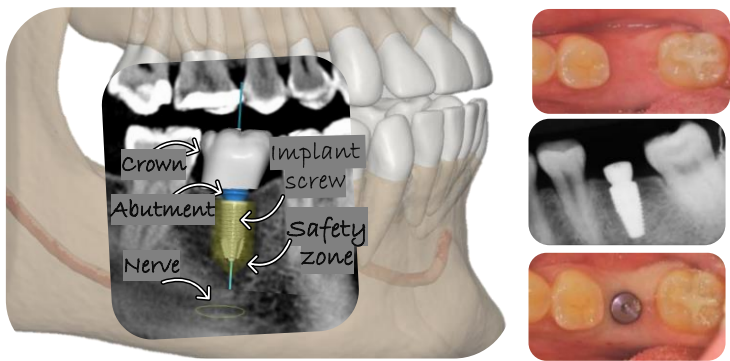


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Background



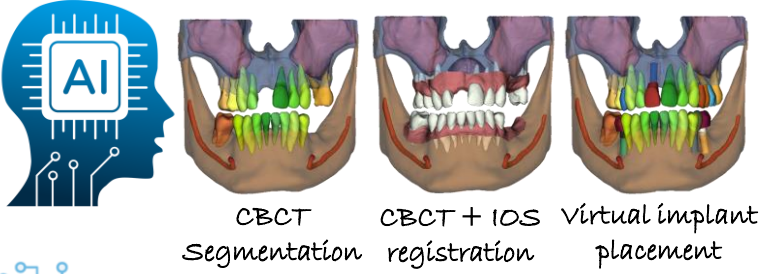
Clinical success relies on proper planning

BUT

Traditional workflow

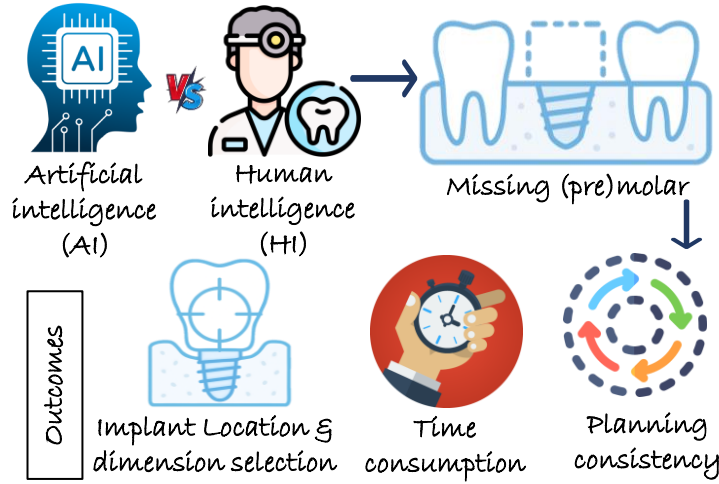


AI in presurgical implant planning



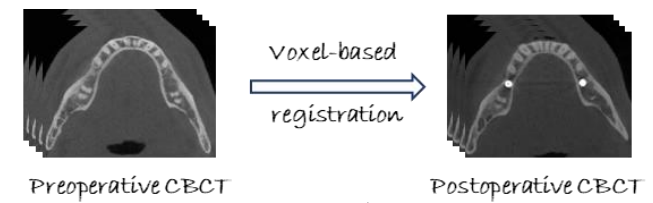
Clinical validation of AI for virtual implant placement ?

Objective



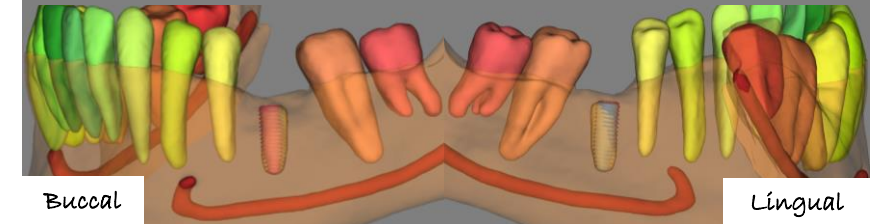
Methods

- Ethical Approval (S66447) UZ Leuven, Belgium
- 1- Single missing mandibular (pre)molar
- 2- Pre- and post-operative CBCT
- 3- No augmentation/motion artifacts



virtual patient creator platform

Three STL files were exported and compared for each case



HI-placed implant (Actual placed by expert) | AI-planned implant (planned by Relu* creator) | HI-Planned implant (two-experts consensus plan)

Results

Table 1. AI performance in Implant Location & dimension selection

Metric	HI-placed	AI-planned	HI-planned	p-value
	Mean±SD			
Angle with anterior adjacent tooth (°)	7.3±3	6.3±4.1	6.9±3.7	0.98
Buccal bone thickness (mm)	2.7±1.5	2.5±1.5	2.5±1.5	0.94
Lingual bone thickness (mm)	1.8±0.9	1.9±1.1	1.7±1.1	0.79
Crestal bone height (mm)	1±0.9	1.2±0.5	1.2±0.5	0.15
Distance to mandibular canal (mm)	5.3±1.8	5.7±1.7	5.8±1.7	0.23
Implant diameter (mm)	4.3±0.3	4.3±0.4	4.3±0.3	0.35
Implant length (mm)	9.7±1.3	9.8±1.3	9.9±1.2	0.74

SD=Standard deviation, mm=millimeter, °=degree

No statistically significant difference between AI-planned implants and those planned and placed by experts



AI 10x faster than experts (p<0.05)

Table 2. Consistency metrics: AI vs. HI planning

	AI1 vs AI2	HI1 vs HI2	p-value
Median surface deviation (mm)	0.00±0.00	0.4±0.29	<0.05
Root mean square (mm)	0.00±0.00	0.7±0.26	<0.05

Conclusion

In this first evaluation of AI-driven implant planning versus HI planning and placement, the AI-based virtual planning approach demonstrated clinically acceptable performance while significantly outperforming experts in planning efficiency and consistency