

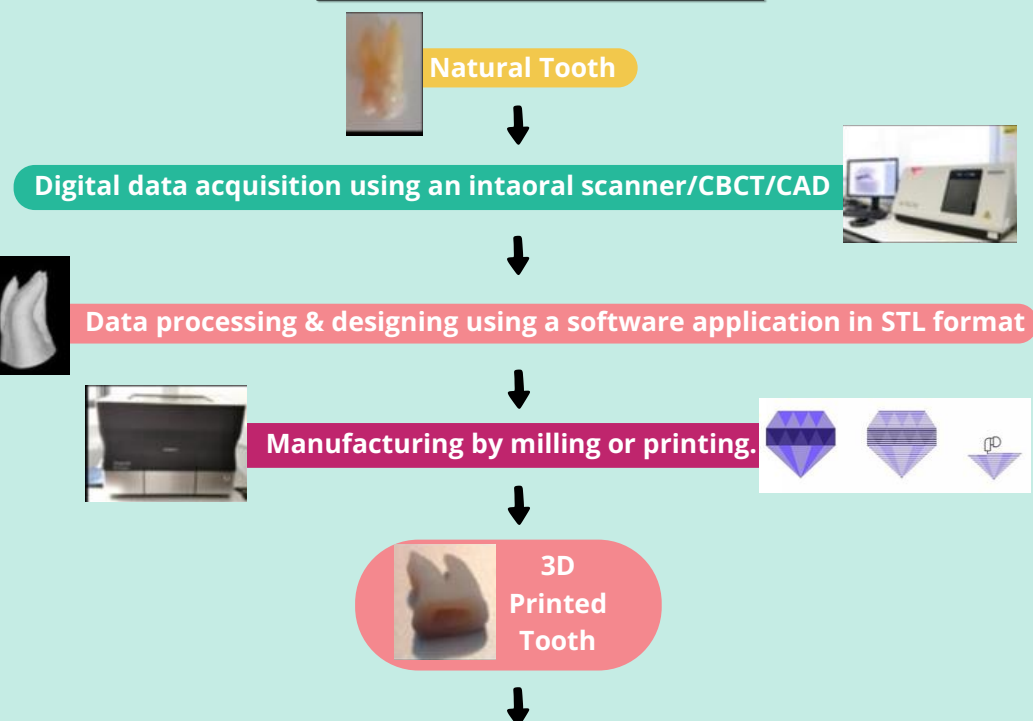
3D PRINTING: THE FUTURE OF PRECISE AND PERSONALISED RESTORATIVE AND ENDODONTIC CARE

Three-dimensional printing, also known as additive manufacturing is the process of joining materials. It relies on 3D data and post processing tools and algorithms to restructure and edit multiple planes to form a 3D model, ultimately generating a prototype using 3D printers.

THE 3D PRINTING JOURNEY



HOW 3D PRINTING IS DONE?



POST PROCESSING

It is one of the most important stages of 3D printing.



ADVANTAGES

- Removes print nuances (waviness and other defects)
- Removes gluing traces
- Strengthens finished 3D model
- Improves aesthetics

CHALLENGES

- Printing speed & resolution
- Ideal 3D printed tooth material
- Lack of standardization
- Technique sensitive
- Elaborate set-up
- Unskilled staff

NATURAL:

- Tissue hardness
- Morphology
- Colour
- Texture
- Radiodensity

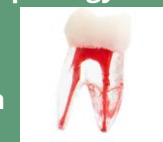


EXTRACTED/NATURAL TOOTH

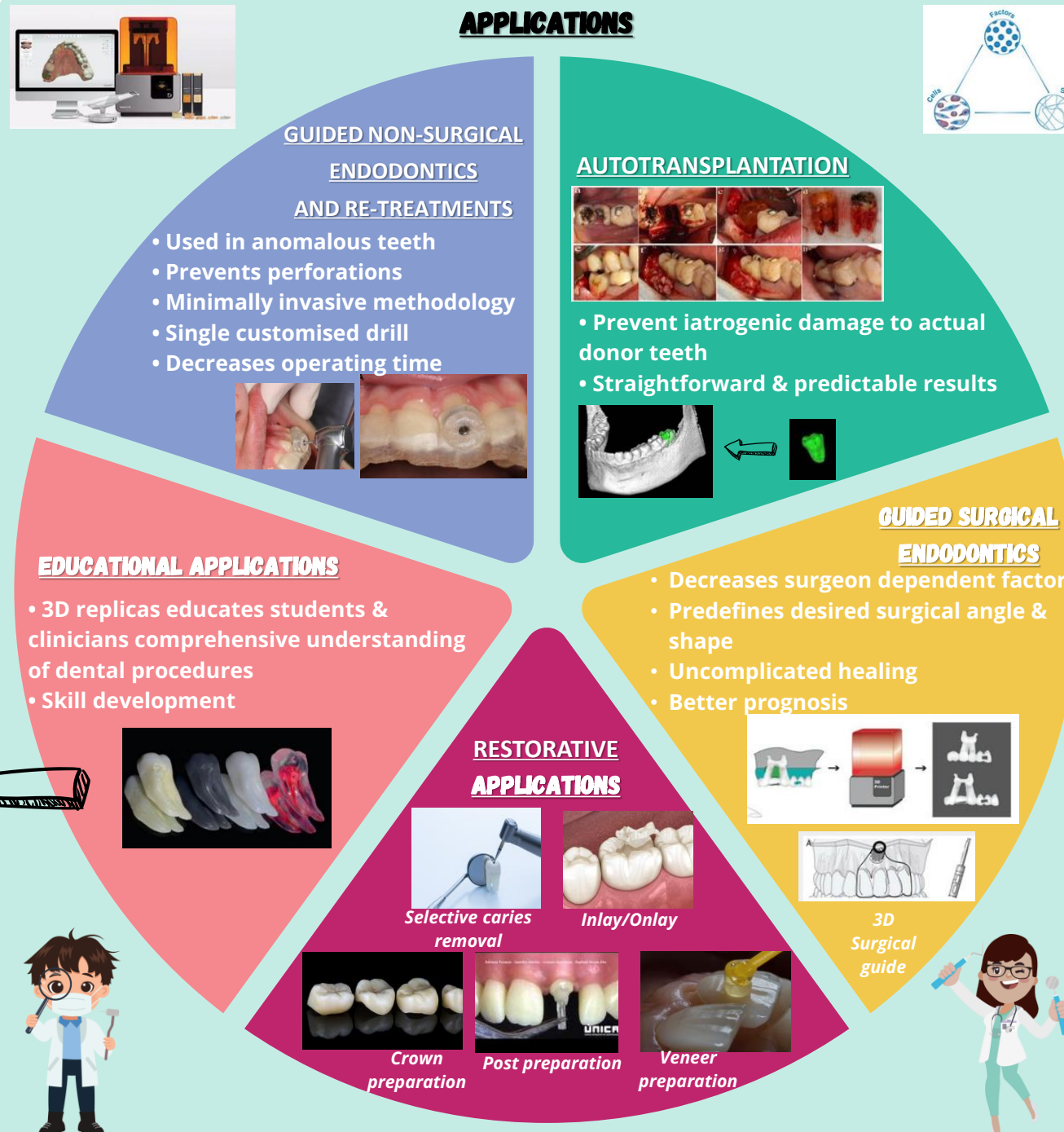
VS

3D PRINTED TOOTH

- No Ethical considerations
- No cross infection risk
- Hands on learning
- Compare different protocols
- Study tooth morphology
- Easy to collect
- Easy storage
- Standardization



APPLICATIONS



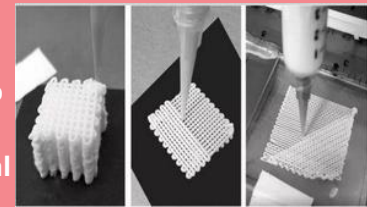
MECHANISM OF 3D PRINTING TECHNOLOGY



CURRENT EXPERIMENTAL RESEARCHES

BIOPRINTERS

Utilisation of 3D printing techniques to combine cells, growth factors & biomaterials to create detailed biomimetic structures which imitates natural tissue.



Types of Bioprinting materials:

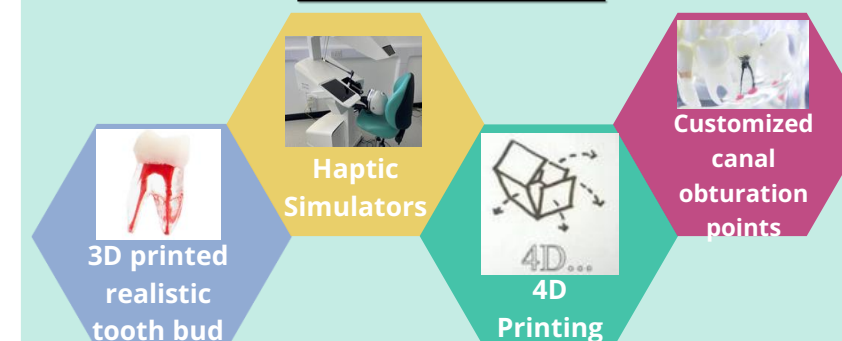
Cell-ink based

Hydrogels are used as bio-inks. For example: Fibrin based gels, Collagen based gels, Cellulose based gels...

Spheroids/Microtissue based

It uses spheroids or microtissues as building blocks like LEGO.

THE ROAD AHEAD...



REFERENCES

- Gunpreet Oberoi, Hermann Agis; 3D Printing in Endodontics
- Reis T, Barbosa C, Franco M, Baptista C, Alves N, Castelo-Baz P, Martin-Cruces J, Martin-Biedma B. 3D-Printed Teeth in Endodontics: Why, How, Problems and Future-A Narrative Review. Int J Environ Res Public Health. 2022 Jun 29;19(13):7966
- Mohd Javaid, Abid Haleem, Current status and applications of additive manufacturing in dentistry: A literature-based review, Journal of Oral Biology and Craniofacial Research, Volume 9, Issue 3, 2019