

A Cost-Effectiveness Analysis of Radiofrequency Renal Denervation for Uncontrolled Hypertension based on the SPYRAL HTN-ON MED Trial in the Netherlands

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Objectives

- Radiofrequency renal denervation (RF RDN) is increasingly recognized as an adjunct therapy option for uncontrolled hypertension, including resistant hypertension.^{1,2}
- This study sought to assess the cost-effectiveness of RF RDN in the Dutch healthcare setting.

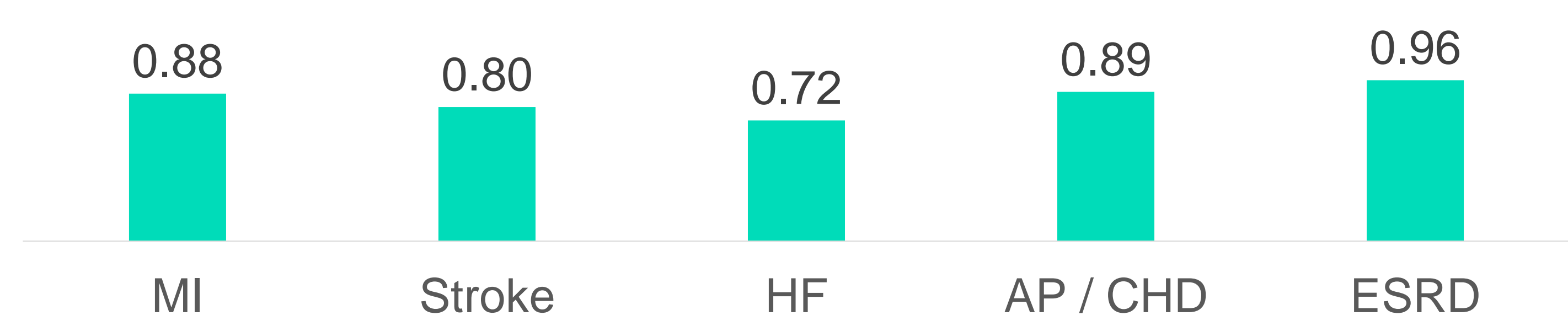
Methods

- Clinical events, quality-adjusted survival, and costs at a ten-year and lifetime horizon were projected with a previously published and validated Markov model based on multivariate risk equations, including the Framingham equations.³ Key input parameters are detailed in Table 1 below.
- Risk reductions from changes in office-based systolic blood pressure (oSBP) were based on a meta-regression of 47 hypertension randomized-controlled trials (RCTs).⁴
- The base case -4.9 mmHg oSBP reduction in the treatment group was obtained from the SPYRAL HTN-ON MED full cohort study, in which both groups maintained use of antihypertensive medication.⁵
- The relative risks (RR) of clinical events at ten years were projected for stroke, myocardial infarction (MI), angina pectoris/coronary heart disease (AP/CHD), heart failure (HF), end-stage renal disease (ESRD), cardiovascular death (CVD) and all-cause death (ACD).
- The lifetime incremental cost-effectiveness ratio (ICER) of RF RDN vs. Standard of Care (SoC) was examined against the applicable willingness-to-pay (WTP) threshold of €20,000 per quality-adjusted life-year (QALY) gained derived from calculation of proportional shortfall. Costs and effects were discounted at 3.0% and 1.5% p.a. per Dutch guidelines.^{6,7}
- Probabilistic sensitivity analysis (PSA, 10,000 simulations) was performed to evaluate the effect of parameter uncertainty on cost-effectiveness findings.

Table 1 Key input parameters.

Parameter	Value	Source
Age (Years)	55.0	Kandzari et al., 2023 (SPYRAL HTN-ON MED Trial full cohort) ⁵
Gender (% Female)	19.9%	
Baseline oSBP	163 mmHg	
Treatment Effect (oSBP vs. sham control)	-4.9 mmHg	
Discount Rate (Costs, Effects)	3.0%, 1.5% p.a.	Dutch Guidelines ^{6,7}
Costs (annual)		
Hypertension (Year 1+)	€300	Estimate based on annual drugs/resource utilization
Stroke (Acute, Year 1, Year 2+)	€11,004; €15,588; €16,476	Van den Berg, 2023 ⁸ ; Pinckaers et al., 2024 ⁹
MI (Acute, Year 1+)	€5,362; €1,196	Van Hulst et al., 2023 ¹⁰
AP Stable (Year 1+); Unstable (Acute, Year 1+)	€117; €3,983; €5,185	Henry et al., 2015 ¹¹
HF (Initial; Year 1+)	€4,413; €273	Henry et al., 2015 ¹¹
ESRD (Year 1+)	€85,650	Van Oosten et al., 2020 ¹²
RF RDN Treatment (one-time procedure at index)	€8,000	Estimate of procedure cost, incl. RF RDN catheter

Figure 1 Ten-Year Clinical Event Relative Risks (RR), RF RDN vs. SoC.



Results

- RF RDN led to a RR and absolute risk reduction (ARR) in clinical events (0.80 and 1.7% for stroke, 0.88 and 0.9% for MI, 0.89 and 1.6% for AP/CHD, 0.72 and 1.4% for HF, 0.96 and 0.014% for ESRD, 0.86 and 1.0% for CVD, and 0.93 and 0.9% for ACD, respectively, see Figure 1).
- Over a lifetime horizon, the therapy added 0.61 QALYs with an incremental cost of €3,828, yielding an ICER of €6,277 per QALY gained (Figure 2). Cost-effectiveness was further improved under a rHTN-specific effect size.
- In PSA, results were shown to be robust, with RF RDN having >99% likelihood of being cost-effective at the designated €20,000 per QALY WTP threshold (Figure 3).

Figure 2 Cost-effectiveness results for base case (-4.9 mmHg effect size).

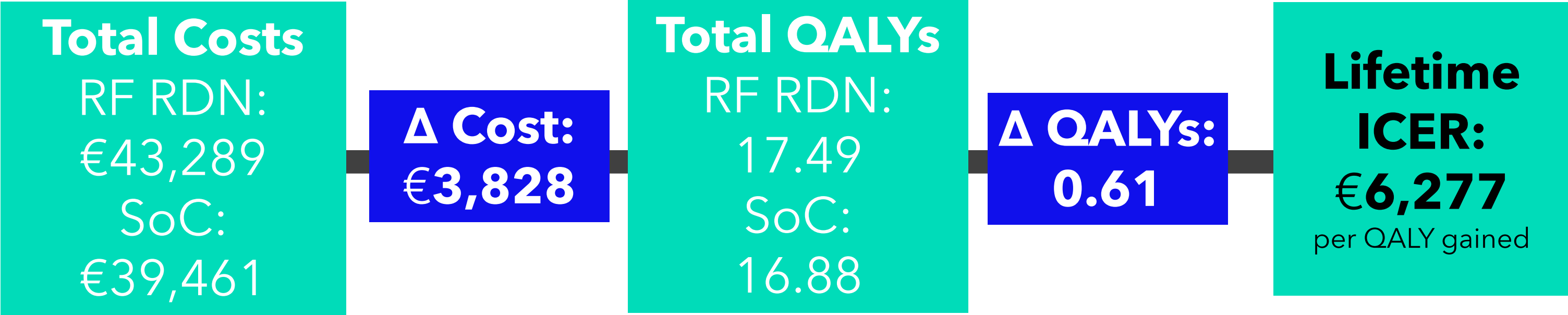
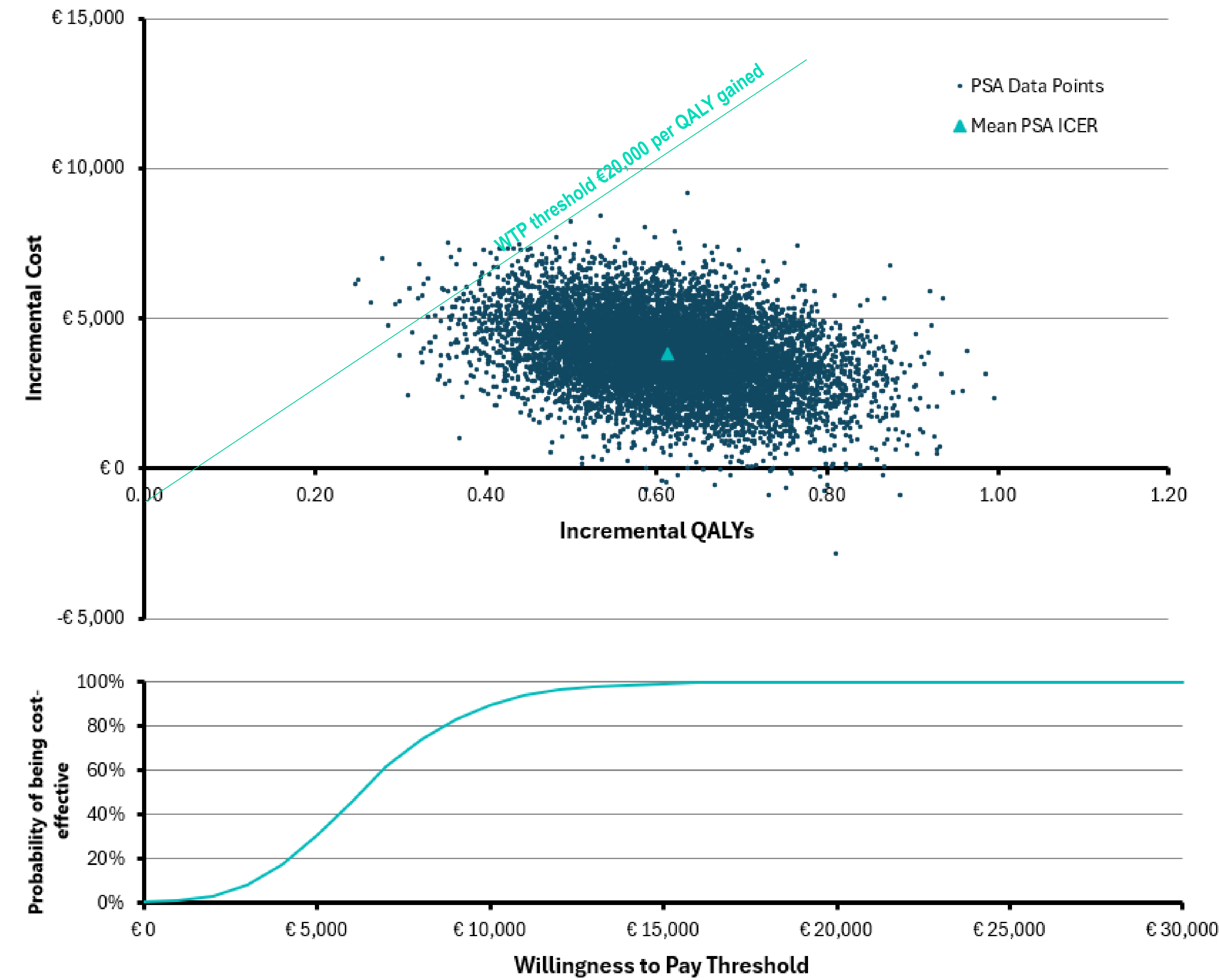


Figure 3 Probabilistic Sensitivity Analysis (PSA) results for base case, PSA scatter plot (top) and cost-effectiveness acceptability curve (bottom).



Conclusions

Findings from this analysis suggest RF RDN adds meaningful clinical benefit at incremental cost that render it a cost-effective intervention in the Dutch healthcare system for patients with uncontrolled including resistant hypertension.

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