

Health Status after Transcatheter Tricuspid Valve Repair in Patients with Severe Tricuspid Regurgitation:

Detailed Results from the TRILUMINATE Pivotal Trial

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On behalf of the TRILUMINATE Investigators

Disclosures

Institutional Research Support

- Edwards Lifesciences
 - Boston Scientific
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 - JenaValve
- Abbott Vascular
 - Medtronic
 - CathWorks
 - Zoll/Therox
 - JC Medical

Consulting/Advisory Boards

- Medtronic
 - Boston Scientific
 - HeartBeam
- Edwards Lifesciences
 - Abbott Vascular

Background

TRILUMINATE Pivotal Trial

- Randomized 350 pts to T-TEER using TriClip vs. medical therapy alone
- Key findings
 - Substantial reductions in tricuspid regurgitation
 - No difference in death or HFH at 1 year
 - Significant improvement in patient-reported health status (symptoms, functional limitations, QOL)

Detailed QOL analysis performed in order to:

- Examine the magnitude and durability of benefit
- Explore heterogeneity of treatment benefit
- Determine whether the QOL benefit is biologically mediated

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Transcatheter Repair for Patients with Tricuspid Regurgitation

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ABSTRACT

BACKGROUND

Severe tricuspid regurgitation is a debilitating condition that is associated with substantial morbidity and often with poor quality of life. Decreasing tricuspid regurgitation may reduce symptoms and improve clinical outcomes in patients with this disease.

METHODS

We conducted a prospective randomized trial of percutaneous tricuspid transcatheter edge-to-edge repair (TEER) for severe tricuspid regurgitation. Patients with symptomatic severe tricuspid regurgitation were enrolled at 65 centers in the United States, Canada, and Europe and were randomly assigned in a 1:1 ratio to receive either TEER or medical therapy (control). The primary end point was a hierarchical composite that included death from any cause or tricuspid-valve surgery, hospitalization for heart failure, and an improvement in quality of life as measured with the Kansas City Cardiomyopathy Questionnaire (KCCQ), with an improvement defined as an increase of at least 15 points in the KCCQ score (range, 0 to 100, with higher scores indicating better quality of life) at the 1-year follow-up. The severity of tricuspid regurgitation and safety were also assessed.

RESULTS

A total of 350 patients were enrolled; 175 were assigned to each group. The mean age of the patients was 78 years, and 54.9% were women. The results for the primary end point favored the TEER group (win ratio, 1.48; 95% confidence interval, 1.06 to 2.13, $P=0.03$). The incidence of death or tricuspid-valve surgery and the rate of hospitalization for heart failure did not appear to differ between the groups. The KCCQ quality-of-life score changed by a mean (±SD) of 12.3±11.8 points in the TEER group, as compared with 0.6±11.8 points in the control group ($P<0.001$). At 30 days, 87.9% of the patients in the TEER group and 4.8% of those in the control group had tricuspid regurgitation of no greater than moderate severity ($P<0.001$). TEER was found to be safe; 98.3% of the patients who underwent the procedure were free from major adverse events at 30 days.

CONCLUSIONS

Tricuspid TEER was safe for patients with severe tricuspid regurgitation, reduced the severity of tricuspid regurgitation, and was associated with an improvement in quality of life. (Funded by Abbott; TRILUMINATE Pivotal ClinicalTrials.gov number, NCT016904147.)

From Allina Health Minneapolis Heart Institute at Abbott Northwestern Hospital, Minneapolis (P.S., N.H., R. Naik), Intermountain Medical Center, Murray, UT (B.W., M.S.), St. Joseph's Hospital and Integrated Medical Services, Phoenix, AZ (P.H.), TWG, Cedars-Sinai Medical Center, Los Angeles (R.M., M.M.), Scripps Clinic Group Hospital, La Jolla (M.J.P.), UC Davis Medical Center, Sacramento (G.S.), Los Angeles Regional Medical Center, Thousand Oaks (S.K.), and Abbott Structural Heart, Santa Clara (E.M.S., P.M.T.)—all in California; Kansas University Medical Center, Kansas City (P.T., G.Z.); St. Michael's Hospital, Toronto (N.F.); and McMaster University, Hamilton, ON (S.M.)—both in Canada; Carolina Medical Center, Charlotte, NC (J.G.S.); Ohio State University, Columbus (J. Benza); Montefiore Medical Center, Bronx (D.J.); and Mount Sinai Health System (C.H.L., D.H.A.) and New York-Presbyterian Columbia University Medical Center (P.T.), New York—all in New York; Northwestern University, Chicago (P.M.); and Mount Sinai Center, Presbyterian Heart Institute Foundation, 320 E. 28th St., Suite 200, Minneapolis, MN 55425.

*The TRILUMINATE Pivotal Investigators are listed in the Supplementary Appendix, available at [NEJM.org](https://www.nejm.org). This article was published on March 4, 2023, and last updated on May 18, 2023, at [NEJM.org](https://www.nejm.org).

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Study Design

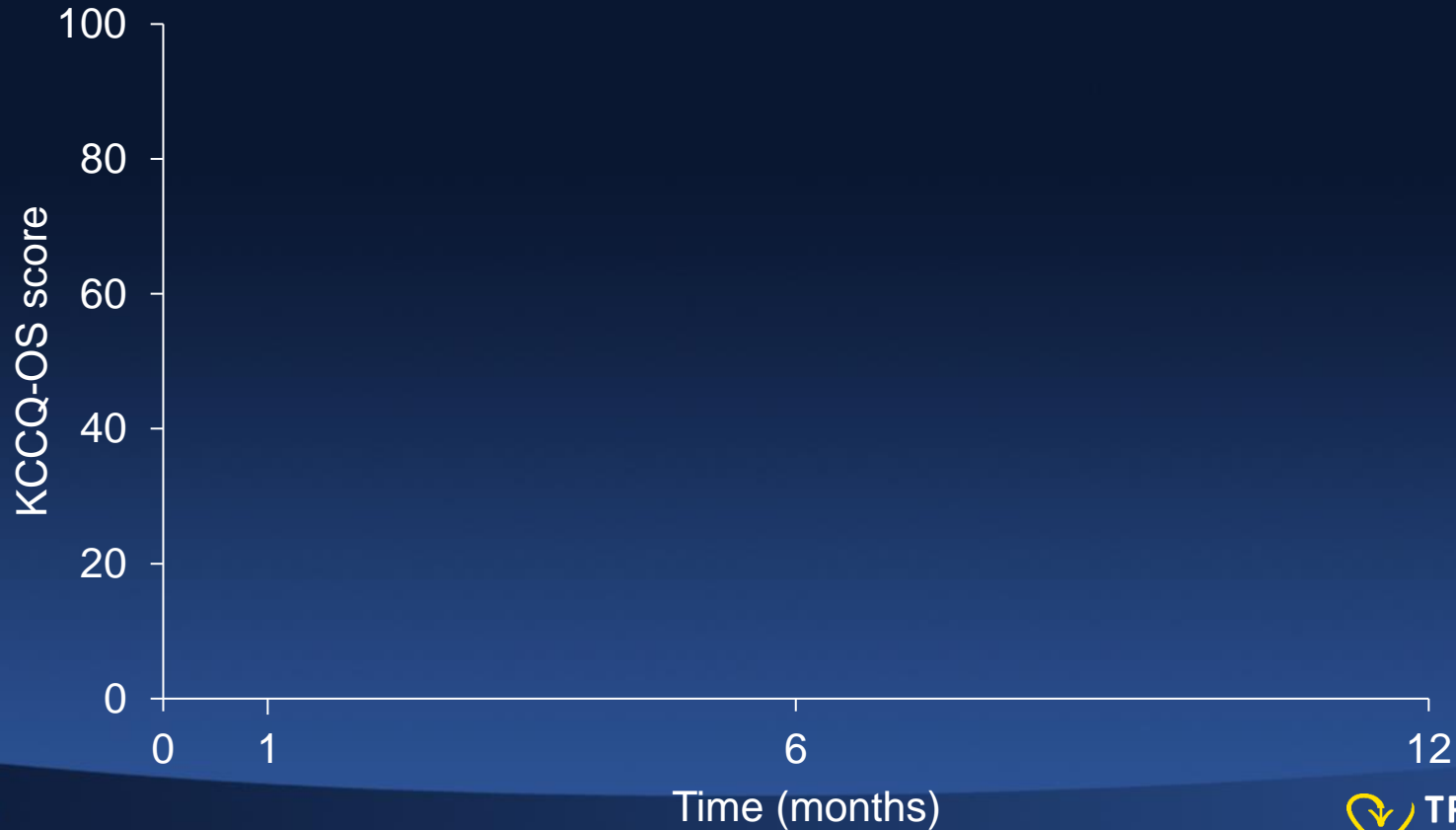
- Multicenter, open-label RCT in patients with severe, massive, or torrential TR and NYHA II-IVa
 - **Excluded:** untreated valve disease, reduced LVEF, severe pulmonary hypertension
- Health status assessed at baseline and 1, 6, 12 months
 - **Kansas City Cardiomyopathy Questionnaire (KCCQ)**
 - Scores 0-100; higher=better; MCID=5 points
 - Primary Endpoint: Overall Summary score (KCCQ-OS)
 - **SF-36 Physical and Mental Summary Scores**
 - Population mean 50 SD 10; higher=better; MCID=2.5 points

Baseline Health Status

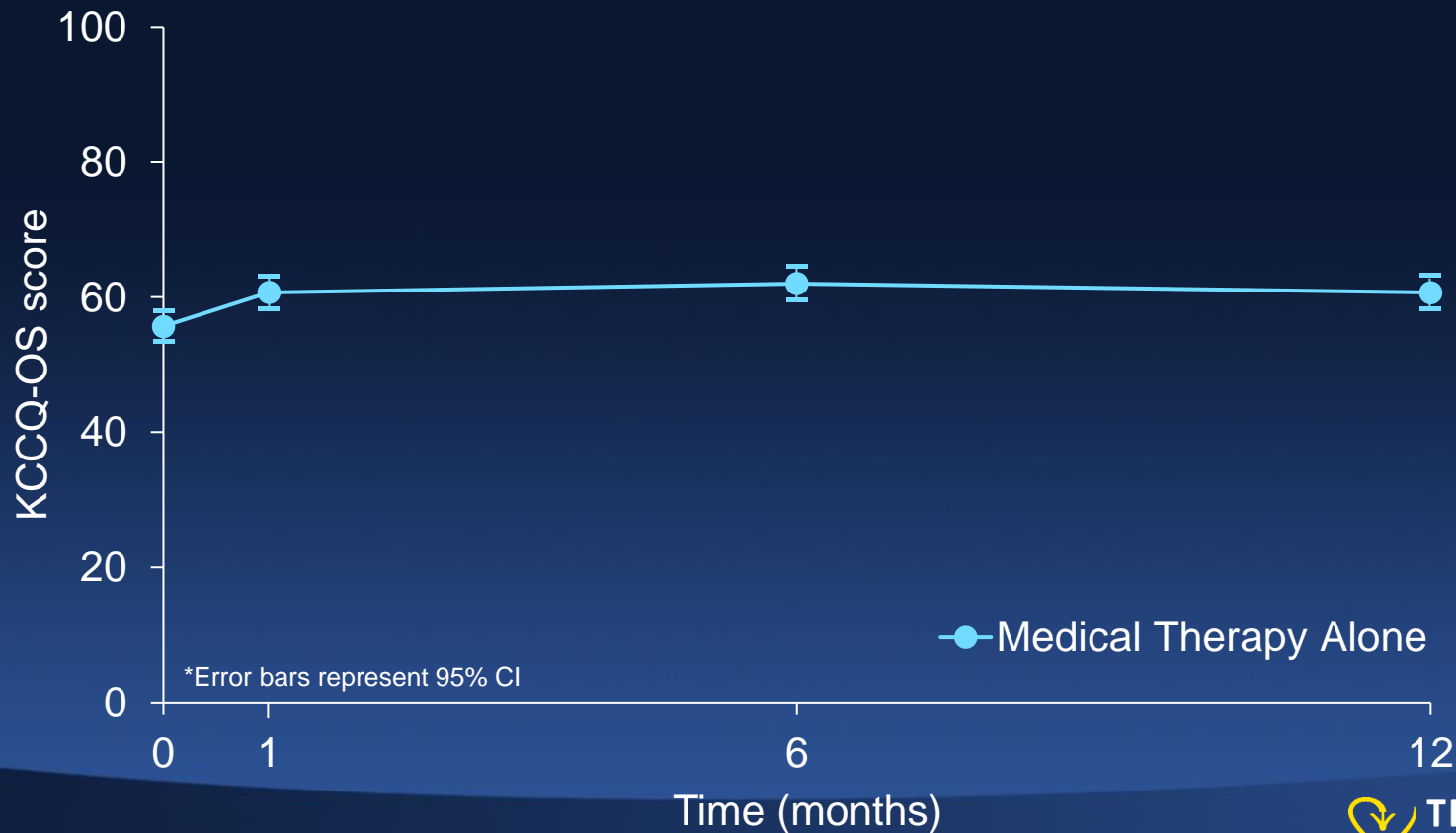
	T-TEER (n=169)	Medical Therapy (n=163)
KCCQ-Overall Summary	56 ± 24	55 ± 24
Physical Limitations	59 ± 24	60 ± 26
Symptoms	63 ± 25	60 ± 26
Quality of Life	50 ± 26	46 ± 26
Social Limitation	52 ± 32	55 ± 31
SF-36 Physical Summary	35 ± 10	35 ± 10
SF-36 Mental Summary	48 ± 12	46 ± 13

*18 patients excluded due to missing all follow-up KCCQ data

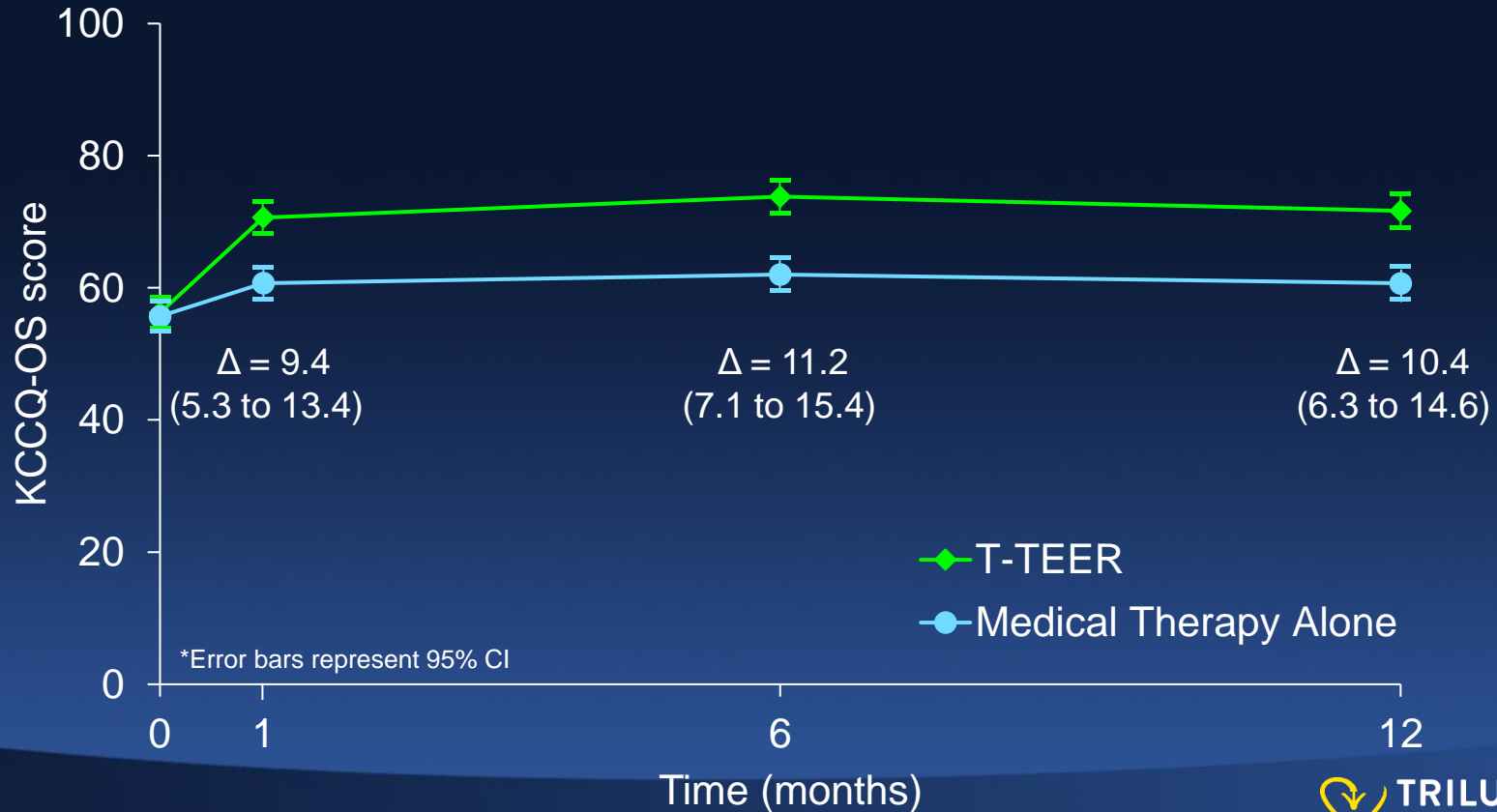
Key Outcome: KCCQ-OS



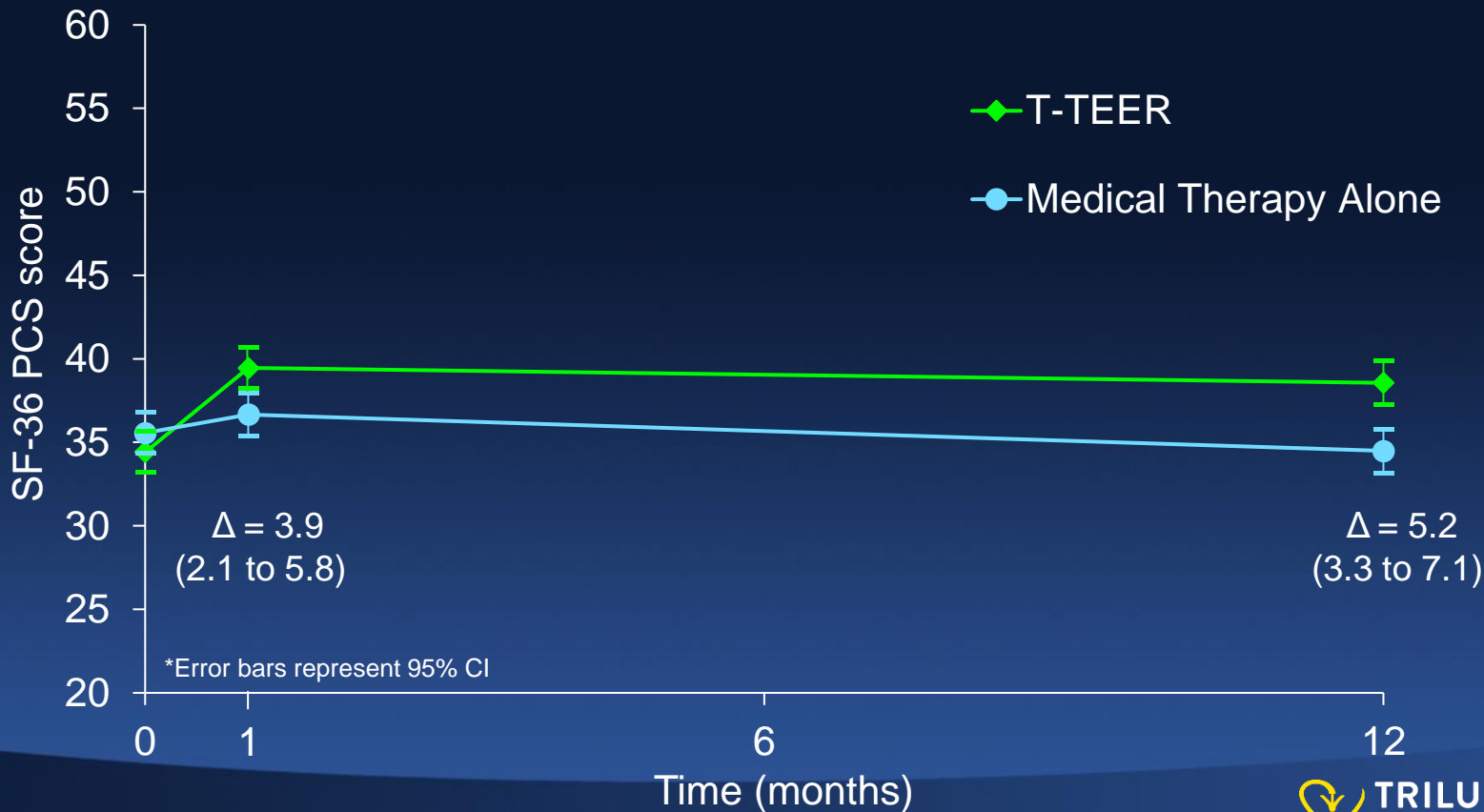
Key Outcome: KCCQ-OS



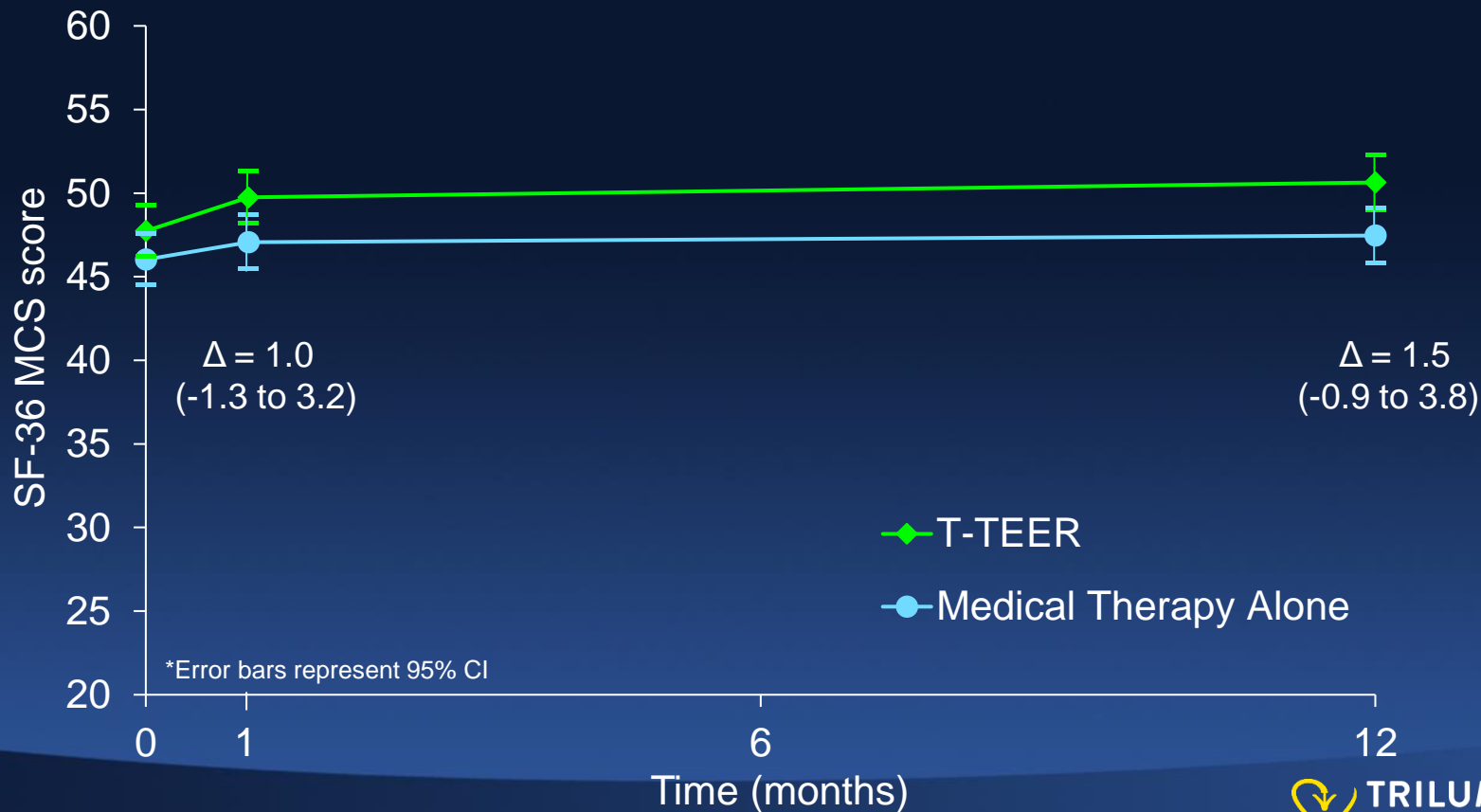
Key Outcome: KCCQ-OS



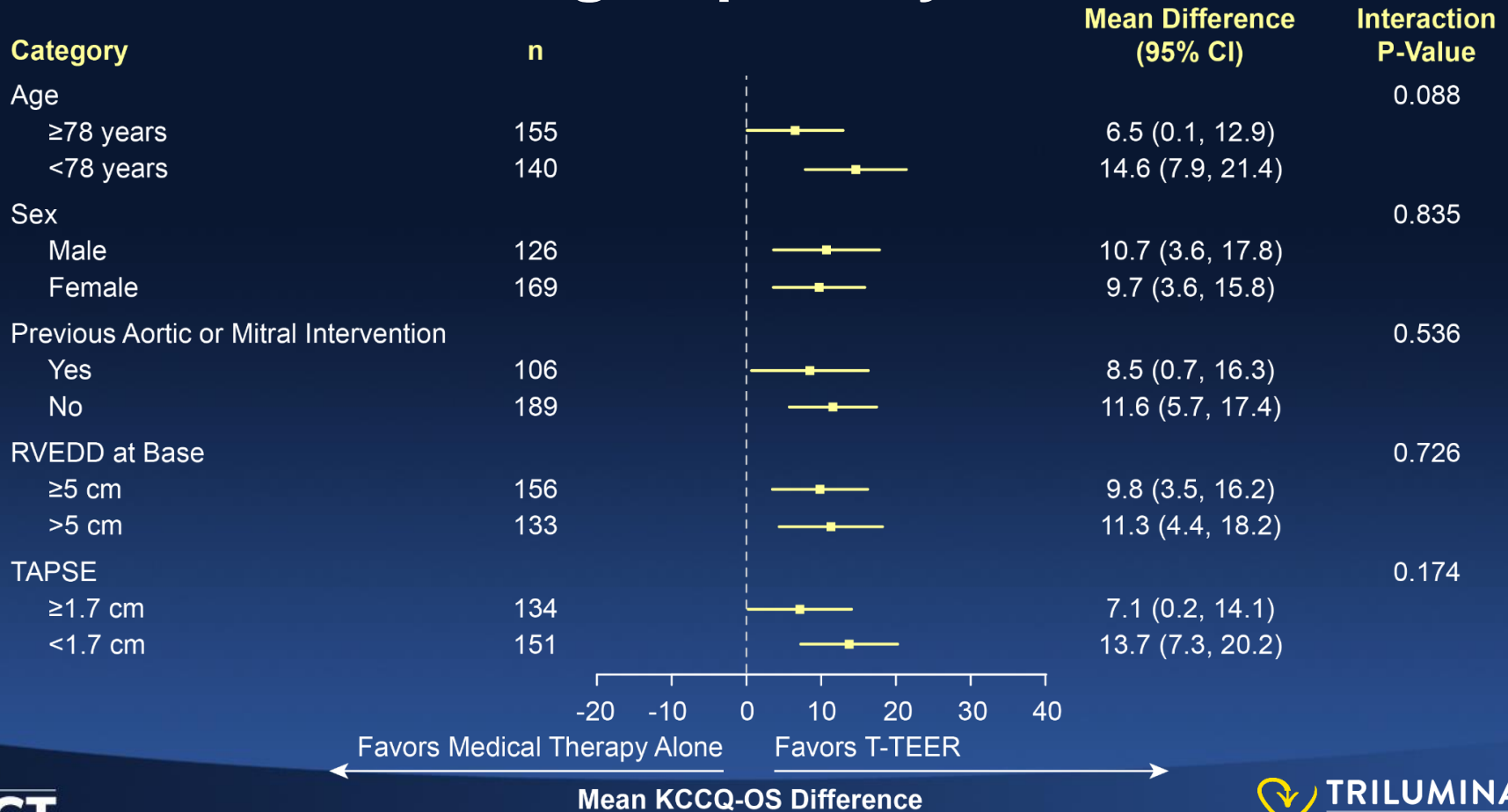
SF-36 Physical Summary Score



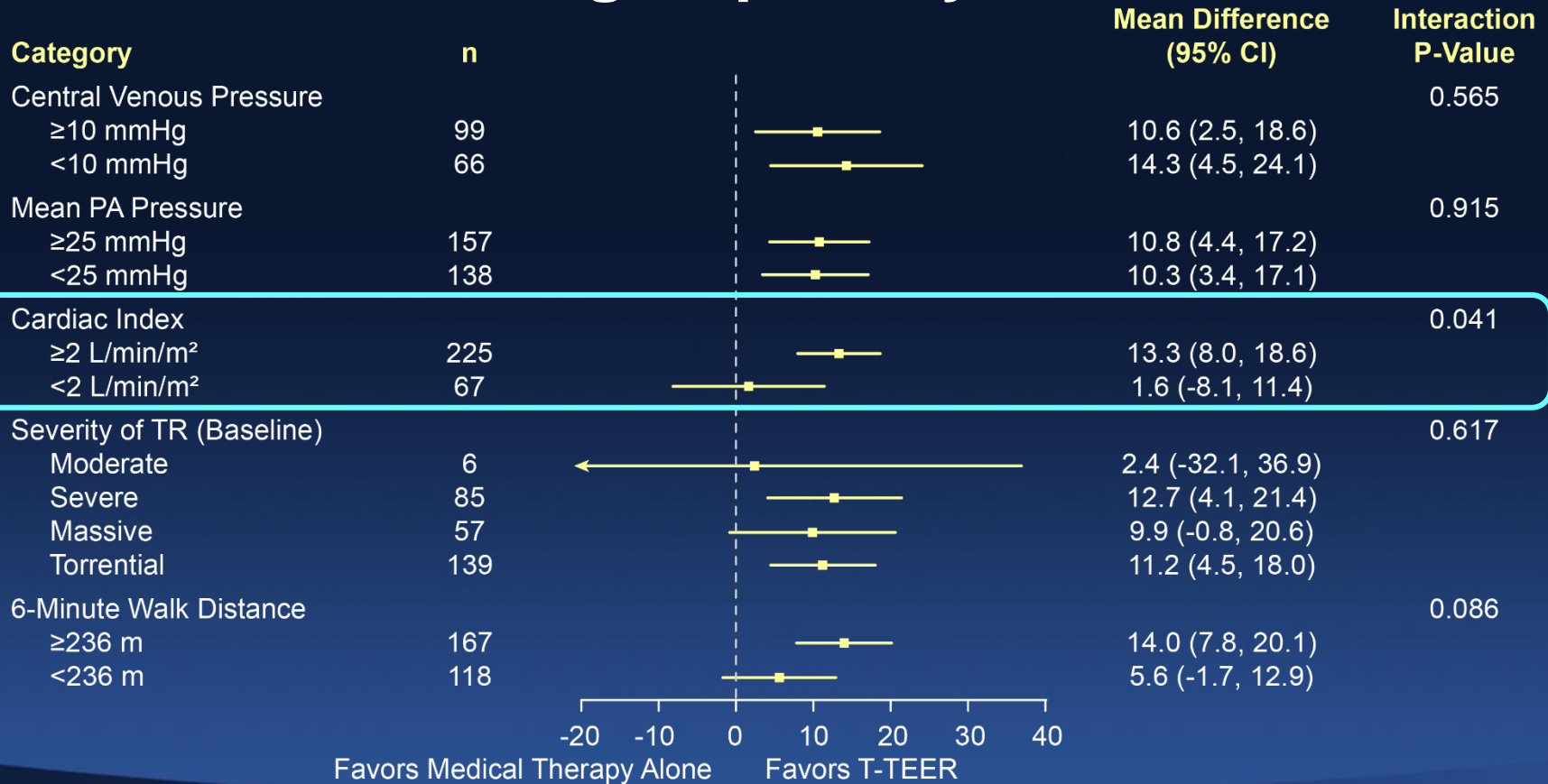
SF-36 Mental Summary Score



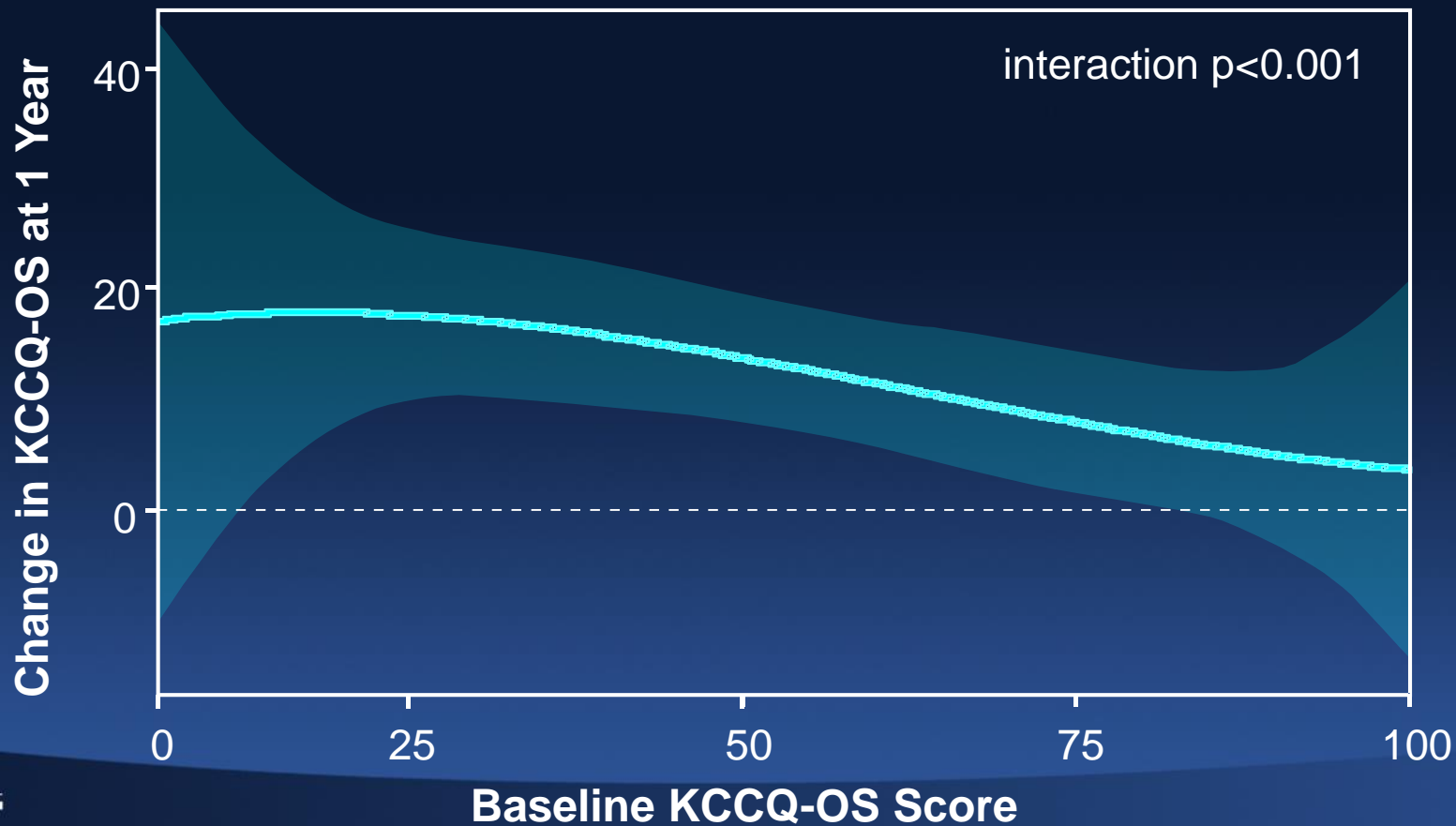
Subgroup Analyses



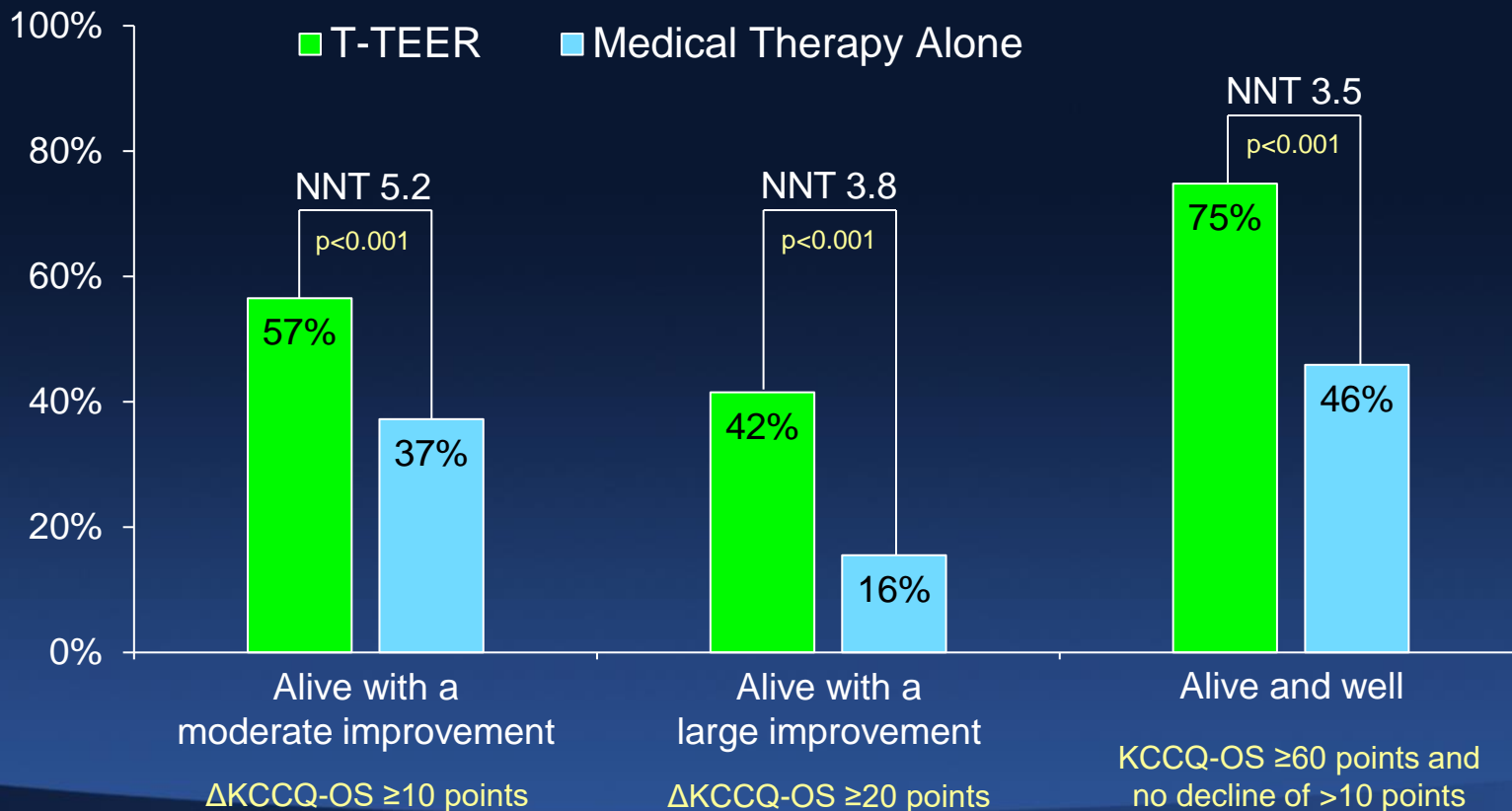
Subgroup Analyses



Predicted Benefit of T-TEER According to Baseline KCCQ-OS



Categorical Outcomes at 1 Year



Exploratory Analyses (Among T-TEER Patients*)

Association of change in KCCQ-OS with change in TR grade (baseline to 1 year)

	Estimate (95% CI)	P-value
Change in KCCQ-OS per 1 grade improvement in TR severity	4.1 (1.8 to 6.5)	0.001

Association of change in KCCQ-OS at 1 month with subsequent events

	Hazard Ratio (95% CI) per 10-point increase in KCCQ-OS	P-value
Death	0.77 (0.64-0.93)	0.007
Heart failure hospitalization	0.70 (0.58-0.84)	<0.001
Death or heart failure hospitalization	0.74 (0.65-0.84)	<0.001

Summary

- In patients with severe TR, T-TEER provided substantial benefits in terms of symptoms, functional status, and quality of life
- The difference in health status between groups was moderately large, fully evident by 1 month, and sustained through 1 year
- Strong treatment interaction with baseline KCCQ-OS; patients with worse health status at baseline were most likely to benefit
- Exploratory analyses suggest that the observed health status improvement is, at least partially, biologically-mediated

Conclusion

These findings support the use of T-TEER with the TriClip device for improvement in the symptoms, functional limitations, and quality of life in patients with severe TR