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Virginia Commonwealth University

Coordinate-based Accuracy Assessment of Different Intraoral Scanners on Full-arch Implant Models With Horizontal Scan Bodies

Department of Prosthodontics, School of Dentistry, Virginia Commonwealth University, Richmond, VA, USA

María Vera Rodríguez, DDS, MS, PhD

Paulo Borella, DDS, MS, PhD

Juliana de Oliveira, DDS

Luciana Brito, DDS, MS

Daniela Mendonça, DDS, MS, PhD

Bryan Limmer, DMD, MS

Gustavo Mendonça, DDS, MS, PhD



Problem

Passive fit in **full-arch implant reconstructions** is highly sensitive to cumulative positional inaccuracies.

Even minimal coordinate deviations may translate into **prosthetic misfit** and **unfavourable biomechanical loading**.

Rationale

Despite improvements in intraoral scanner technology, long-span full-arch scans remain prone to **distortion accumulation**.

Conventional accuracy assessments based on STL superimposition may mask clinically relevant implant-position discrepancies.

Study Focus

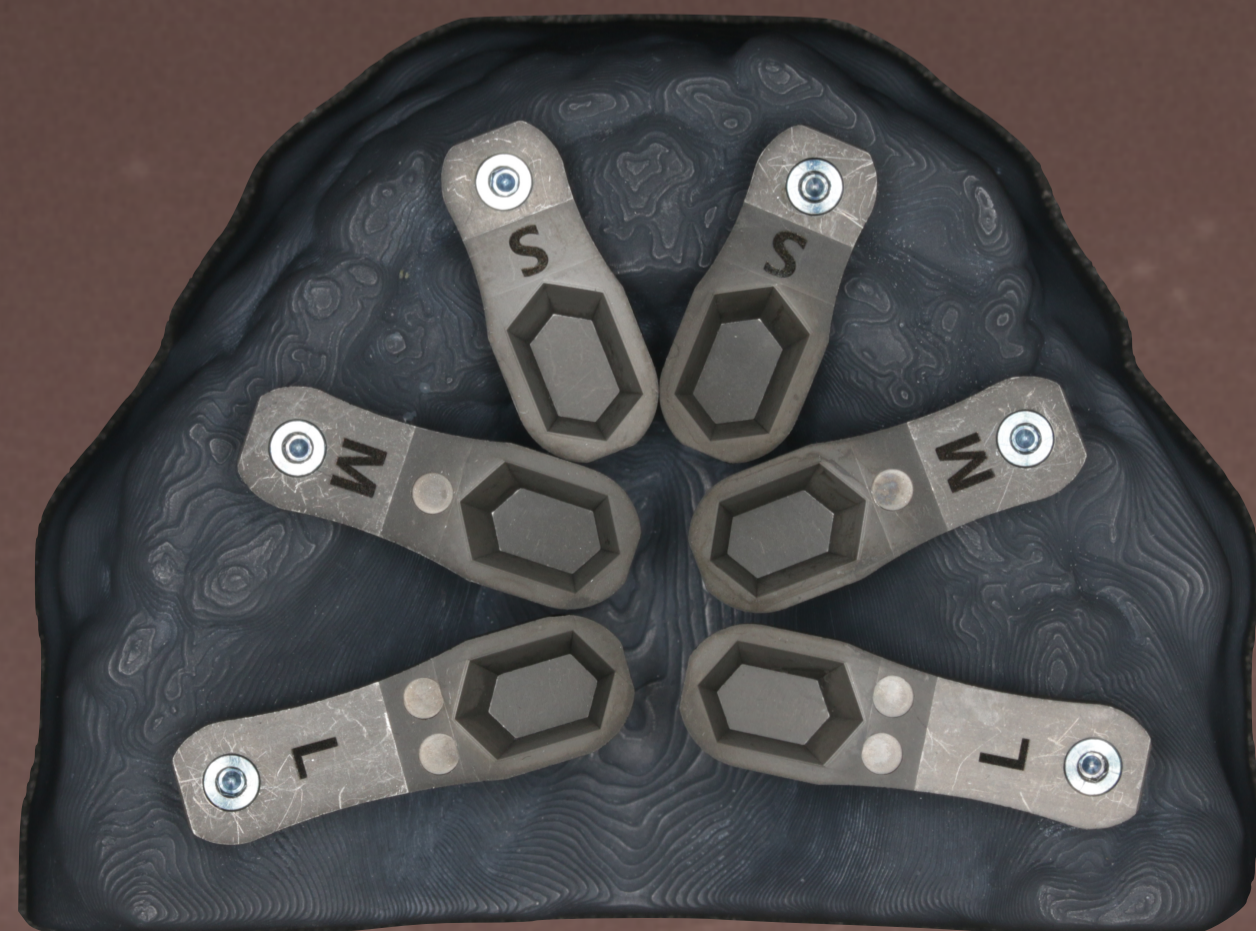
To isolate and evaluate implant-position accuracy in full-arch digital impressions using a **coordinate-based approach**, independent of global surface alignment.

1

Scan body system



S.I.N.



TruAbutment

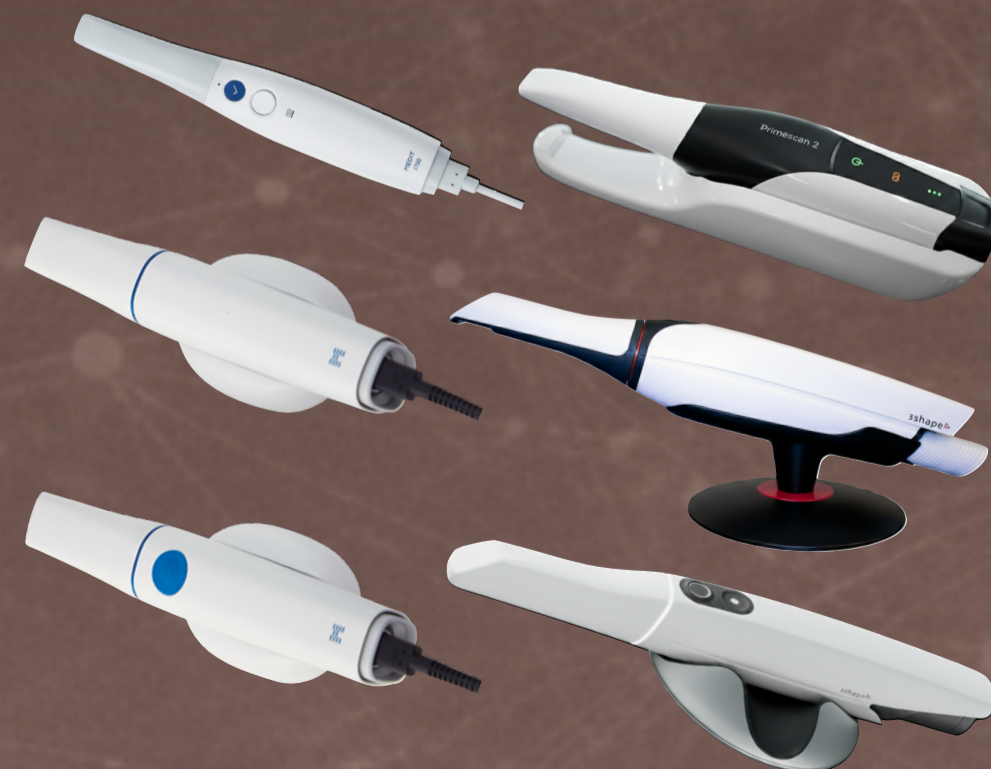
2

Scanner

n = 10 scans / scanner / scan body system



Control



Test

3

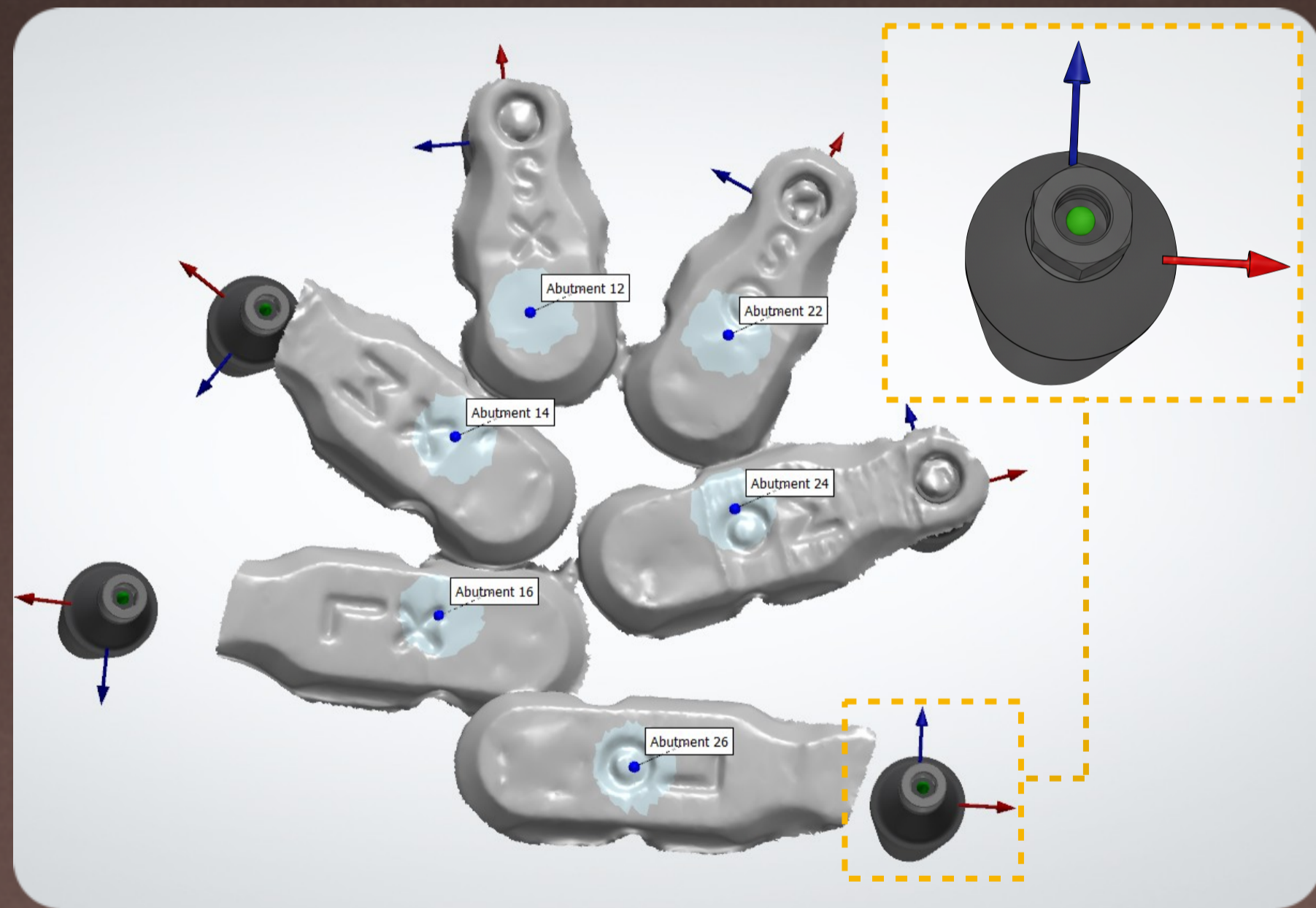
Scan body-library alignment





4

Coordinate extraction



5

Data processing



6

Implant coordinate comparison



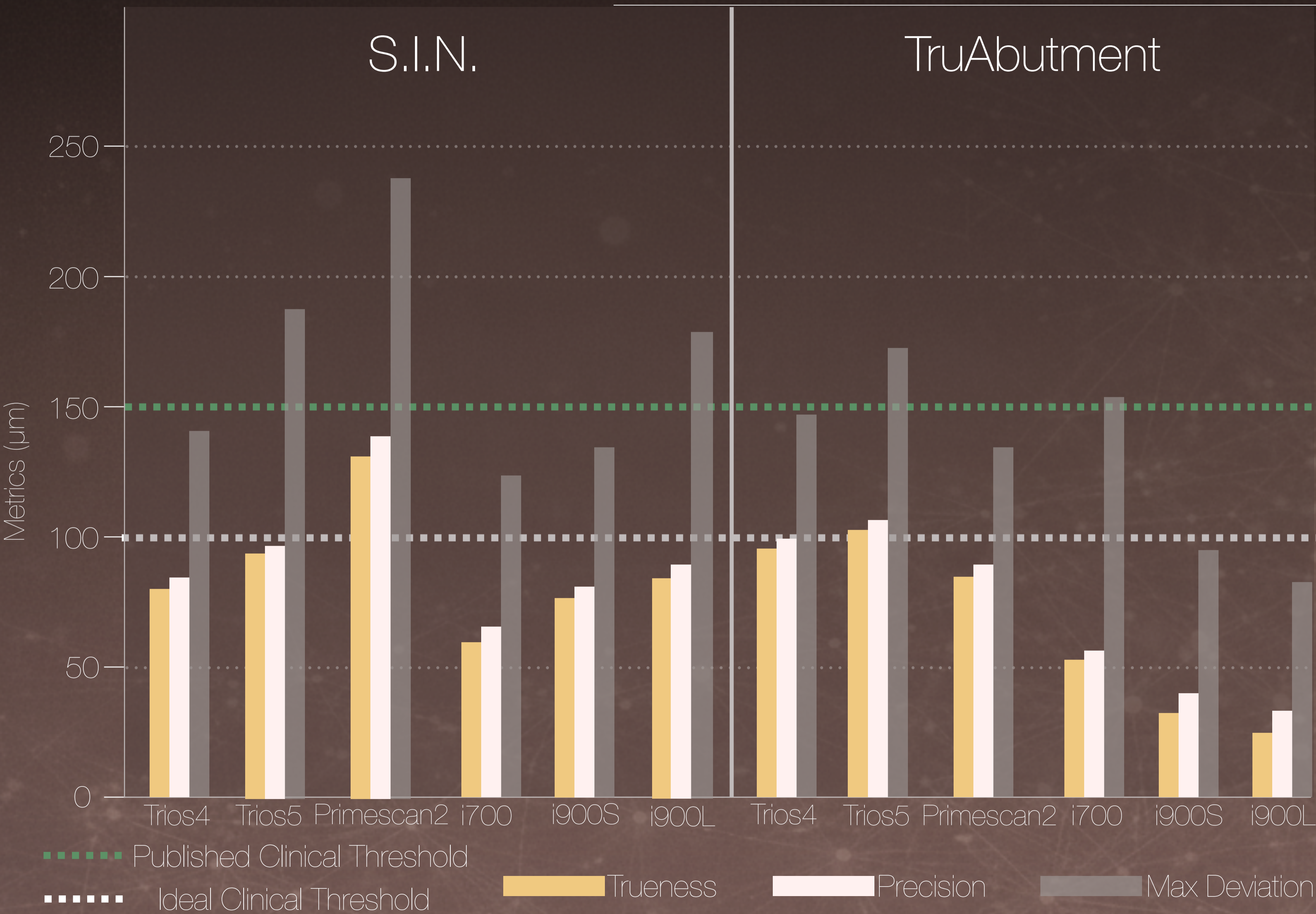
STL/XML Python script CSV

Trueness (Mean Deviation)

Precision (RMSE)

Max deviation

Key Results & Clinical Implications



Key findings

Significant scanner-dependent differences ($p < 0.001$).

Medit i700/i900 series showed highest trueness.

All systems within clinical acceptable limits.

Clinical insight

Consistent distortion patterns suggest scanner-specific bias.

Coordinate-based metrics enable algorithmic correction strategies.

