors. Carbon Nanotubes are used as mechanical and chemical sensors. It is detected that electronic properties of CNTs are sensitive to the adsorptions of few type of gas molecules [95-97]. Sensors are capable of detecting a range of chemical vapors. When molecules bond to nanowires made from semiconducting materials such as zinc oxide, the conductance of the wire changes. The amount that the conductance changes and in which direction depends on the molecule bonded to the nanowire [97-100].

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