

# Nanomedicine: a hope for mankind

## Opinion

Late 90s, mankind's first 'giant step' has made in the medical science when the nanotechnology met the healthcare field. The new branch was emerged called "Nanomedicine" which can describe as follows: By engineering the nanodevices and designing the therapeutic drugs at the nanoscale level for the complete examining, control, construction, restore, protection, and enhancement of all human biological system.<sup>1</sup> What makes the nanomedicine to flourish the future health care system?

## The necessity

Conventional health care system is challenged by the three interlocking crises, i.e. (i) Cost, (ii) Demographic variation and (iii) Quality. Current statistics unfold that due to the poor quality of the present system, 15 % of the patient admitted to the hospitals suffered from the adverse event. 10-20 % of all adverse events are caused by a medication error. The outcome of the conventional health care R&D labs is lesser than the cost invested. Usually, the patient responds to the therapy is always lower than 50 % in most chronic disease such as; Migraine, Rheumatoid arthritis, Osteoporosis, Alzheimer, Oncology, etc.<sup>2</sup> Moreover, the present diagnostic system is based on the symptoms rather than prediction / prevention and lacking in early diagnosis/managing illness. To overcome these issues, development of the new technology is crucial. Hence, nanomedicine made the revolution in the healthcare by greatly improved directed therapies for treating cancer and cardiovascular disease using new nano-drug / gene delivery systems. The tiny implantable devices help to supervise the health precisely and nano-biosensor provides the data at the earliest stage of the disease.

## Present

Under the hood of nanomedicine, there are various robust machines (nanosensors,<sup>3,4</sup> nanorobotics),<sup>5-8</sup> analytical methods (quantum dot fluorescence,<sup>9,10</sup> DNA proteomic arrays),<sup>11</sup> new materials (biomimic, self-assembling materials),<sup>12</sup> gene therapeutic materials (nanocapsules<sup>13</sup>) and new pharma system (nanoparticles labeled drugs, theranostics) has developed thus far. Currently, 44 nano-drug delivery and 15 nano-imaging / diagnosis products are commercially available. At the same time, regulation of these products is necessary before appearing to the public because of their toxicity.<sup>14</sup> Today, it even remains difficult to challenge some of this postulation (safety vs. Efficiency). However, nanomedicine rewrite the history of the health care system by finding the cure and enhance the rate of patient response to the therapy in chronic diseases, such as HIV/AIDS,<sup>15</sup> Tumor,<sup>16</sup> Diabetics,<sup>13</sup> and Malaria.<sup>17</sup> In addition, one of the growing public health problems is 'superbugs' which is induced by the improper and excessive use of antibiotics has led to the evolution of antibiotic-resistant bacterial strains. Nanomedicine has started the work on this issue, already.

## Prospects

Common to all science is that discoveries always raise additional questions. Despite the fact that numerous research has done in a targeted drug delivery system yet the interaction of protein and nanosystem mechanism is mystified. A strong pipeline focused

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on various therapeutic areas is also expected to the growth of the nanomedicine in the academic as well as an industrial sector in the current era. The global nanomedicine market is scheduled for the amount of US\$177 billion by 2019, which is highest in the general sector (food, electronics, etc).<sup>2</sup> Undeniably, nanomedicine is the urgency of the future medicinal system; on the other hand, what we have achieved at present is barely scraping the surface in terms of nanotechnology role in the health care system, hence advancing this technology is necessary in the near future for better serving to the mankind.

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## Conflict of interest

The authors declare there is no conflict of interest.

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