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A Review: 3D Printing

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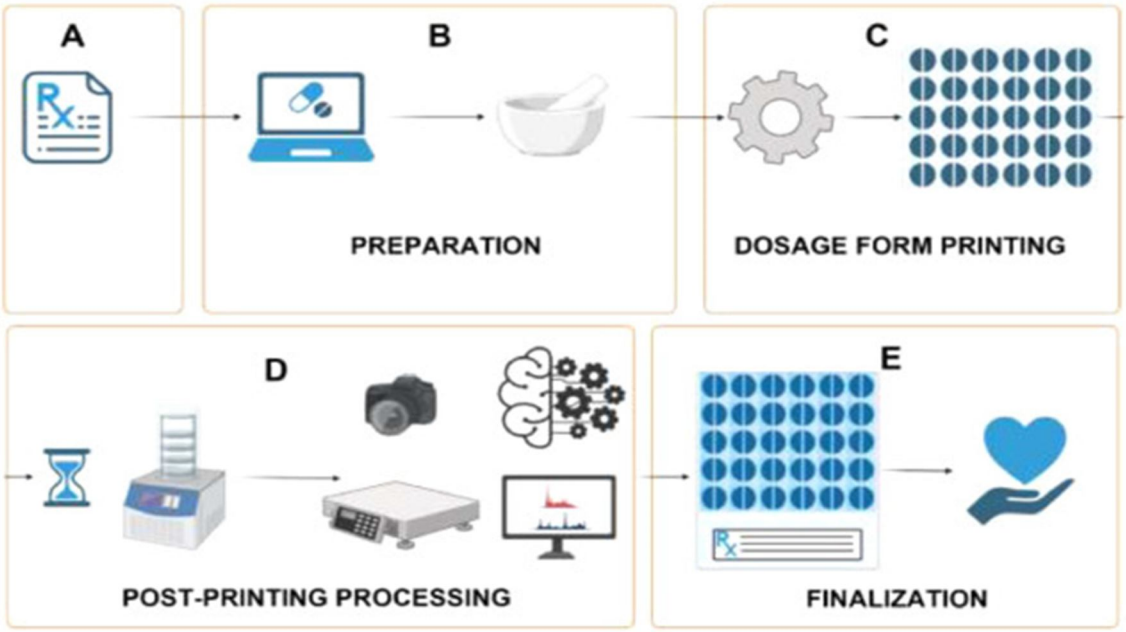
Abstract: ***3D printing or additive manufacturing is a method of creating three dimensional solid matters from a digital file. The design of a 3D printed object is accomplish using additive processes it is also called as RAPID PROTOTYPING. In an additive process an object is manufactured by dozing consecution layers of material as far as the entire object is created.3D concept has the capabilities to furnish benefits for patients, pharmacists and the pharmaceutical industry alike by empower the on-demand design and production of various formulations with individualized dosages, shapes, sizes, drug release and multi-drug combinations. This article criticizing the major benefits for using 3D printing in pharmaceuticals, highlighting the crucial role that healthcare staff play, and will continue to play, in the future implementation of 3D printing into the pharmaceutical sector.***
Keywords: Additive manufacturing, 3D printing

I. INTRODUCTION

3D printing is one of the most subversive & it is a process of discover an object using a machine that puts down the material layer by layer in three dimensions until the correct object is formed. It permits the rapid alteration of information from digital 3D mode into a physical object. 3D printing can give a significant role in multiple active ingredient dosage forms, where the formulation can be as a single blend or multi layer printed tablets with sustained release properties powerful tool serving as technology of precise manufacturing of individually developed dosage form.

It is also called as additive manufacturing. Three dimensional printing technologies is a novel rapid prototyping technique in which solid objects are constructed by depositing several layers in sequence. 3D printing technology has high potential in individualized dosage form concept called the polyp ill concept. The term three dimensional printing was defined by ISO (International standard organization) as "fabrication of object through the deposition of a material using a print head, nozzle or another printer technology. [1]

Pharmaceutical 3D printing has many applications, we can say that it brings the manufacturing process closer to the patient, benefiting many different patient groups, It allows for the personalized dosing of drugs, removing the need to self-prepare medication or take multiple pills to each the prescribed, non-commercialized dose, an issue that arises for many treatment pathways that can lead to adverse effects. Pharmaceutical 3D printing also allows for personalized polyp ills, pills with multiple drugs combinations. This would benefit complex disorders and co morbidities. [2]



II. EXAMPLES OF COMMON TYPES OF 3D PRINTERS

Drug name	Type of dosage form	3D printing type	Reference
4-Aminosalicylic acid	Tablet (IR)	Fused Deposition Modeling (FDM)	3
Acetaminophen	Tablets shaped as disk, donut, cuboid, oval or grid in 3 sizes each	3D-Screen printing	4
Acetylsalicylic acid	tablet (IR, ER) with Multiple Layers of Varying Thicknesses Using 2 Gel Drug Formulations	Semisolid Extrusion (SSE) into a Capsule	5
Albendazole Sulfate	Gastro-Retentive Tablet (ER for 6 H)	Melting Solidification Printing Process (MESO-PP) (Modified From SSE)	6
Amlodipine	Polypill tablet with Indapamide, Lisinopril, Rosuvastatin	Fused Deposition Modeling (FDM)	7
Atenolol	Tablet	Semisolid Extrusion (SSE)	8
Caffeine	Tablet (IR)	Direct Powder (DPP) Extrusion	9

III. APPLICATION OF 3D PRINTING IN THE PHARMACEUTICAL INDUSTRY

The application of 3d printing in the pharmaceutical industry is are as follows-

1) Drug development – Formulation optimisation

a) Clinical trials

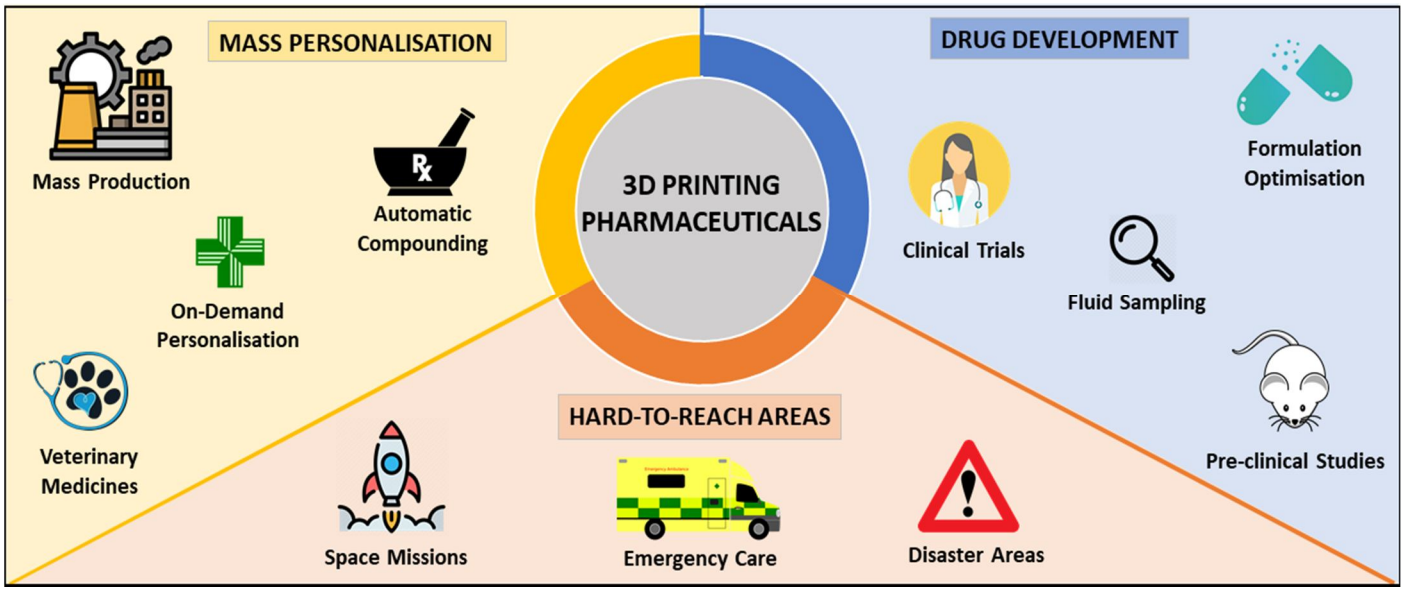
b) Fluid sampling

c) Preclinical Studies

2) Mass personalisation – Mass production

a) Automatic compounding

b) Veterinary medicines



IV. CONCLUSION

In this review we discussed about 3d printing and their application. In this review we discuss about importance of 3d printing in pharmaceutical as well as in industry. 3D printing as a process with the potential to inexpensively improve medication safety, strength, quality, precision, uniformity, and purity compared to those produced by traditional methods Healthcare professionals, including pharmacists, doctors, and nurses, are of paramount importance in enabling the integration of this technology and will be key to advising academics, the pharmaceutical industry and biotech companies on strategies to innovate the sector using 3D printing.

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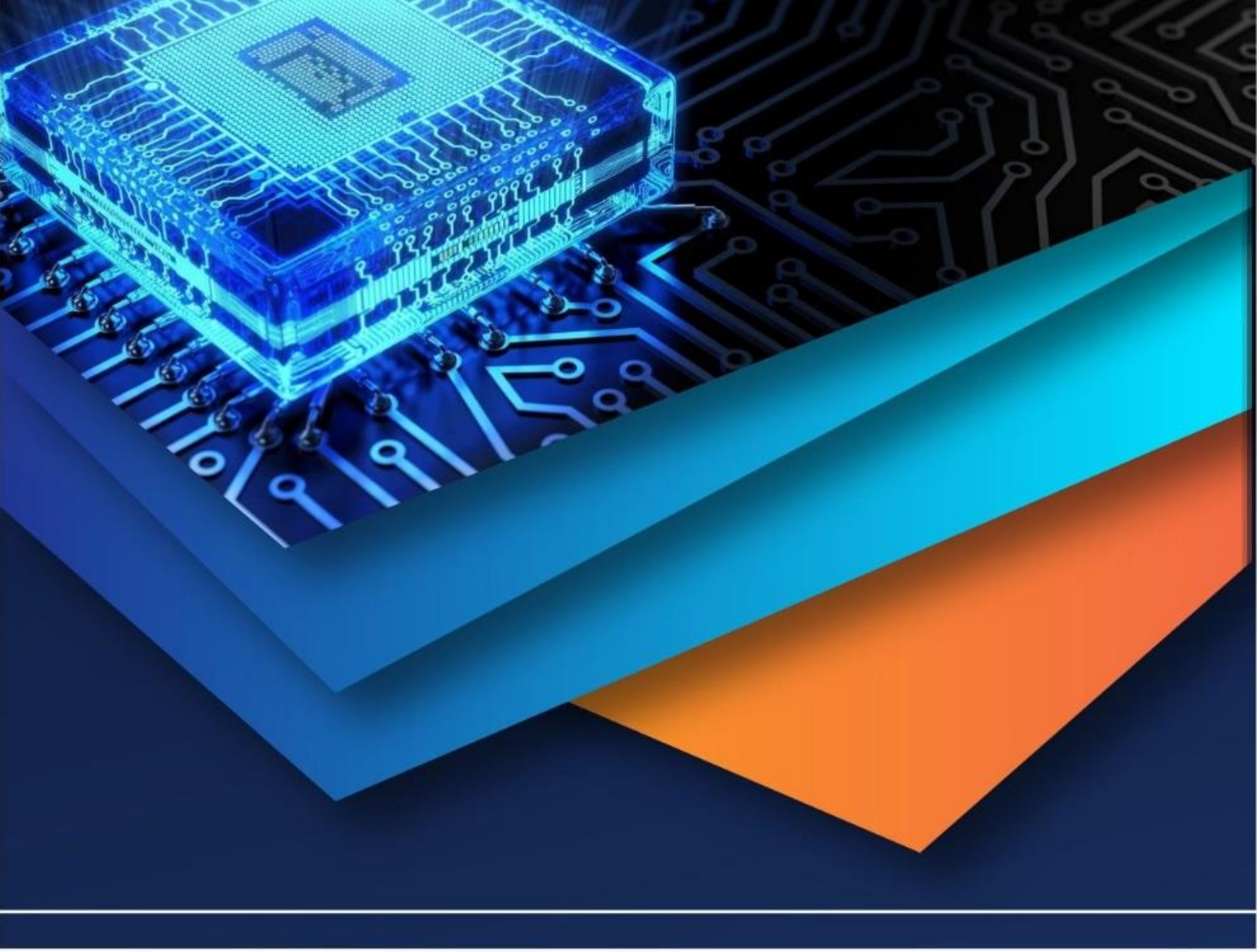

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