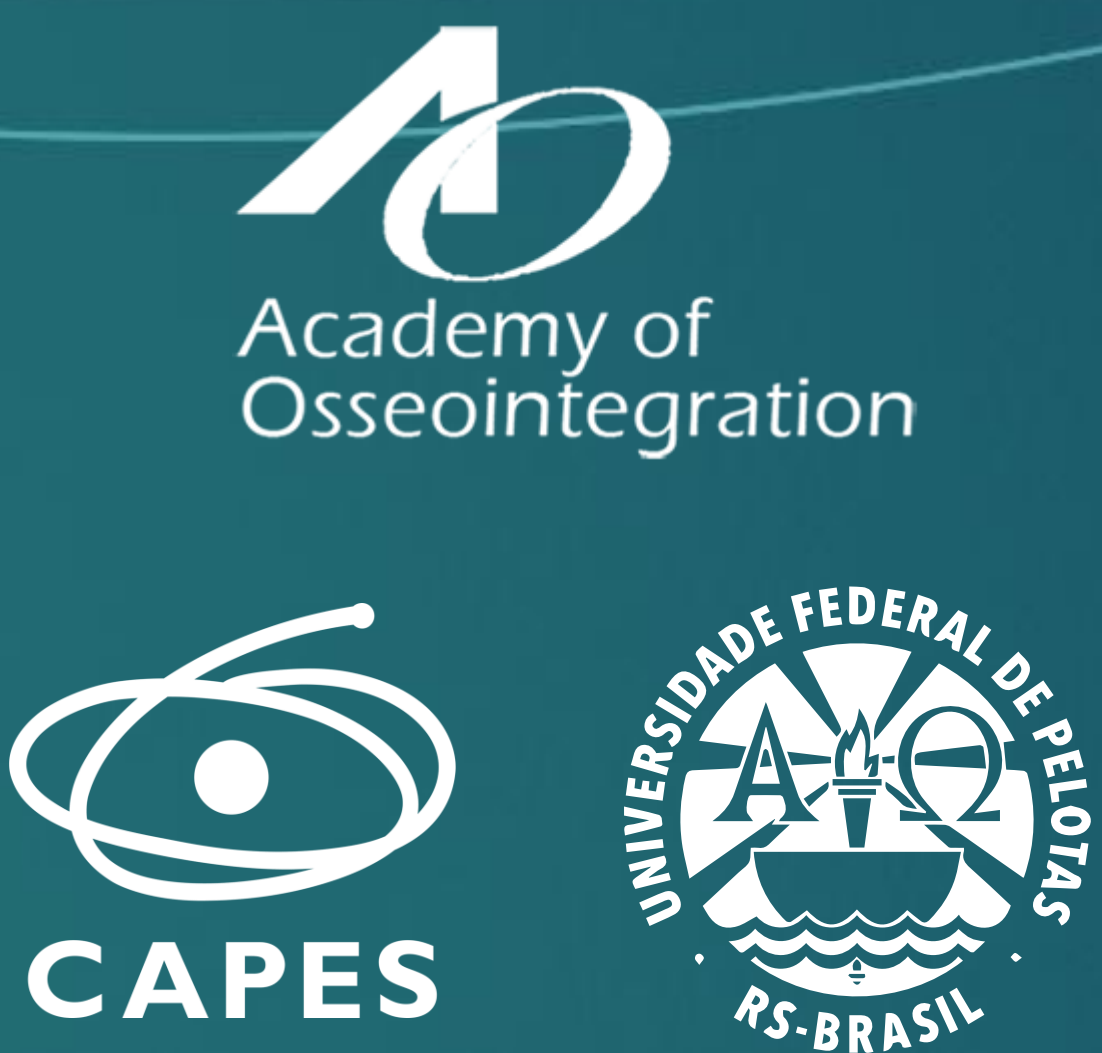


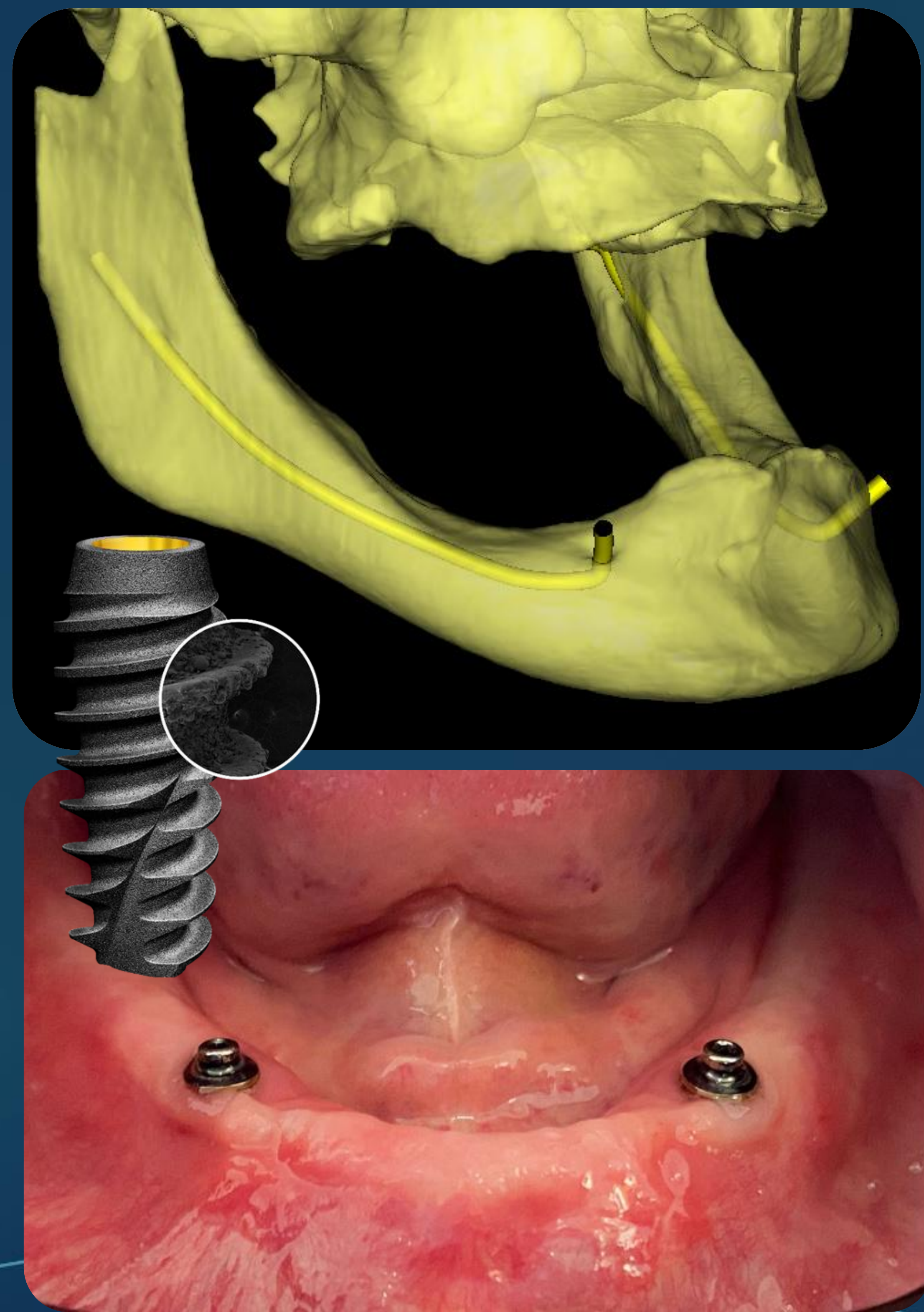
FUNCTIONAL AND QUALITY-OF-LIFE OUTCOMES OF MANDIBULAR OVERDENTURES SUPPORTED BY ADDITIVELY MANUFACTURED NARROW-DIAMETER IMPLANTS: A RANDOMIZED CLINICAL TRIAL

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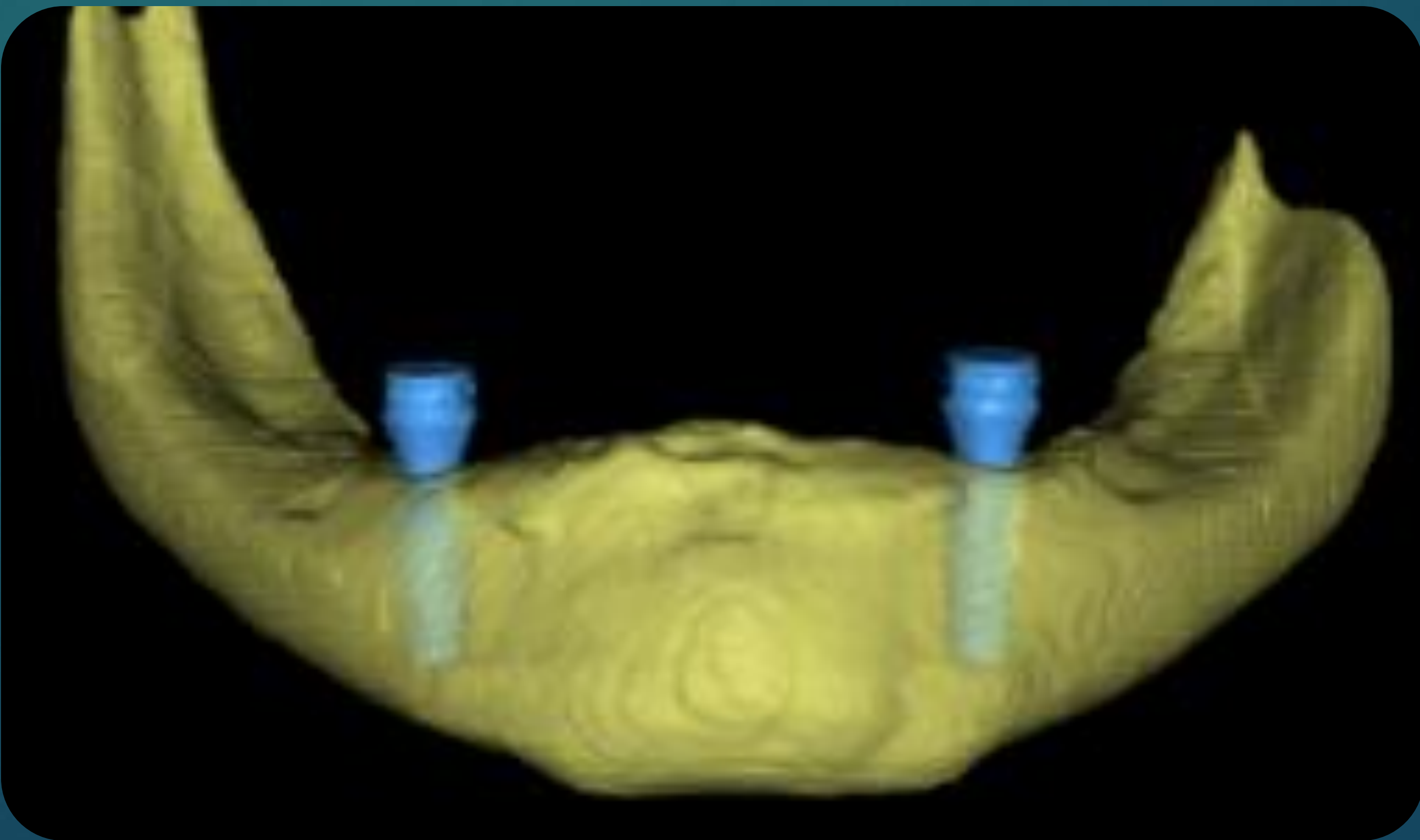
BACKGROUND



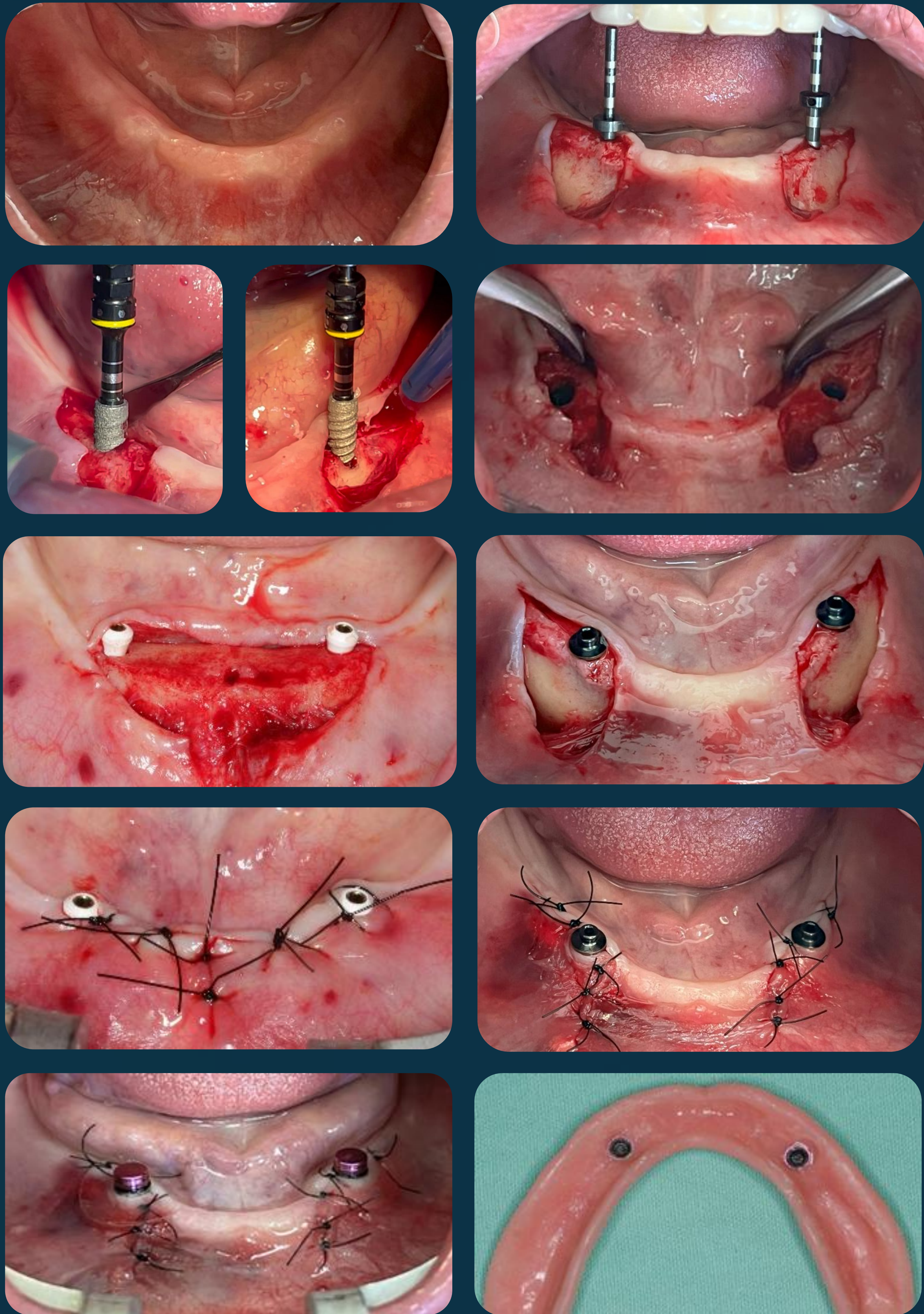
- For edentulous older adults, treatment success is measured by comfort, function, and confidence in daily life.
- Mandibular bone resorption often compromises denture stability, leading to pain, functional limitations, and early abandonment.
- Two-implant mandibular overdentures are the minimum standard of care in edentulous patients reestablishing function and comfort, directly impacting daily activities and overall quality of life.
- Advances in additive manufacturing have enabled the production of narrow-diameter implants with greater precision and mechanical strength, supporting new clinical approaches and potentially improving surgical accuracy and biological adaptation.

How loading protocols influence the speed and quality of functional recovery with these implants remains a clinically relevant, patient-centered question.

OBJECTIVE



This randomized clinical trial (RCT) compared functional performance and oral health-related quality of life between immediate and conventional loading protocols for mandibular overdentures supported by two additively manufactured narrow-diameter implants.



Experimental design



Ethical Committee Approval

- Protocol 6.420.934

Study type

- Prospective and parallel

Sample

- 16 fully edentulous patients
- Conventional complete denture wearers

Intervention

- Mandibular overdenture rehabilitation
- Narrow-diameter implants (3.5 × 10 mm)
- Stud-type retention system (Equator)
- Loading protocol: Conventional vs. Immediate

Outcomes

- Masticatory function
- Quality of life
- Satisfaction level

Evaluation time points

- Baseline, 30, 90 and 180 days

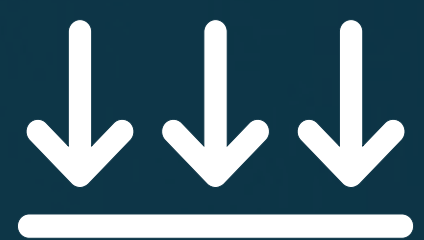
Statistical analysis

- Intra-group comparisons: Friedman test, paired Wilcoxon and T test
- Inter-group comparisons: Mann-Whitney test

Functional outcomes

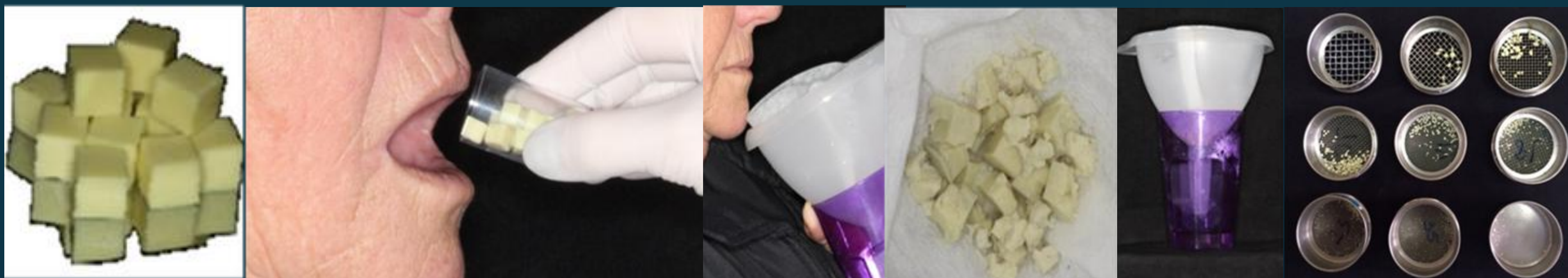
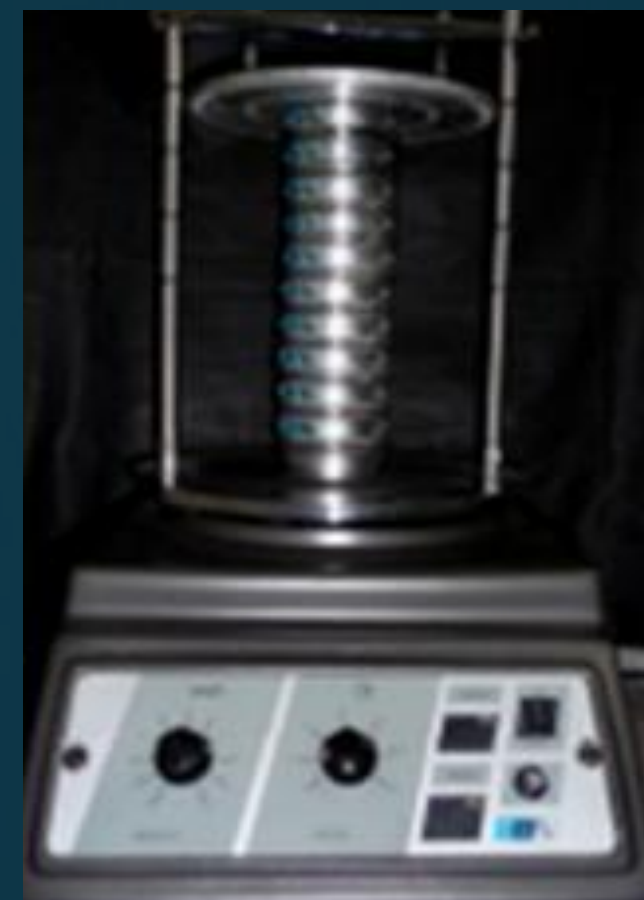
Bite force

- Gnathodynamometer (IDDKv4)
- Three bilateral measurements of 30 seconds



Masticatory Function

- Chewing of artificial test food: 3.7 g of Optocalv
- Tests
 - Masticatory Performance: 40 chewing cycles
 - Swallowing Threshold: free cycles
 - Outcomes: ME 5.6, ME 2.8, X50, B, Number of cycles and Time



Oral health-related quality of life



Daily Impact on Daily Living Questionnaire (DIDL)

- 36 questions distributed across five dimensions:



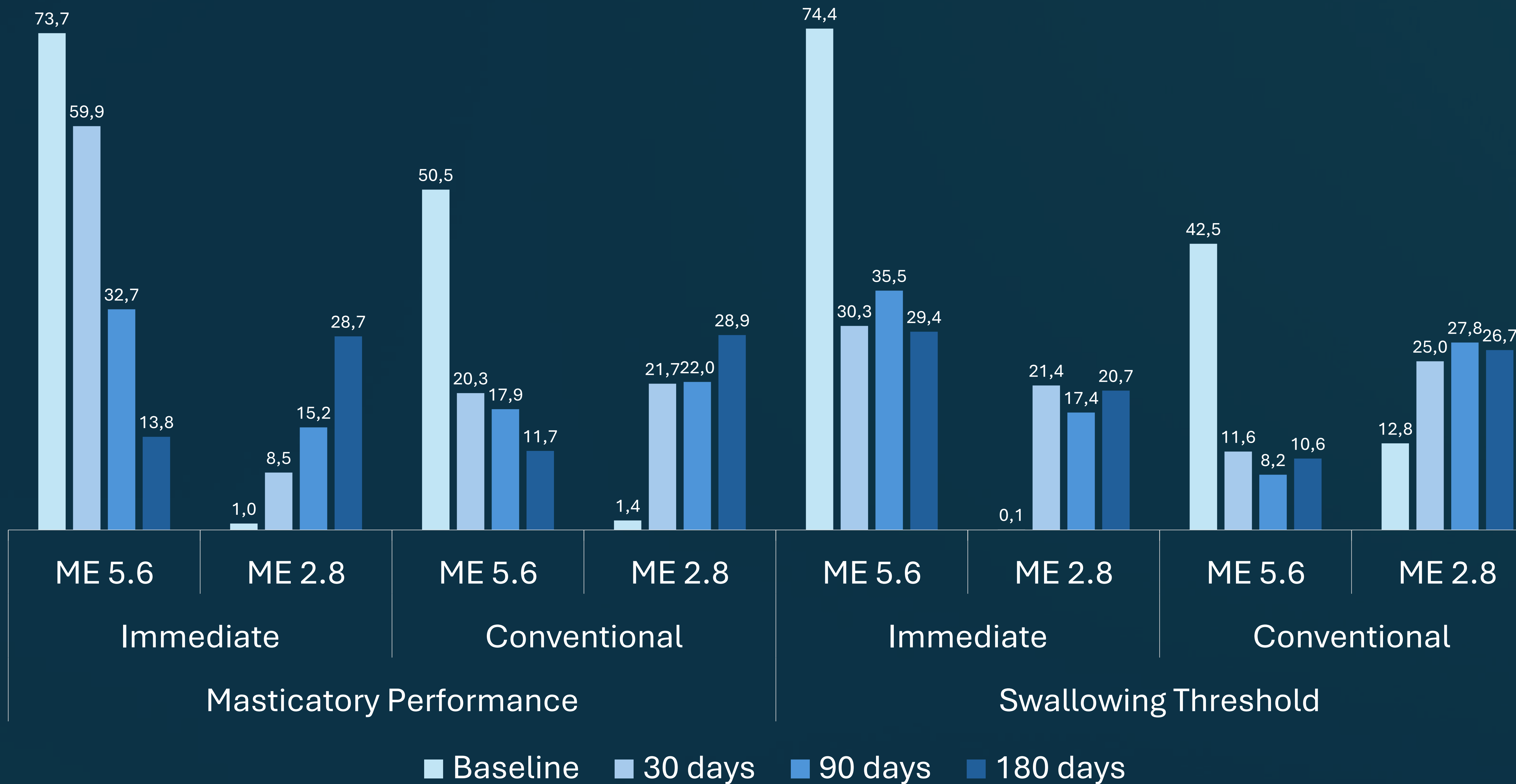
Responses: Agree, Disagree, and Neutral (scores -1 to +1)

Satisfaction Levels: Satisfied, Relatively satisfied and Desatisfied

RESULTS

Temporal Changes in Masticatory Function

Masticatory Efficiency (%)



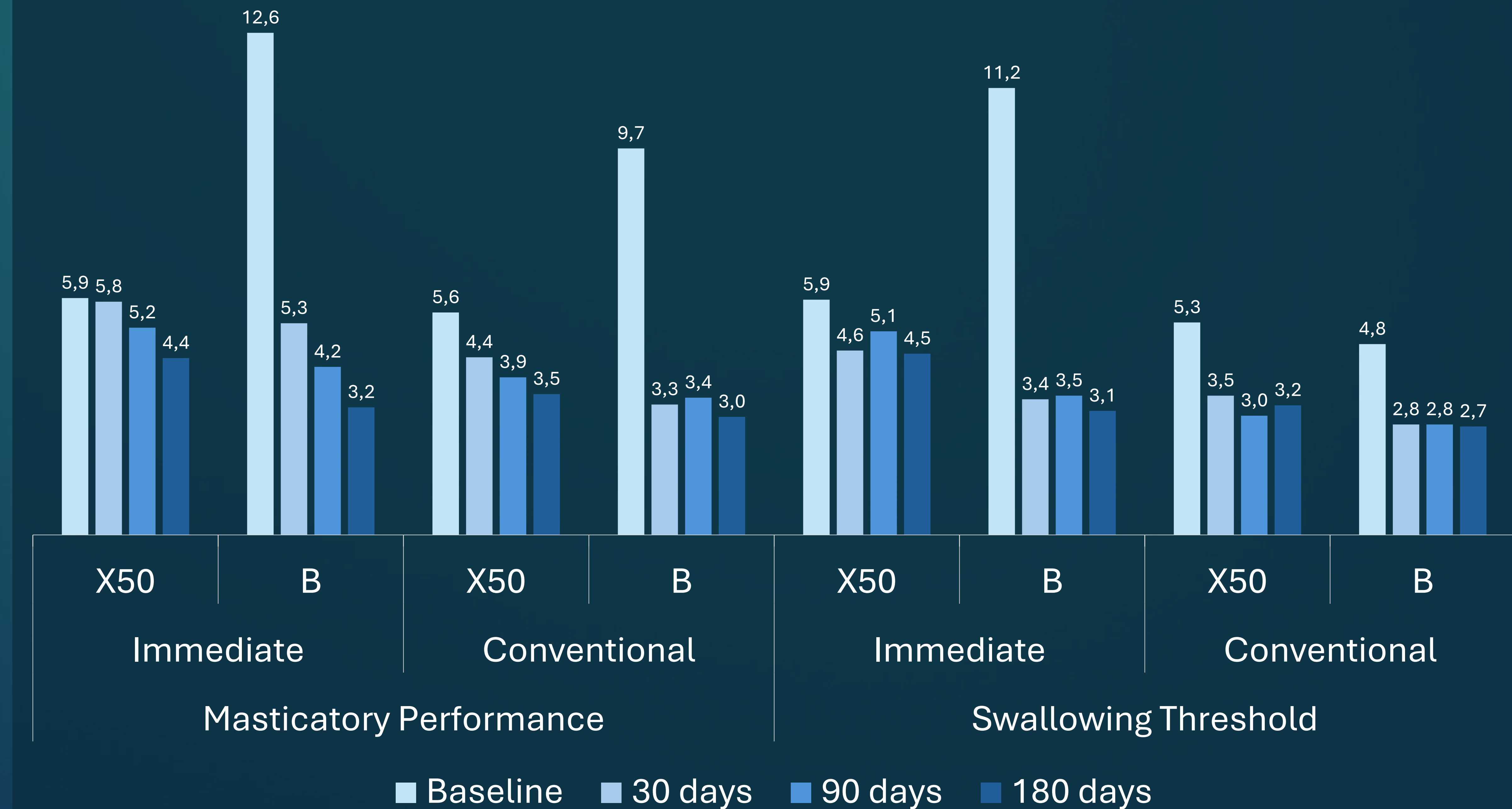
MP: Efficiency

- ✓ No between-group differences for EM 5.6 or EM 2.8 at any time ($p > 0.05$).
- ✓ CL showed early improvement at 30 days for EM 2.8.

ST : Efficiency

- ✓ At 90 days, CL outperformed IL for EM 2.8% ($p = 0.016$) and EM 5.6% ($p = 0.046$).
- ✓ Early gains at 30 days were observed for CL (EM 5.6) and IL (EM 5.6 and EM 2.8).

Masticatory Performance (mm)



MP: Performance

- ✓ No between-group differences for X50 or B ($p > 0.05$).
- ✓ CL and IL improved early at 30 days for B.

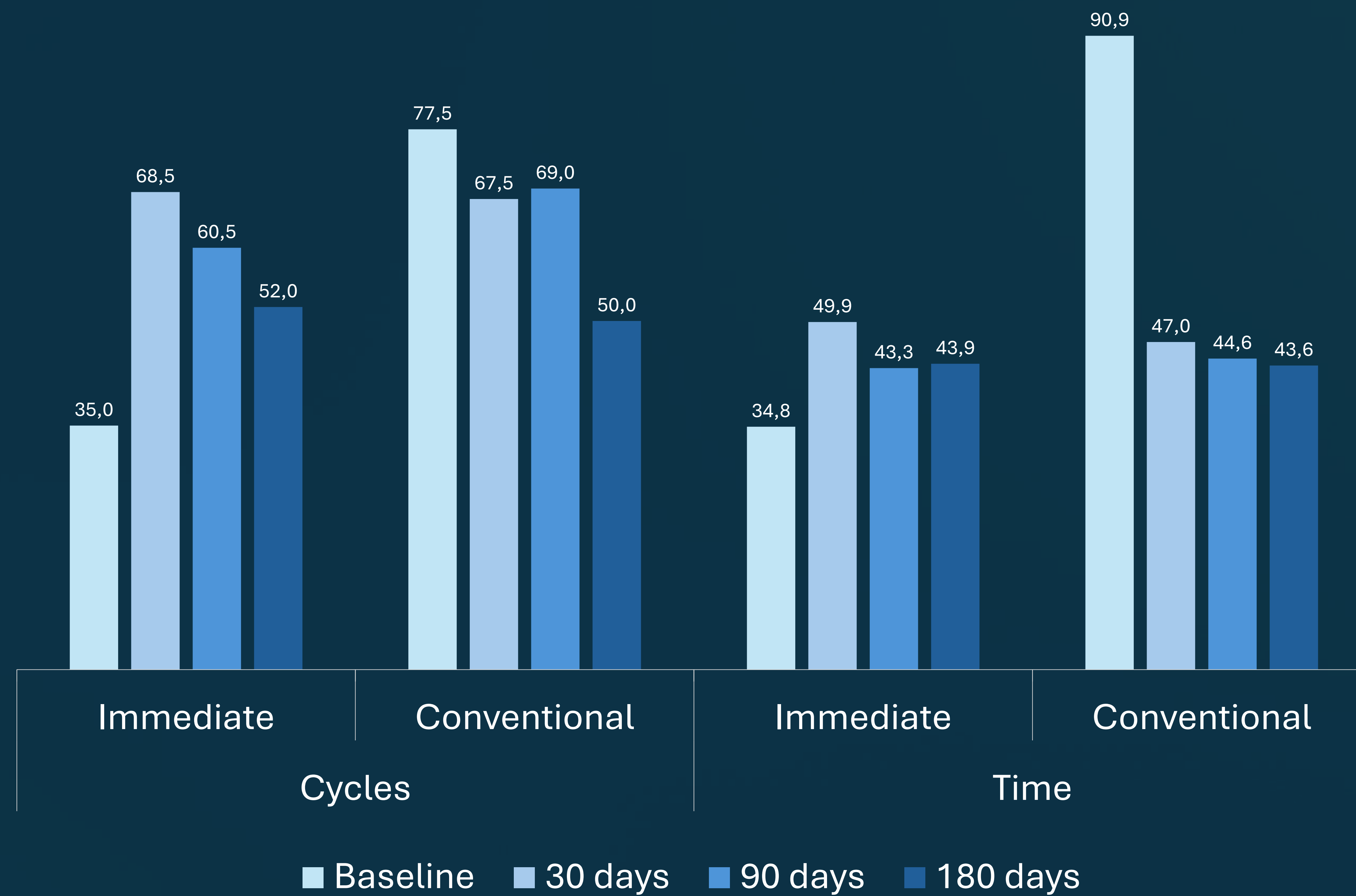
✓ ST : Performance

- ✓ At 90 days, CL showed superior performance for X50 ($p = 0.036$).
- ✓ Early improvements at 30 days occurred in CL (X50) and IL (B).

RESULTS

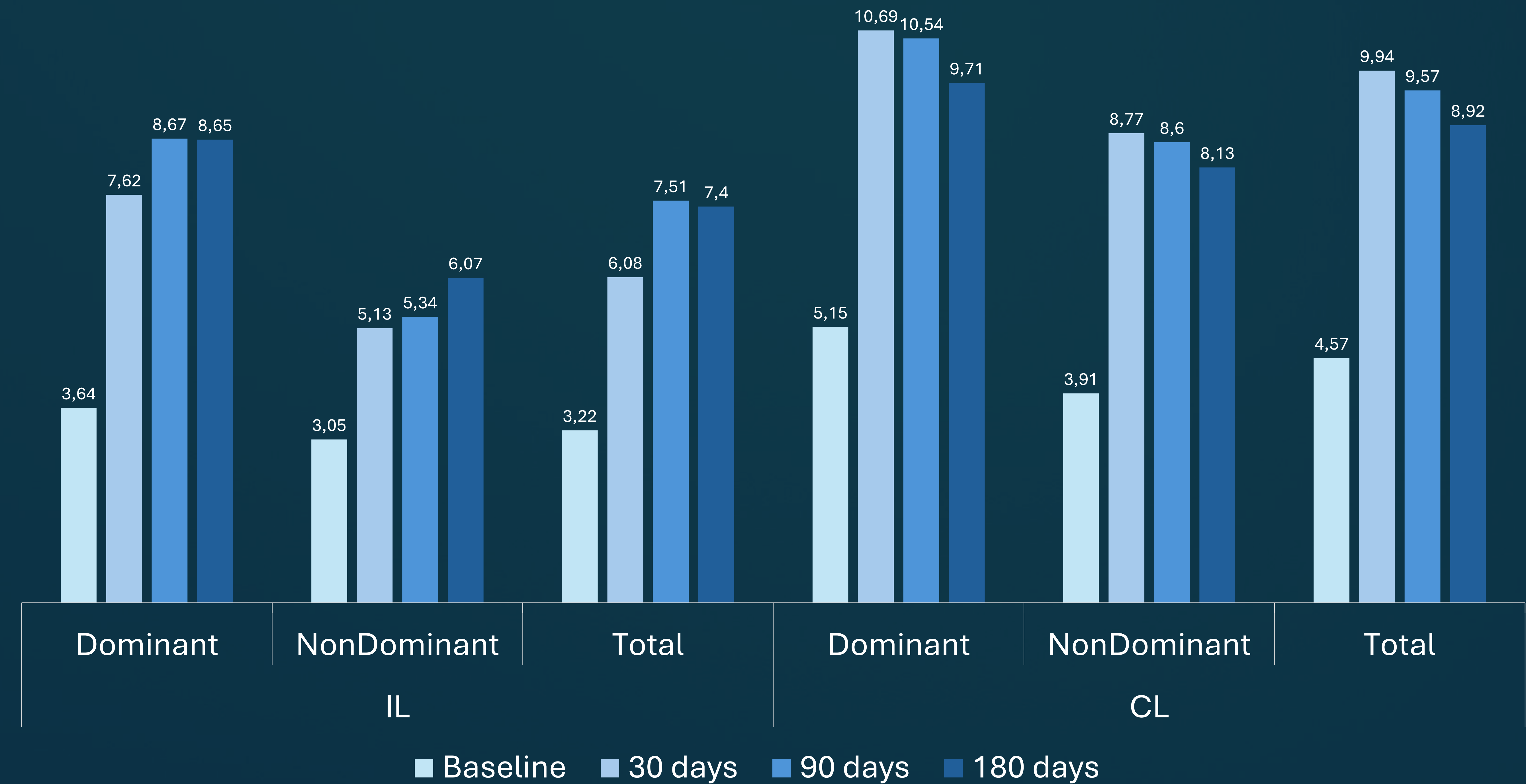
Temporal Changes in Number of Cycles, Chewing Time and Bite Force

Swallowing Threshold: Cycles (number) & Time (seconds)



Neither number of cycles nor chewing time differed significantly between groups or within groups over time ($p > 0.05$).

Bite force (Kgf)



Between-group difference only at 30 days for the non-dominant side ($p = 0.046$) favoring CL.

- Both groups showed early improvements at 30 days. BF values stable up to 180 days.
- CL presented higher absolute bite force at all time points.

RESULTS

Temporal Changes in OHQoL and Patient Satisfaction

➤ **Baseline difference between protocols observed only for Appearance ($p = 0.02$).**

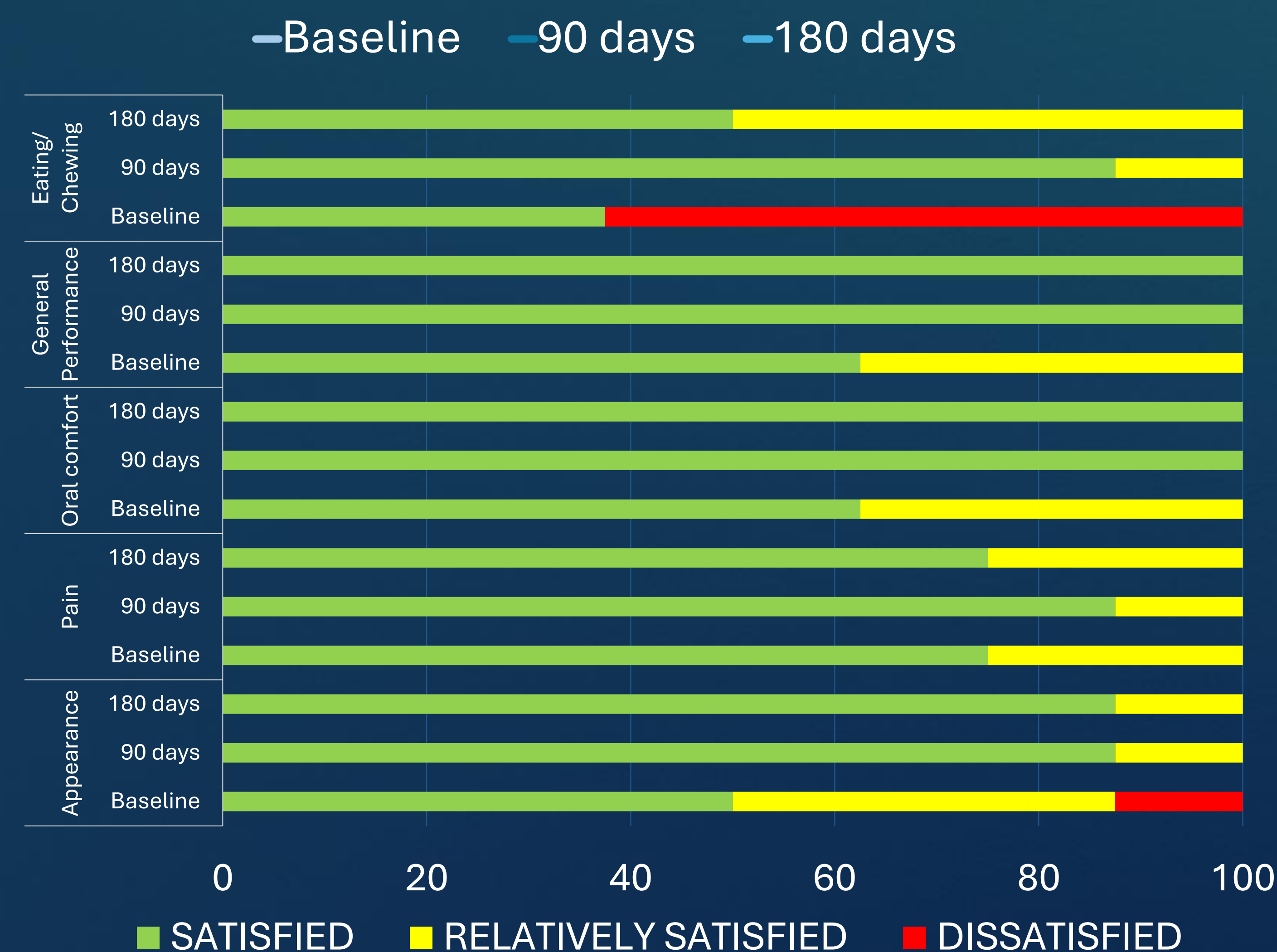
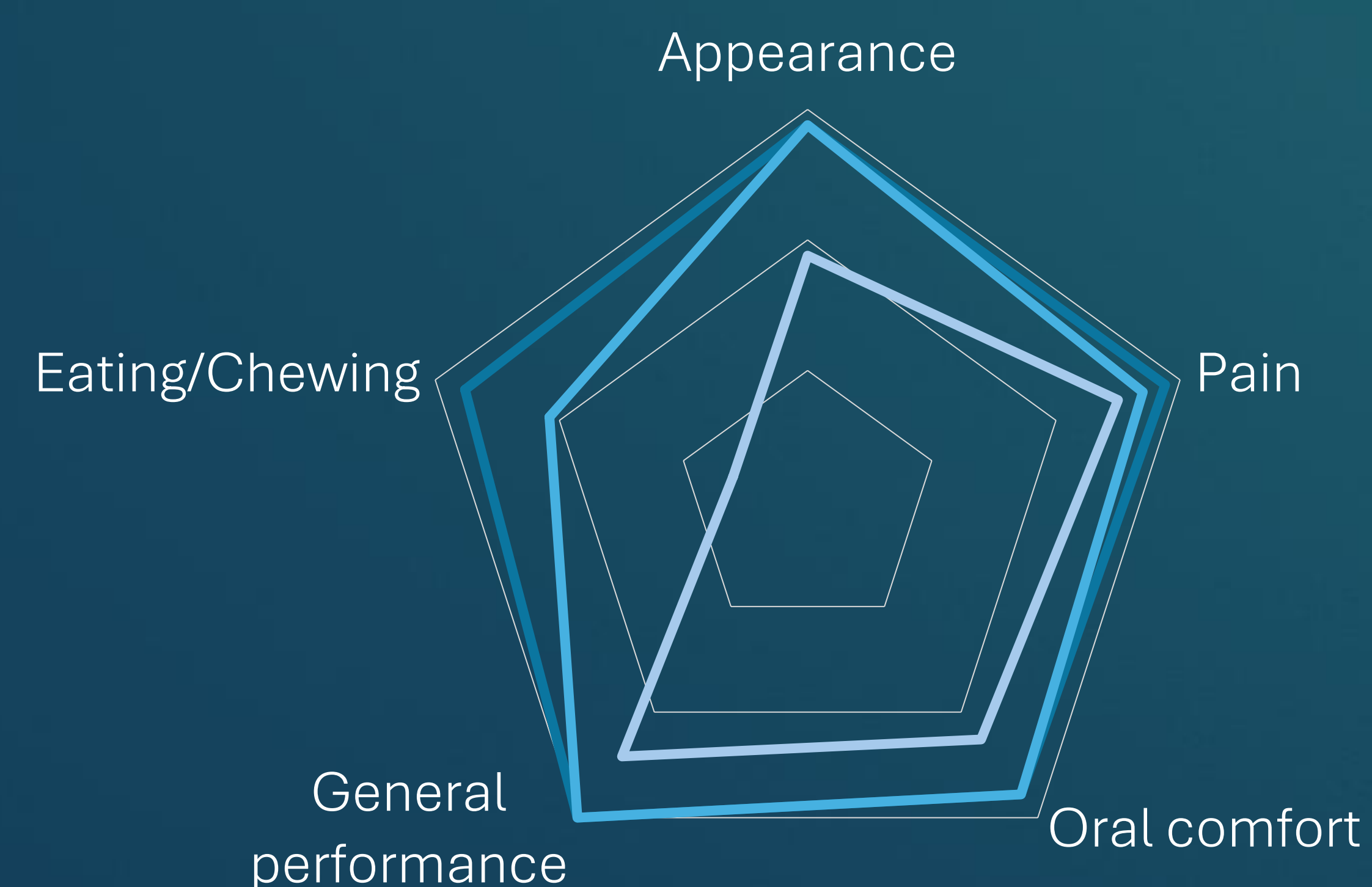
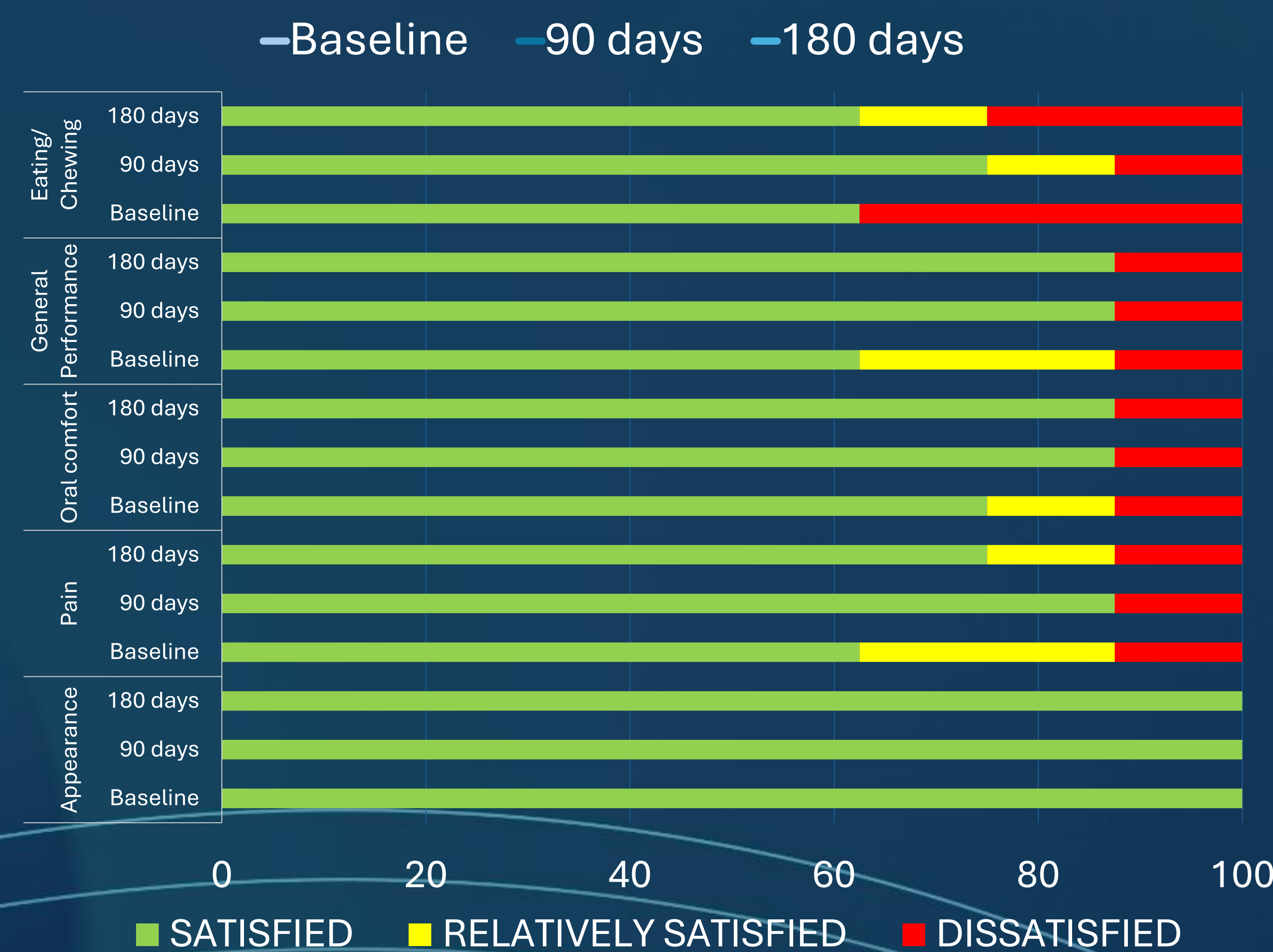
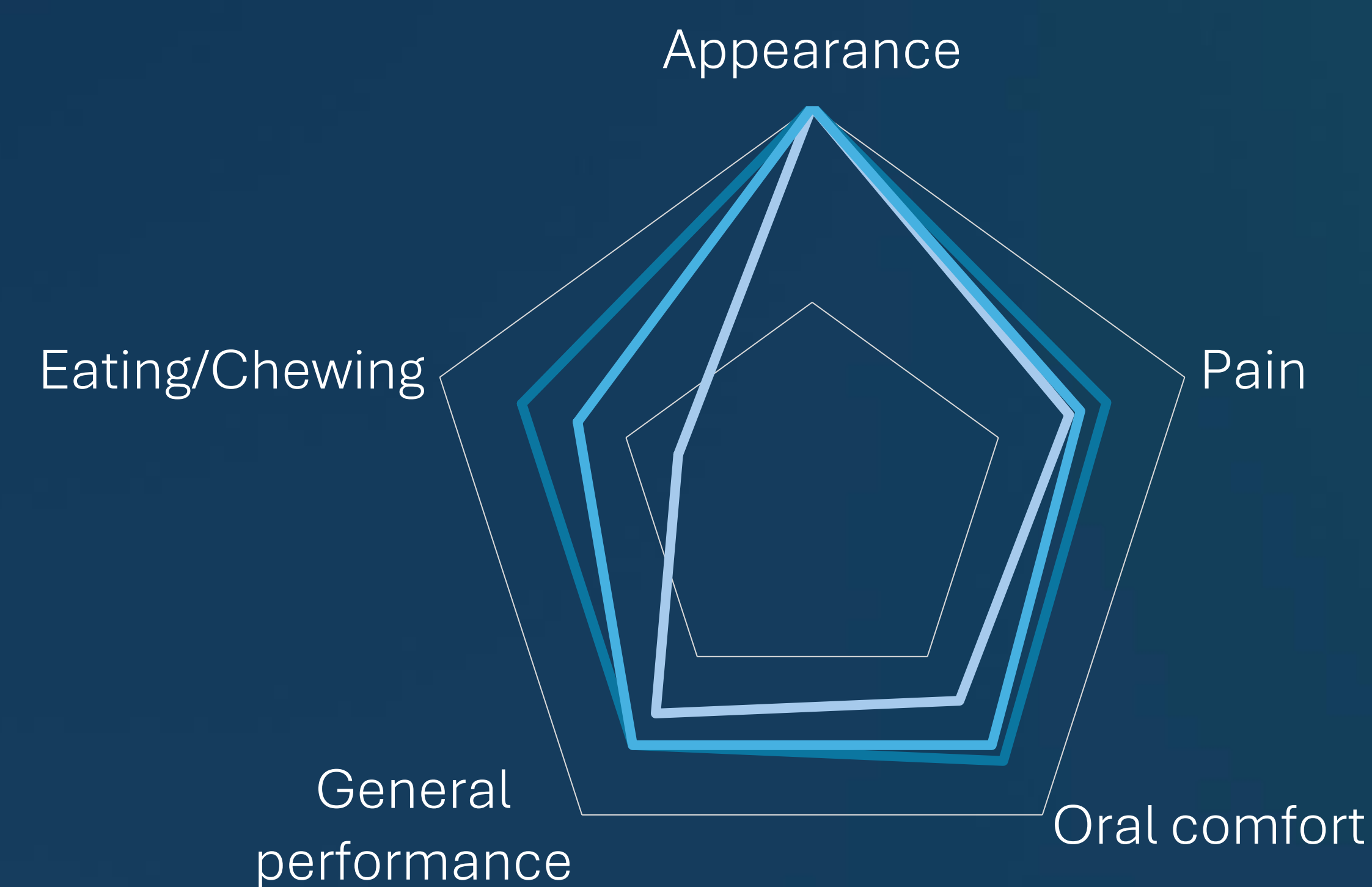
➤ **CL:** improved general performance over time ($p = 0.007$).

Immediate Loading:

- Small, stable effects throughout follow-up

Conventional Loading:

- **At 90 days, moderate-large effects for eating/chewing ($ES = 1.14$) and general performance ($ES = 0.89$).**



CONCLUSION

Both immediate and conventional loading protocols for mandibular overdentures supported by two narrow-diameter, additively manufactured implants resulted in significant improvements in masticatory performance and OHRQoL **after six months.**

