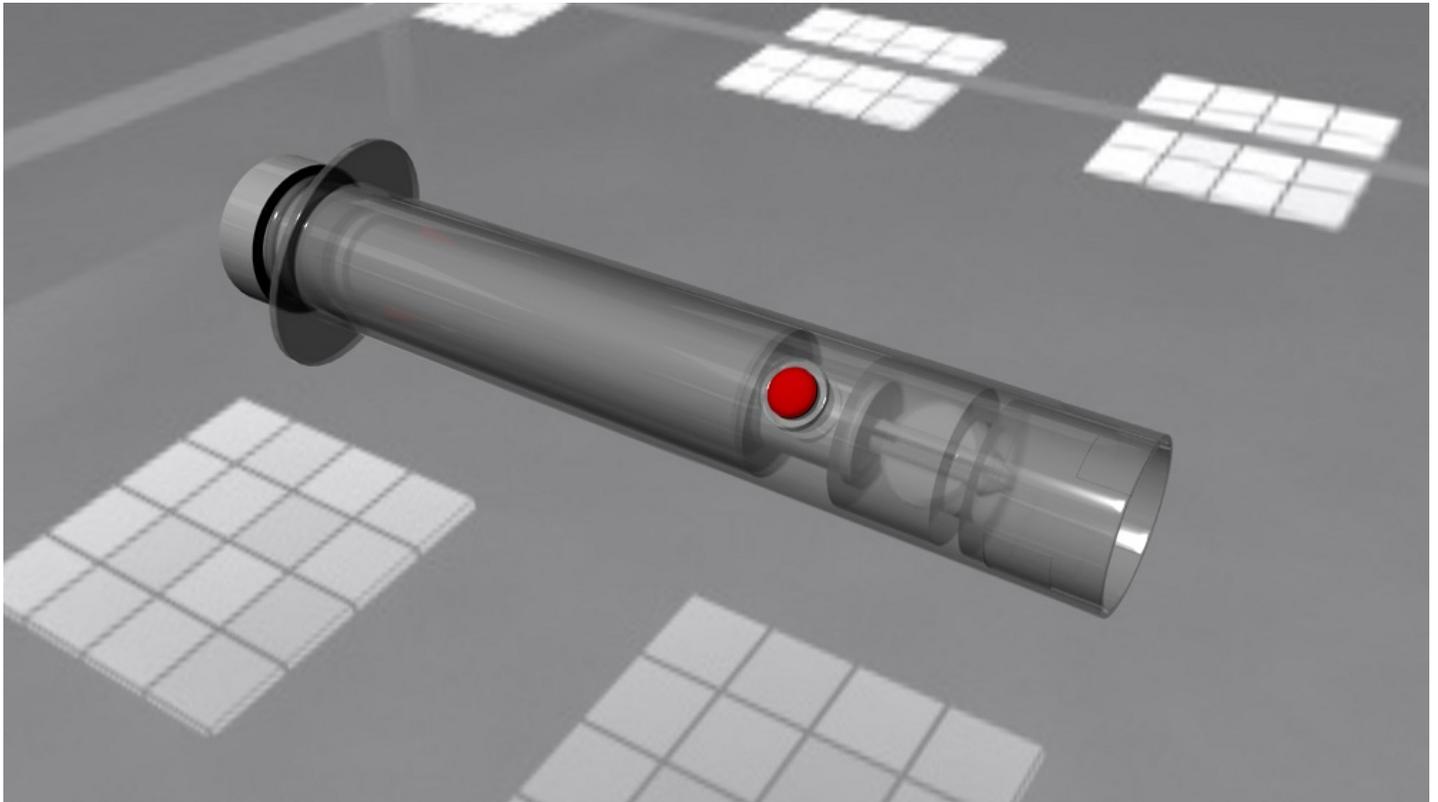


## A futuristic safe & affordable injection system

<https://www.biovoicenews.com/futuristic-safe-affordable-injection-system/>

By : Rahul Koul - October 6, 2017



**New Delhi: Since birth to the deathbed, injections play an important role in our life. Vaccination, immunization, various ailments need undesirable injections and we have to accept unwillingly. More importantly, the exposed deadly contaminated needles of used syringes and the needle stick injuries caused by such syringes, are responsible as a primary source of the most dreadful diseases like HIV/AIDS, Hepatitis B, Hepatitis C, tuberculosis as well as other communicable diseases.**

**Several governments across the world have started adopting legislation that restricts the frequency of needle-stick injuries (NSIs). WHO's Global Health Initiative for Needle Safety is urging countries to transition by 2020 to the exclusive use of the new "smart" syringes.**

**In this background, a family in India collectively undertook the WHO's recent report on the subject as a missionary challenge and consistently worked with a zeal to find out a most suitable solution to effectively curb the menace of unsafe injections. The family of five includes two sisters, Ms Pratibha Rathore and Ms Bharati Rathore, their brother Mr Jai Hind Rathore, their parents, Dr Neelam Rathore, presently working as Medical Officer in a State Ayurvedic Hospital under the Government of Uttar Pradesh and Dr B C Rathore who is a senior Government Officer under the Ministry of Commerce and Industry, Government of India.**

**In their quest to find a viable solution, the innovator family initiated their thorough research in**

2006. After seeking answers their questions, they finally arrived at a conclusion that incorporation of any retraction mechanism in a syringe containing three basic components i.e. barrel, plunger with piston and needle with needle guard, might never be a costless process, hence the retractable syringes were bound to be far costlier than any ordinary syringe.



(From left) Pratibha Rathore, Dr. B. C. Rathore, Dr. Neelam Rathore, Bharati Rathore & Jai Hind Rathore

**The family of Innovators! The inventors, a family of five members, say that they have put persistent endeavors and invested entire knowledge, skill, efforts, time, money, energy as well as all available resources in missionary task of designing their dream invention to save the lives of millions. Ms Pratibha Rathore who holds the M Tech. in Medical Nanotechnology, her sister Ms Bharati Rathore who too an MTech in Cognitive & Neuroscience, their brother, Mr Jai Hind Rathore who is an expert in 3D designing, animation and virtual prototyping of the product. Their parents, Dr Neelam Rathore, medical practitioner and Dr B C Rathore, expert in legal and intellectual property rights have contributed to the development of the product through the knowledge of respective domains.**

## Eureka Moment

During 2013, while discussing the matter, a new idea sparked in their discussions that why should we not separate the retraction mechanism from syringe and reuse it frequently to bring down its cost with each and every reuse. This was really a eureka moment in their journey, which entirely metamorphosed the whole scenario. They further decided to dissect the syringe into two parts and incorporate the costly retraction mechanism in a frequently reusable injector, whereas the dose-wise medicine could be packed between a piston head and retractable needle in a container to be known as drug-cartridge.

Despite being this a brilliant idea, they had to address several intriguing delicacies i.e. how medicine be packed between the piston head and retractable needle in such a manner that the metallic needle is not in close contact of medicine; how will the needle come out of the drug-cartridge and expose to accomplish the injection procedure; how will it be retracted after the completion of injection procedure with the help of the retraction mechanism which is embodied in a separate reusable injector. Simultaneously, they also worked on to design a fluid collector operable on the same injector.

### Final shaping up of the technology

The consistent endeavors of the team for more than two years ultimately paid to overcome all such hurdles and all practical difficulties, and finally they could accomplish the task successfully. The decade long consistent endeavors have resulted in five International Patent Applications of different technological designs of retractable syringes in 2012.

During 2014, they founded the Rescitech Vision Pvt Ltd, a technology and design company with a focus on sustainable innovations. The later part of the product development was undertaken under the company's umbrella. Ultimately, in 2015, they succeeded in developing greener, safer, cheapest and ergonomic 'Futuristic Safe Injection System-2020' to get rid of the dreadful menace of unsafe syringes, wherein no syringe is required to inject the medicine in patient's body and the medicine may directly be transferred from manufacturing unit to the patient body avoiding all the risks or possibilities of contamination and over-dosage/under-dosage of drugs. The team embodied all of their efforts in the sixth Patent Application filed in India on 10<sup>th</sup> March, 2015 followed by International Patent Application dated 26<sup>th</sup> Feb, 2016, which has been published by World Intellectual Property Organization (WIPO) on 15<sup>th</sup> Sept, 2016 as [WO/2016/142799](#) entitled "A Fluid Injecting System with NEEDLE RETRACTION BY VACUUM"

'Futuristic Safe Injection System-2020' is a method and device for sustainable drug delivery system. It provides two variants of reusable 'injector', 18 variants of safely disposable 'drug-cartridge' and a 'fluid-collector'. Drug-Cartridge provides a *smart packaging material* to pharmaceutical industry. It has an inbuilt piston and retractable needle along with a fixed dose of medicament, which is attachable with a frequently reusable injector embodying the retraction mechanism to constitute an efficient self-retractable safety syringe, wherein the needle retracts automatically within the empty cartridge after the completion of injection procedure.

The LED provided in the injector regulates and keeps vigil on the entire injection procedure and also facilitates the injection procedure by illuminating the injection site during the dark hours. Neither of the two parts (i.e. drug-cartridge and injector) *per se* is syringe, but constitutes an efficient, simple and user-friendly *self-retractable safety syringe*, when coupled together. The Fluid Collector is designed to prevent the risks of needle stick injuries and needle reuse during the safe collection of the body fluids when coupled with reusable injector.

Talking about the product, Bharati Rathore, Director, Rescitech Vision, mentions, "Our invention is expected to decrease the bio-medical waste generated due to disposable syringes globally up to 70-75% and save the same extent of raw material particularly plastic material to be converted into bio-medical waste."



### Potentially affordable needless solution for masses

In proposed innovation, the end-user only needs to buy medicine packed in the drug-cartridge without any further requirement of separate syringe for each and every dose. No need to buy a separate syringe makes this innovation a cheapest and affordable solution for all resulting in huge saving on the out-of-pocket expenditure of the end-user. It will decrease overall cost of injection procedure by at least 70-75% and also will decrease the global health burden as well as global disease burden to a considerable extent simultaneously.

### Current status

The virtual prototype has been created to ensure the feasibility of the breakthrough technology. International Patent Application (PCT/IB2016/051060) has already been filled, which has been published by World Intellectual Property Organization, Geneva on 15<sup>th</sup> September 2016 as WO/2016/142799.

As per Bharati, the invention is ready for commercialization. The European Patent Office (EPO), has recognized their entire claim as novel, possessing inventive steps and industrially applicable. The company is in process of filing the national phase patent applications in various potential PCT jurisdictions i.e. USA, Europe, EAPO, ARIPO, China, Japan, Brazil, Australia, Canada, South Africa etc. to secure patent rights. Simultaneously, the efforts are underway to initiate further R&D and commercially exploit the invention, so that the real benefits of the technology may reach to the end-users.

Recently, the invention scored second position in the world among 225 inventions submitted from various countries by securing more than 32000 global populous votes at #youforG20: Project of an Interconnected World, an initiative undertaken by Deutschland on the occasion of G-20 Summit-2017 at Hamburg. The invention has been listed on TOP 4<sup>th</sup> position worldwide amongst ten 'Future Medical Technologies in 2020'. It has also been shortlisted among few inventions globally in the first stage of 'The First Mile Innovation Challenge' by The Consortium for Affordable Medical Technologies (CAMTech) of Massachusetts General Hospital in association with GE Sustainable Healthcare Solutions.

The invention has also been awarded with 'BIRAC-SRISTI Appreciation Award-2017' worth Rs 1Lakh by the 'Society for Research and Initiatives for Sustainable Technologies and Institution' (SRISTI) and 'Biotechnology Industry Research Assistance Council' (BIRAC) under Department of Biotechnology (DBT), Government of India. Now, we are at final stage of pitching in 'Millennium Alliance Award' conducted by FICCI in August, 2017.

However, despite the numerous accolades, Bharati points out that since 2006, all their financial resources, whatsoever available at their ends has exhausted completely in inventing and prosecuting patents. She elaborated, "Presently, we are facing hard a severe crunch of funds urgently required even for filing and prosecuting our national phase patent applications in potential countries. We urgently need to undertake R&D activities too. In order to effectively address all such urgent requirements, we are in urgent need of a huge amount of money in crores along with the expertise resources, which we are clearly lacking and finding no active platform which may support us in accomplishing our pious and visionary mission."



**"The technical effect of these features is that the injector is reusable while the only parts to be discarded are the needle hub and the medicament cartridge. As a result a cheaper and friendlier to the environment system is achieved without an increased risk of needle injuries."**

**The European Patent Office, while examining the International Patent Application (PCT/IB2016/051060) [WO/2016/142799](#)**

## Way Forward

The statistics reveal that more than 2.5 billion syringes were used in 2010 which are forecasted to grow by 10% annually. Potential market of syringes is expected to increase from USD 10.56 billion in 2016 to USD 15.99 billion in 2021 at a growth rate of 8.7%.

"Despite all market constraints i.e. costs, procurement structure etc. will be negated by our technology to effectively meet the rising global demand," says Bharati adding that "We are keeping all our sincere efforts underway to commercially exploit our invention, so that the

real benefits of the technology may reach to the end-users. We are also building global network and arranging necessary funds, resources, expertise etc. to commercialize our innovation globally.”

Bharati reveals that they have quite lucrative offers from big companies, but are afraid of shelving’ of their technology. They have planned to commercialize it through licensing model at our own. Therefore, these are very testing times for them as they have to stay focused on their goals without much funds and at the same time also not get swayed by false promises. “We are zealously trying to become a part of the most ambitious ‘*Make in India*’ regime of Government of India. We have seriously planned to adopt Licensing model for commercialization and revenue generation,” she says.

The company has voluntarily offered a free of cost license to WHO, UNICEF and RED-CROSS to use its invention globally for the well-being of public at large, so that the ultimate benefits of the invention may directly reach to the end-users in urgent need. The innovators expect that the Indian industries will come forward with open heart to support them in commercializing their innovation keeping in view the paramount consideration of national interest. Hopefully, they will not get disappointed.