



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 7, July 2022

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.118



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# A Short Assessment on "Needle Free Injection"

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**ABSTRACT:** Needle free injection gadget are to introduce the more than a few drug treatments into sufferers without piercing the skin with a traditional needle. Needle-free science presents the many benefits of decreasing patient concern about the use of needle. Needle free injection is the very effective injections a large vary of pills and bioequivalent to springe and needle. It consequences in much less pain, and is strongly preferred with the aid of patients. Additional advantages consist of very fast injection comparedwith traditional needles and no needle disposal issues. Not solely benefit of the pharmaceutical enterprise to the increasing product sales, it has the introduced practicable to amplify compliance with dosage regimens and expanded outcomes. Today, they are a gradually developing technological know-how that guarantees to make the administration of medicine more efficient and less painful.

## **KEYWORDS:-**

Needle free injection, Needle free devices, Needle free technology, Drug administration and drug shipping system.



## **I. INTRODUCTION**

Needle-free injection machine are novel approaches to introduce a variety of medicines into sufferers besides piercing the pores and skin with a traditional needle. Needle-free injection strategies can be used to administer vaccines and medications in the pork industry. They are promoted as a possible option for patients with needle phobia. The needle free is used to describe the an sizeable range of drug delivery technologies, which consists of science that do now not have a needle however make use of electrophoresis to force pills thru the skin, applied sciences that use one or more very small needled, however needles nevertheless. Needle free units are taken to the shape of power sprays, fit to be eaten products, inhalers, and pores and skin patches.



Devices are on hand in reusable and disposable forms, for home or physician's workplace use, and also in variations for a couple of patients and institutional uses.

#### **HISTORY :-**

The first syringes had been the first developed through a French surgeon, Charles Gabriel Pervez, in 1853, hypodermic there is a minor development in syringes is the science has been remained unchanged for closing one hundred fifty year. Needle free structures were the first described through marshalllockhart in 1936 in his patent jet injection. Then in the early 1940's higson and others developed high pressure "guns" the use of a fantastic jet of liquid to pierce the pores and skin and deposit the drug in underlying tissue.

#### **Classification of Needle Free Injection Technology:-**

##### **1. On the groundwork of working.**

- a) Spring Systems.
- b) Laser powered.
- c) Energy propelled systems.
  - i) Lorentz force.
  - ii) Gas propelled/air forced.
  - iii) Shock waves.

##### **2. On the basis of type of load.**

- a) Liquid.
- b) Powder.
- c) Projectile.

##### **3. On the basis of mechanism of drug delivery.**

- a) Nano-patches.
  - i) Sandpaper assisted delivery.
  - ii) Iontophoresis enabled.
  - iii) Micro-Needles.

##### **4. On the groundwork of site of delivery.**

- a) Intra dermal injectors.
- b) Intramuscular injectors.
- c) Subcutaneous Injectors.

#### **Types of Needle Free Injection:-**

Needle-free injection drug shipping systems are categorized as follows

##### **1. Powder injections**

##### **2. Liquid injections**

##### **3. Depot or Projectile Injection**

Type 1 – Powder Injection

Design of powder injection systems

These injections consist of a chamber crammed with stable drug content and a nozzle for firing drug particles into the pores and skin via making use of the power source which commonly is compressed gas. The injection has a diaphragm (a few microns thick) on either side of the chamber to cover the drug chamber.

#### **Mechanism of powder injection :-**

\* Particles exist from the nozzle along with a gas stream.

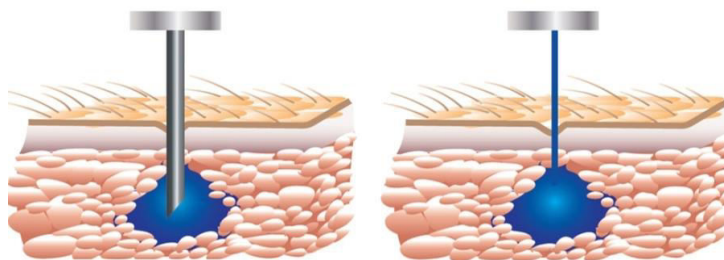
\* Particles impinge the pores and skin surface leading to the formation of a gap into the skin with the progression of the injection.

\* Drug particles get deposited in a spherical sample at the give up of the hole and penetrate throughout the stratum corneum.

\* After their penetration into the skin, drug particles get distributed completely into the stratum corneum and the viable epidermis. Powder injection is accomplished by a light gas gun. It provides the required particle velocity by use of an accelerating piston which accelerates and carries particle with it. Particle leave piston surface by means of a deceleration mechanism which slow down the piston. This leads to ejection of particle that act on the target tissue area

Mechanism of Working: -

Needle-free injection technology is used force generated by a compressed gas (typically air, CO<sub>2</sub> or nitrogen) to propel the



vaccine Start Paraphrasing at excessive speed through a tiny orifice. When administered thru the skin, an ultrafine move of fluid penetrates the skin, handing over the vaccine in a fraction of a 2d to the skin, subcutaneous tissue, and intramuscular tissue. Injection event requires less than 0.5 seconds.

### Stage of Delivery

**There are three stages in the needle free drug delivery:**

\* The top pressure phase-is choicest stress used to penetrate the skin is 0.025 sec

\* Delivery or dispersion segment is up to 0.2 sec

\* Drop off segment is

The whole quantity of time required to deliver the vaccine is upto 0.5 seconds.

### **Components of the Needle Free Injection Systems**

#### **\* Nozzle**

The nozzle has the two huge functions it acts as the passage for the drug and as the surface which contacts the skin. The nozzle contains a flat surface and an office. The nozzle gives the surface which comes in contact in the skin and the orifice which has the drug passes thru when injected. The orifice controls the drug stream diameter and speed. A flow diameter of approximately 100 micrometer and touring at 100 m/s can achieve the desired injection depth of two mm.



**\* Drug reservoir**

The drug volume is holds the injection fluid interior the device.

**\* Pressure source**

The power source is furnished to the essential using energy to the injection. Then many gadgets in the market use both mechanical or stored strain as power storage elements. The mechanical method stores energy in a spring which is released by way of pushing a plunger to provide to the crucial pressure. The pressure storage method is used to compressed gas in vessel which is launched at the time of injection.

## II. CONCLUSION

Needle free science presents the very apparent advantage of minimizing patients worry concerning the use of a needle. Other benefits contain very quick injection as compared to usual needles and injection disposal troubles are not often seen. Not only it can help the pharmaceutical enterprise in rising product sales, however also it has the more workable to amplify conformity with dosage regimens and enhanced outcomes. In the creating world, there are predominant task of disease transmission due to reuse of needle which can overcome by using the use of needle free injection technology.

## REFERENCES

- 1) Patwekar SL, Gattani SG, Pande MM. Needle free injection system: A review. Int J Pharm Pharm Sci. 2013;5:14-9. [Google scholar]
- 2) Kale TR, Momin M. Needle free injection technology – An overview. [Last cited on 2014 Oct 12]; Innov pharm. 2014 5:1-8. Available from [http://www.pharmacy.umn.edu/innovations/prod/group/cop/@pub/@cop/@innov/documents/article/cop\\_article\\_473898pdf](http://www.pharmacy.umn.edu/innovations/prod/group/cop/@pub/@cop/@innov/documents/article/cop_article_473898pdf).
- 3) Vishnu P, Sandhya M, Sreesh Kiran R, VanichV, Naveen babu K. Needle Free Injection Technology: A review. Int J Pharm. 2012; 2:148-55. [Google Scholar]
- 4) Kumar RB. Needle free injection systems. Pharm Innov. 2012; 1:57- 72. [Google Scholar]
- 5) Kumar RM, Reddy SM, Kumar SK, Goli A, Kumar SP. Review on needle free drug delivery systems. Int J Rev Life Sci. 2011; 1:76-82. [Google Scholar]
- 6) Garg T. An evolutionary approaches s in development of needle free injection technologies. Int J Pharm Pharm Sci. 2012; 4(Suppl 1) [Google scholar]
- 7) Kohle S, Sontake S. A review on needle free drug delivery system, Int J Pharm Pharm Sci. 2013;5:15-20 [Google scholar]
- 8 ) King T. Encyclopedia of Pharmaceutical Technology-Viscosity. 3 rd ed. Vol. I. James Swarbrick Informa Healthcare; 2007. Drug Delivery: Needle-free system; p. 1214. [Google scholar]
- 9 ) Needle free insulin devices- how does it work? British journal of diabetes and vascular disease.2004;4 (2), 2004, Sherborne Gibbs.Ltd.
- 10 ) Needle free drug delivery technology by Dr. Roger G Harrison, Drug delivery and Formulations, innovation in pharmaceutical technology.
- 11) United states, Center for Disease Control Prevention, National Institutes for Occupational Safety and Health, Preventing Needlestick injuries in Healthcare Setting N.P n .d web.
- 15) Baker AB, Sanders JE. Fluid mechanics analysis of a springloaded jet injector. IEEE Trans Biomed Eng. 1999;46:235-42. [PubMed] [Google scholar]
- 16) Sarah CP. Under the skin of intra-Dermal vaccines, Proceedings of National Academy of Sciences; Published on June 18, 2013; pp. 10049-51. [PMC free article] [PubMed] [Google scholar] .



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**Impact Factor: 8.118**



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