COST-EFFECTIVENESS ANALYSIS OF LUNG CANCER PREVENTION STRATEGIES

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BACKGROUND IN LUNG CANCER

BACKGROUND

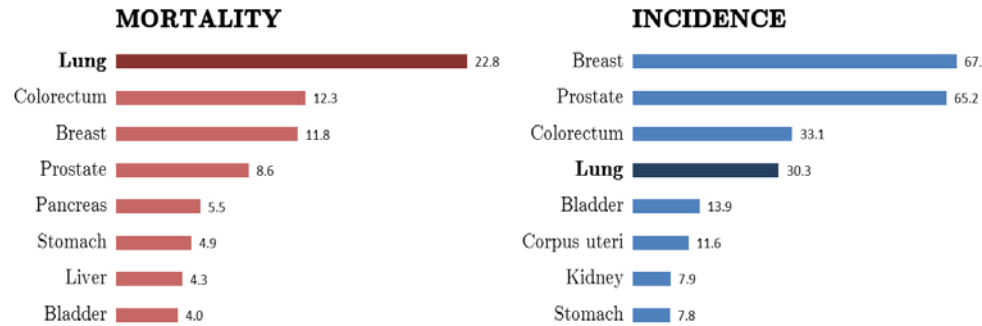
About lung cancer

☞Lung cancer (LC) is the most common cause of death by cancer and one of the most incident worldwide.

☞LC does not produce symptoms in its early phase. In advanced phases, the most common symptoms are often confused with those of other causes → late diagnosis.

☞The most important risk factor is **tobacco**: >80% of all LC deaths.

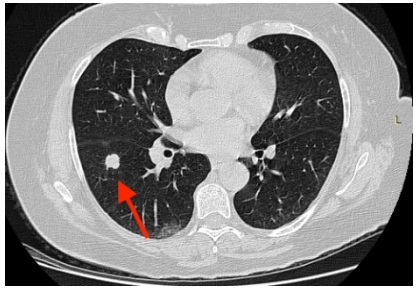
☞Risk increases with age.



LC mortality and incidence in Spain, 2012

Lung cancer prevention

☞QUIT SMOKING. Not to smoke, or quitting smoking, is the best prevention measure to prevent LC. The risk of developing LC is estimated to be reduced by 80% 15 years after quitting.



☞SCREENING. Several studies have shown that early detection with low-dose computed tomography (LDCT) in high risk population reduces LC mortality.

OBJECTIVES

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☞To develop a simulation model reproducing the natural history of LC.

☞To ensure a highly configurable model, being able to run in different study cases and including a variety of input parameters.

☞To perform a cost-effectiveness analysis comparing the implementation of three preventive strategies in lung cancer (LC) with a no-intervention scenario.

METHODS

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Analytic overview

☞**Modeling approach**: Markov-based microsimulation model of lung cancer (LC) to simulate and evaluate preventive strategies on smoking cessation and lung cancer screening.

☞**Calibration**: Model outputs are calibrated to epidemiologic data from Spain, specifically LC incidence and mortality, and overall mortality.

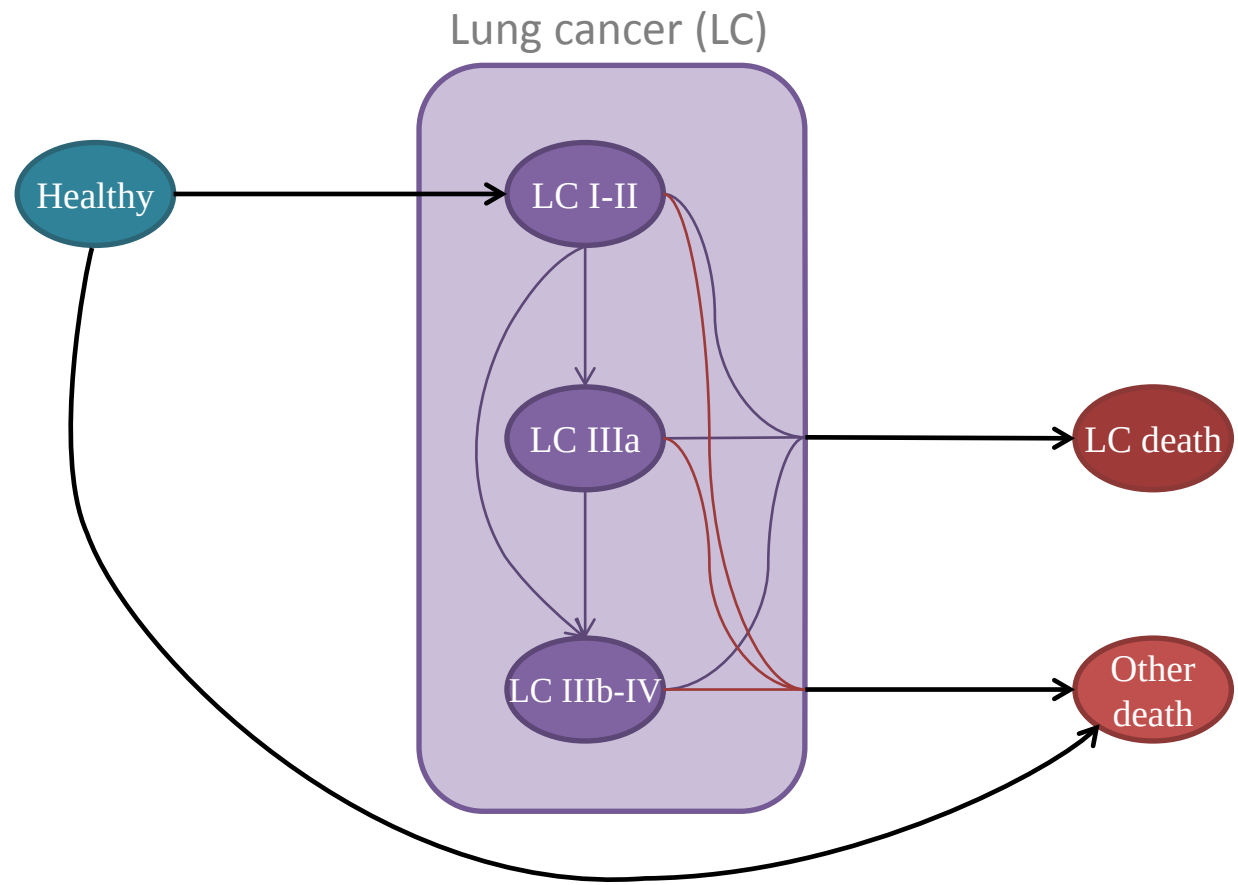
☞**Main model outcomes**: quality-adjusted life expectancy, incidence and mortality reduction, and lifetime costs.

☞**Cost-effectiveness analysis**: health care system perspective, costs and health benefits discounted at a 3% annual rate, incremental cost-effectiveness ratios (ICERs expressed as € per QALY gained).

☞**Sensitivity analysis**: for age group, frequency, intervention coverage and effectiveness, and costs.

Model

☞Schematic illustration of the **Markov chain** model:

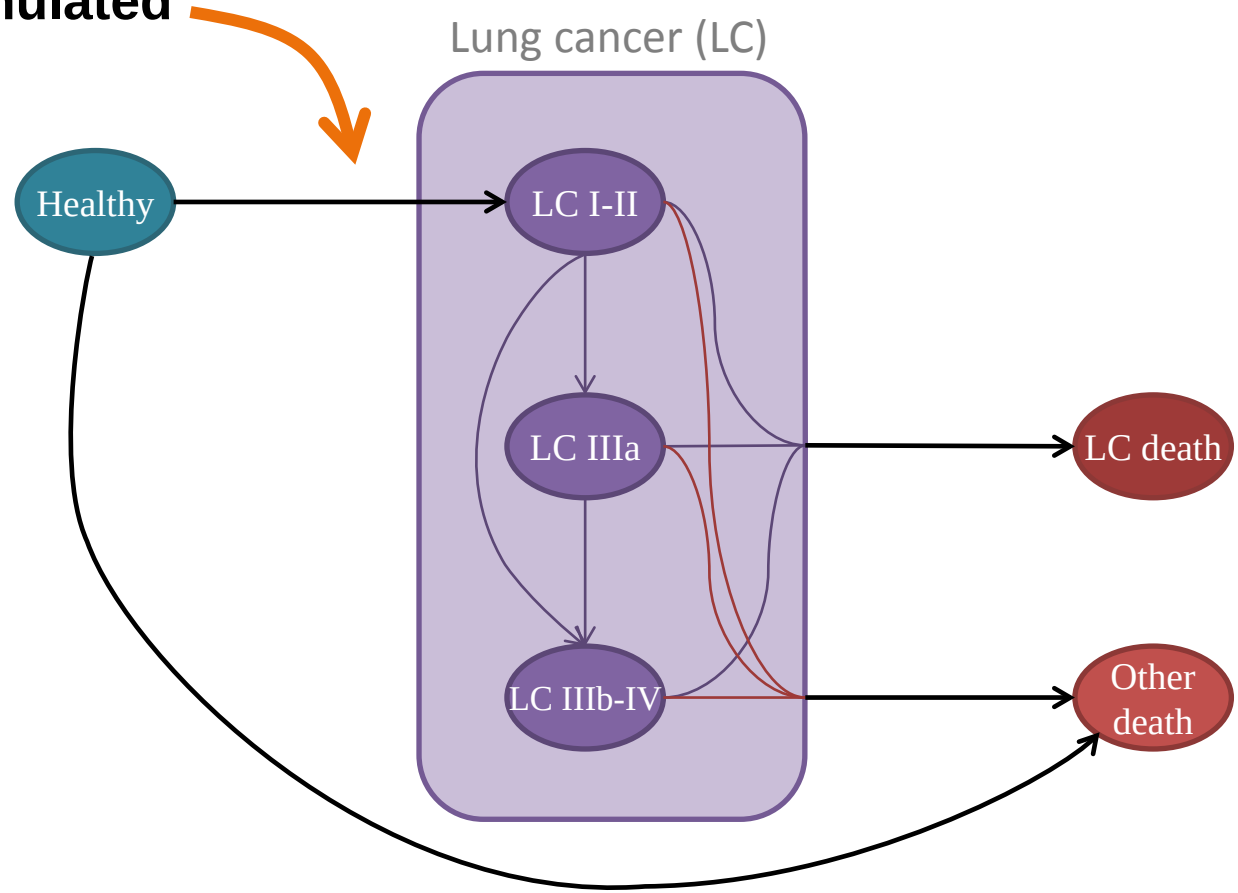


Model

☞Schematic illustration of the **Markov chain** model:

☞Combined with **microsimulated** features:

- ☞effect of smoking
- ☞effect of quitting
- ☞diagnosis by screening



Strategies

Available interventions

1. Brief intervention on quitting (**BI**). 5 As: Ask, Advise, Assess, Assist, Arrange.
2. Intensive treatment on quitting (**IT**). Drug-based treatment + follow-up.
3. Organized screening (**SC**). Three LDCT tests in 3 years.

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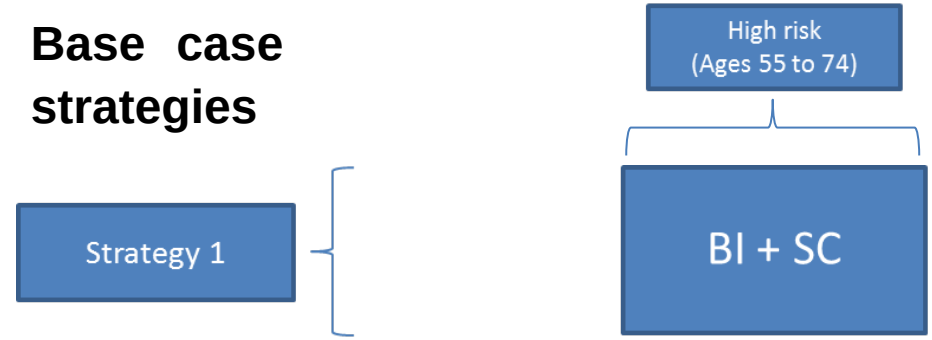
- **High risk**: age 55 to 74 and ≥ 30 packs-year.

Base case strategies



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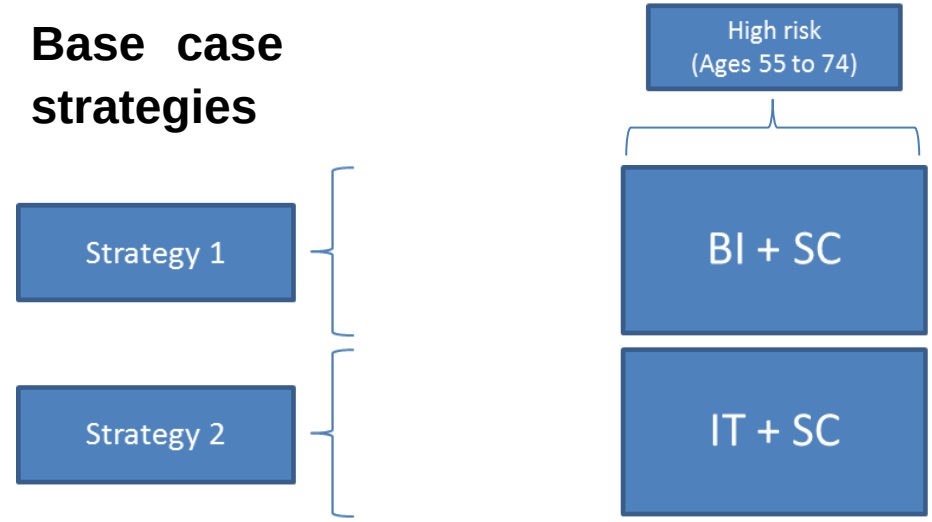

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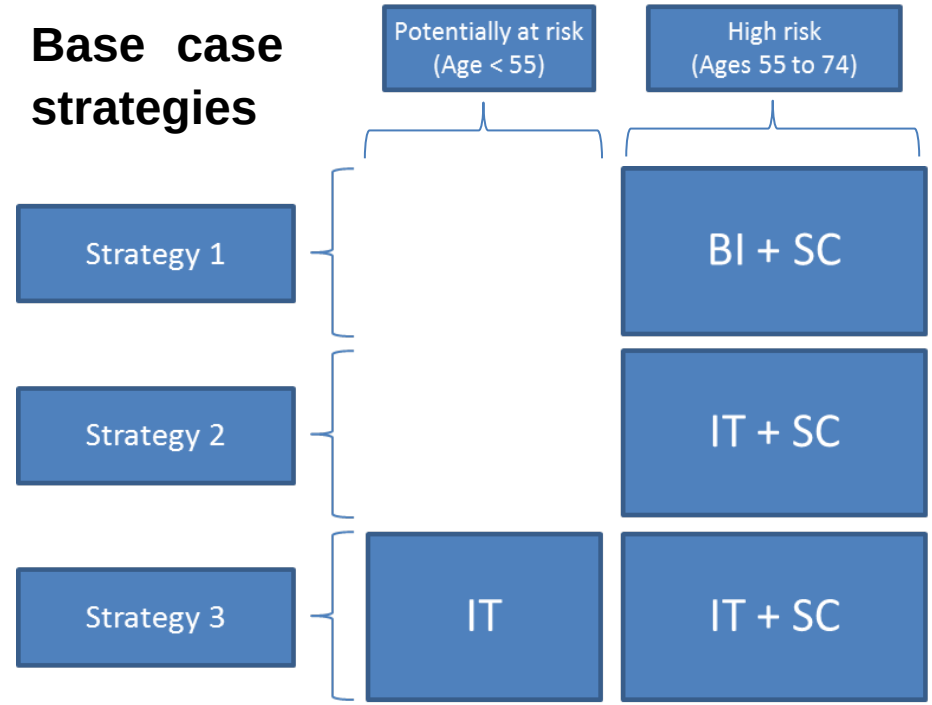
- **High risk**: age 55 to 74 and ≥ 30 packs-year.
- **Potentially at risk**: age < 55 and high-risk smoking habits.



RESULTS

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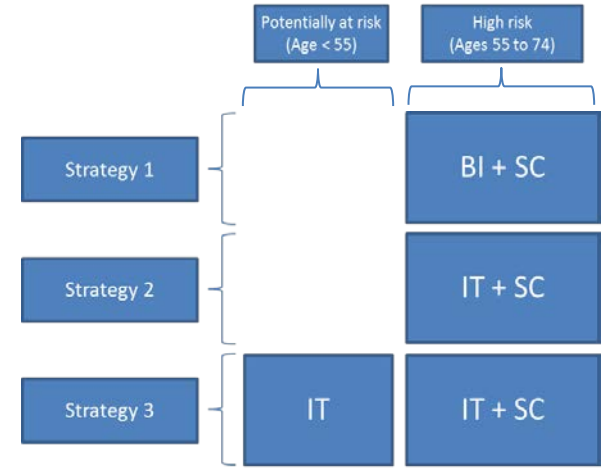
Base case analysis

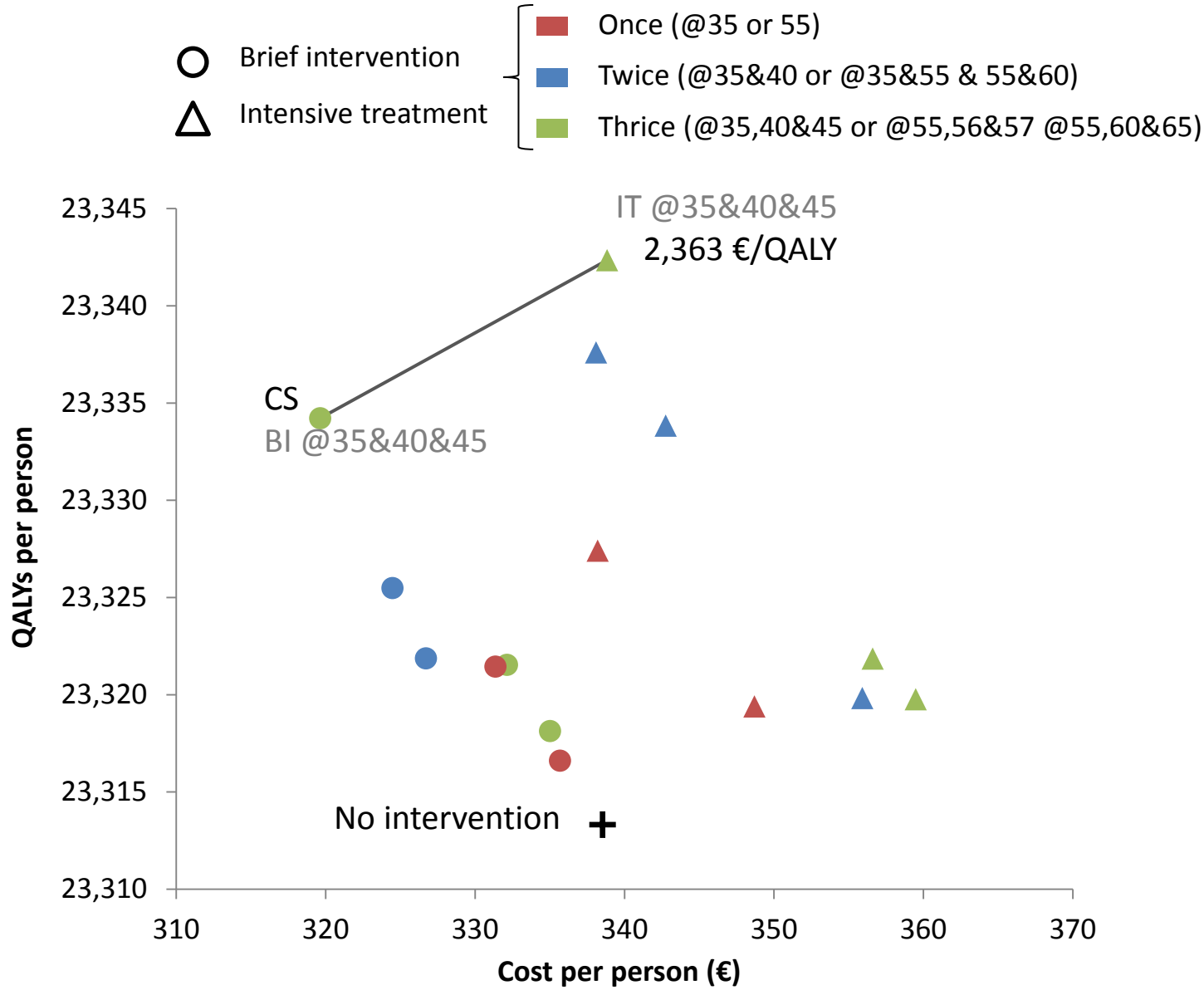


BASE CASE STRATEGIES	Risk reduction (%)	Cost per person (€)	QALY per person	ICER (€/QALY)
No intervention		338.536	23.31332	
Strategy 1 (BI@55+3xSCR-HR@55&56&57)	1.7%	335.849	23.31839	*CS
Strategy 2 (IT@55+3xSCR-HR@55&56&57)	3.2%	349.369	23.32060	**Dom
Strategy 3 (IT@35 +3xSCR-HR@55&56&57)	6.3%	339.092	23.33203	238

*CS: cost-saving
**Dominated: more costly and less effective than other strategies or with higher ICERs than more effective strategies

Coverage: 18% (patients attending in primary health care services with smoking habits in Spain)
Effectiveness: 20% for brief intervention, 39.77% for intensive treatment, 60.4 for SCR.

RESULTS Smoking cessation alone by frequency and age



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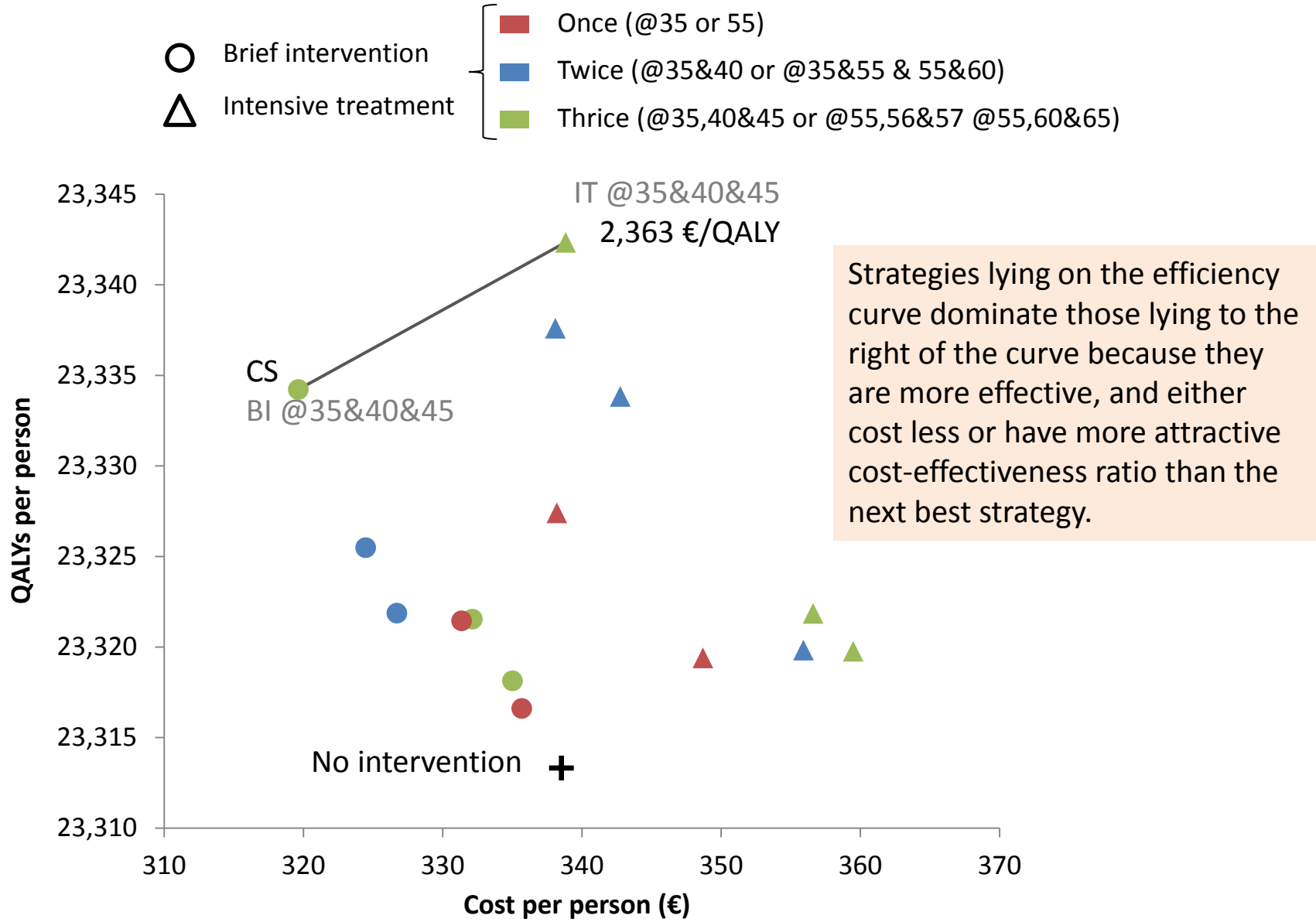
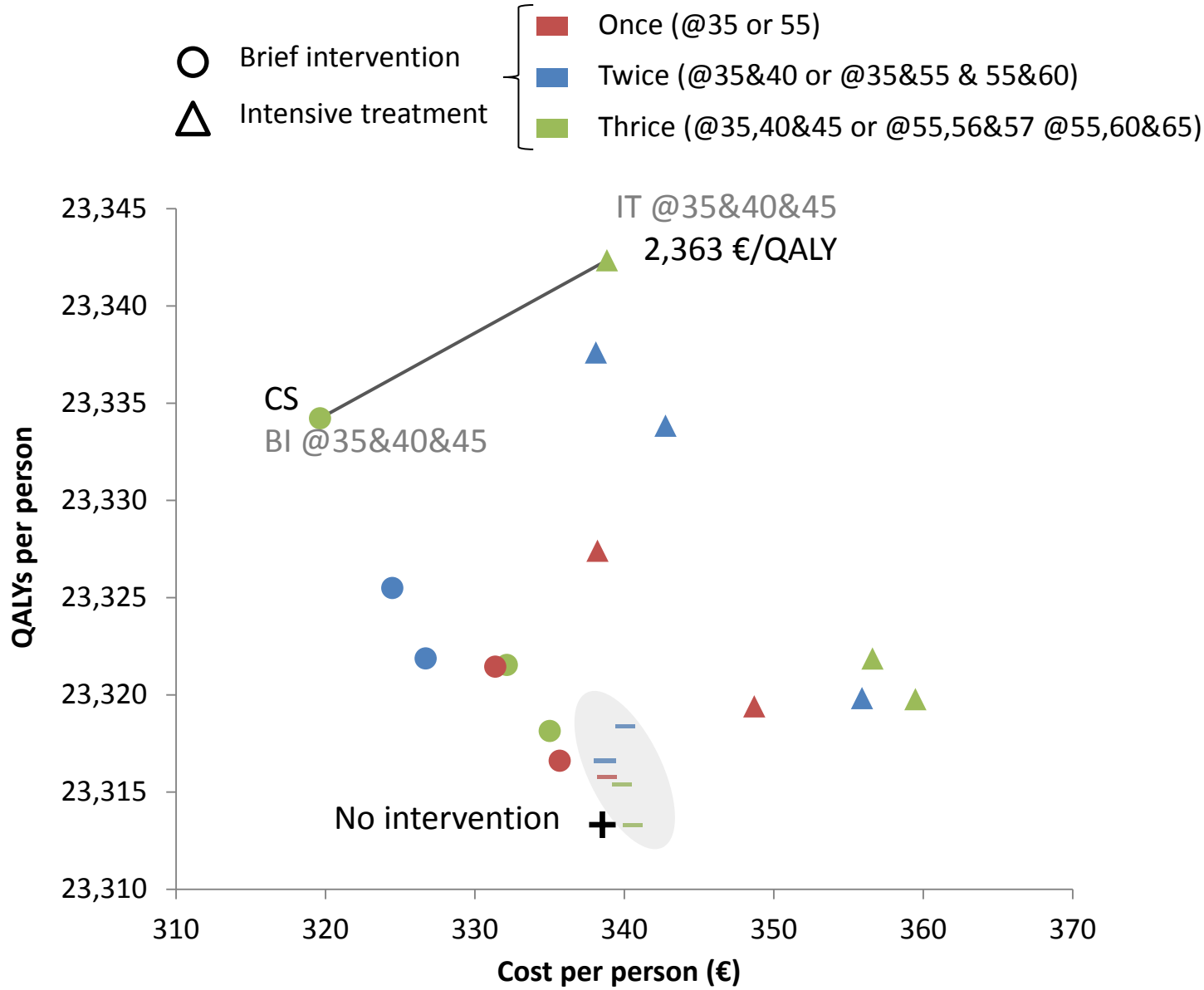
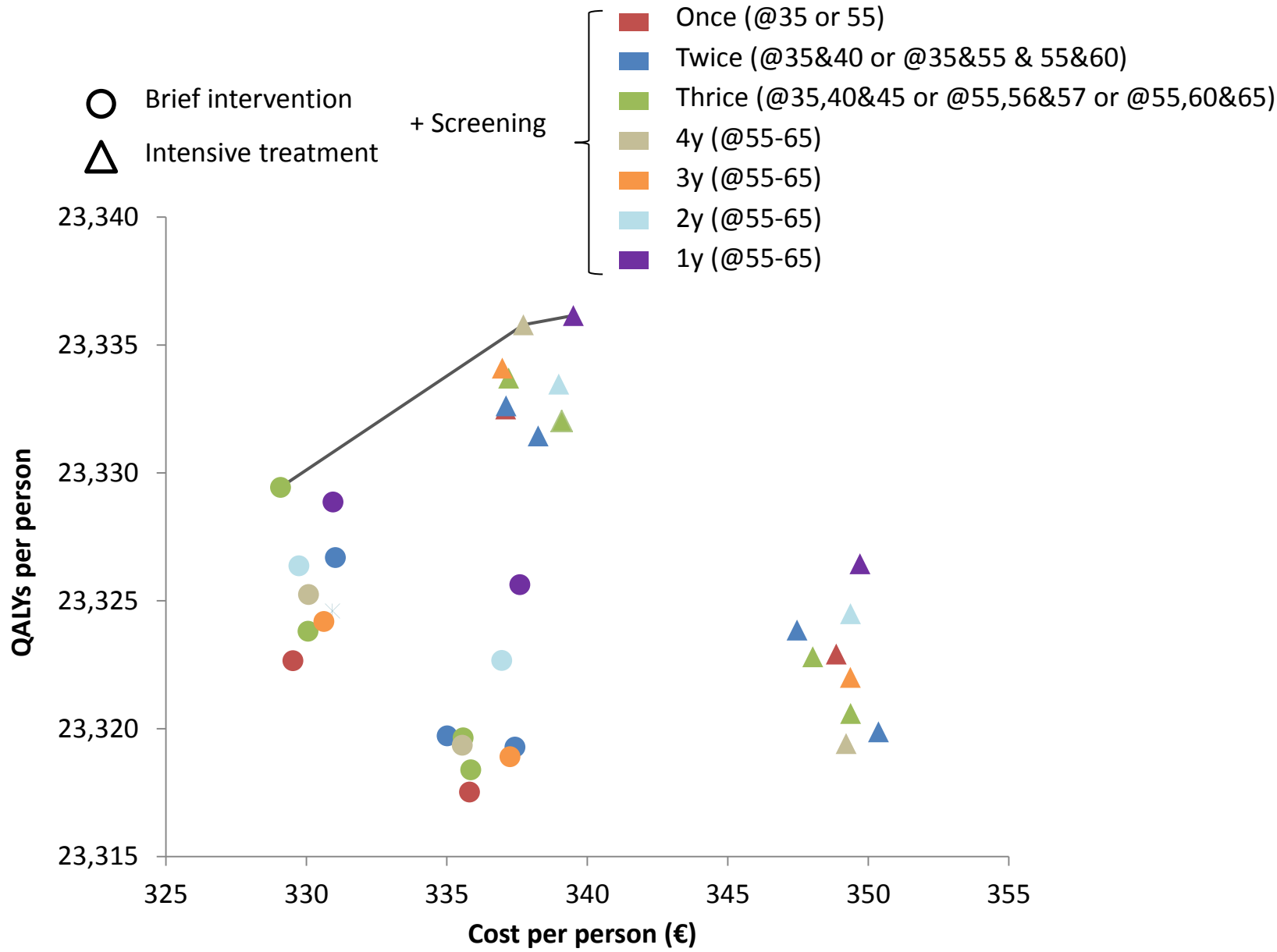


Strategies lying on the efficiency curve dominate those lying to the right of the curve because they are more effective, and either cost less or have more attractive cost-effectiveness ratio than the next best strategy.

RESULTS Smoking cessation alone and screening alone by frequency and age



RESULTS Once smoking cessation + screening by frequency and age



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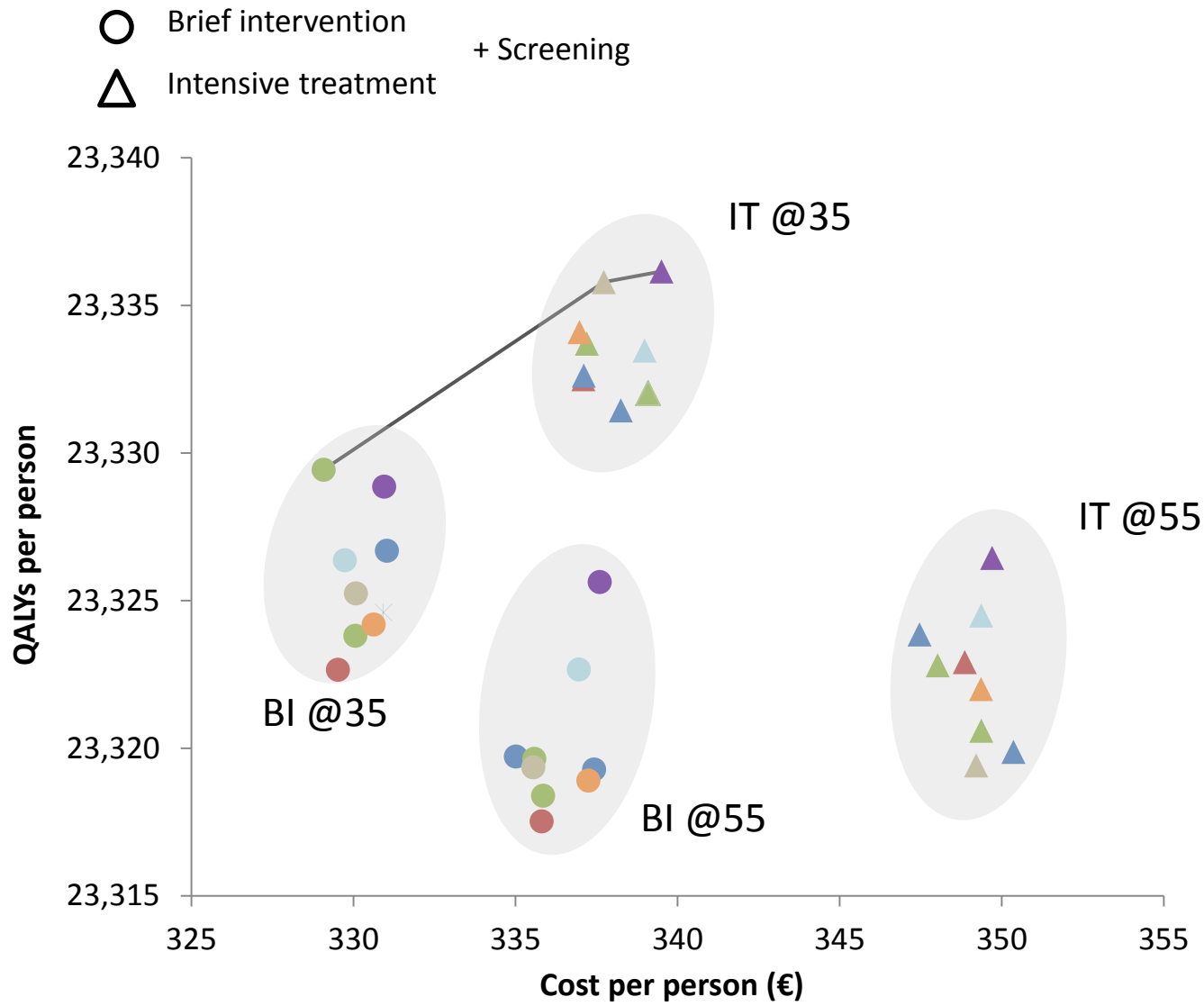

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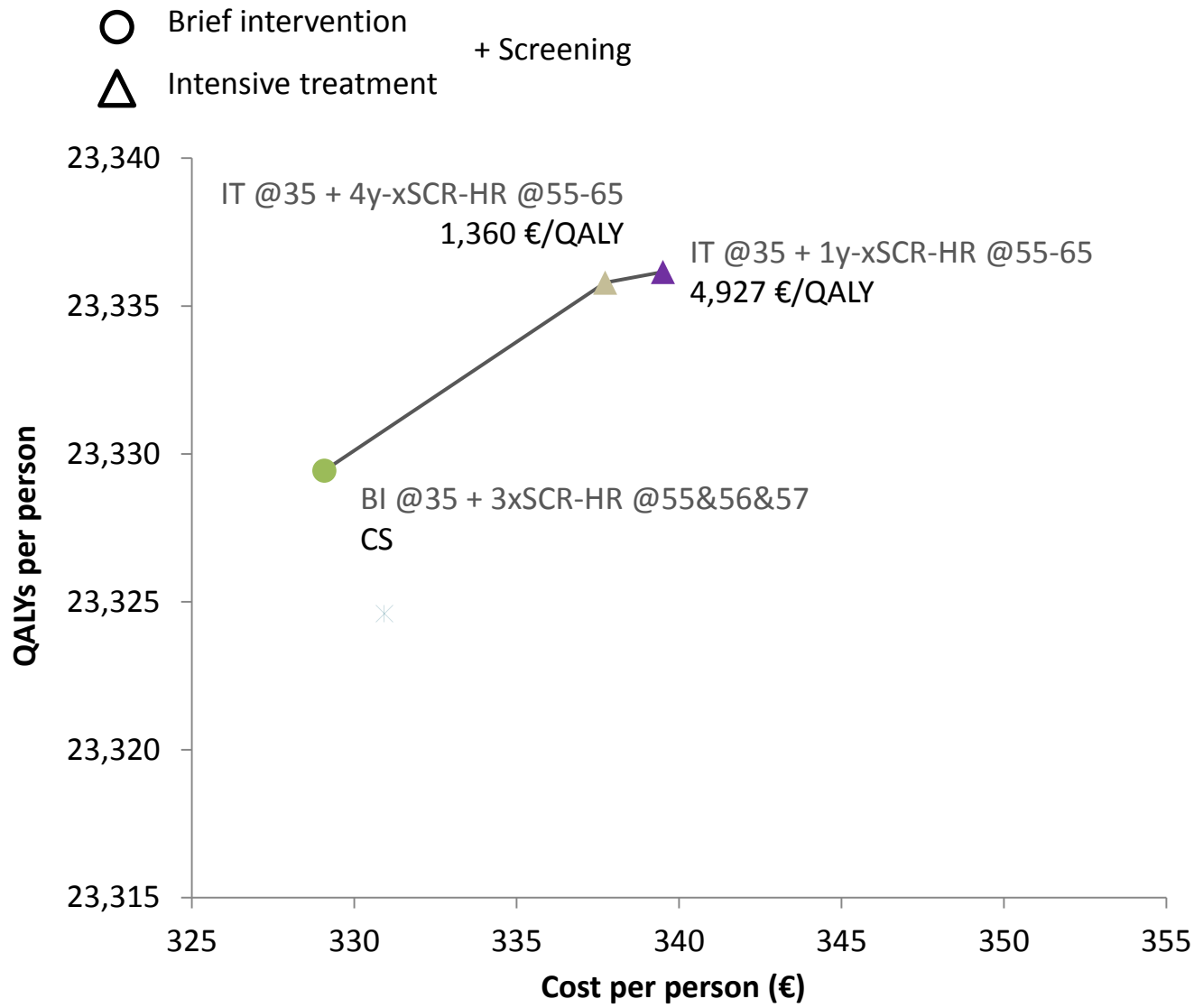
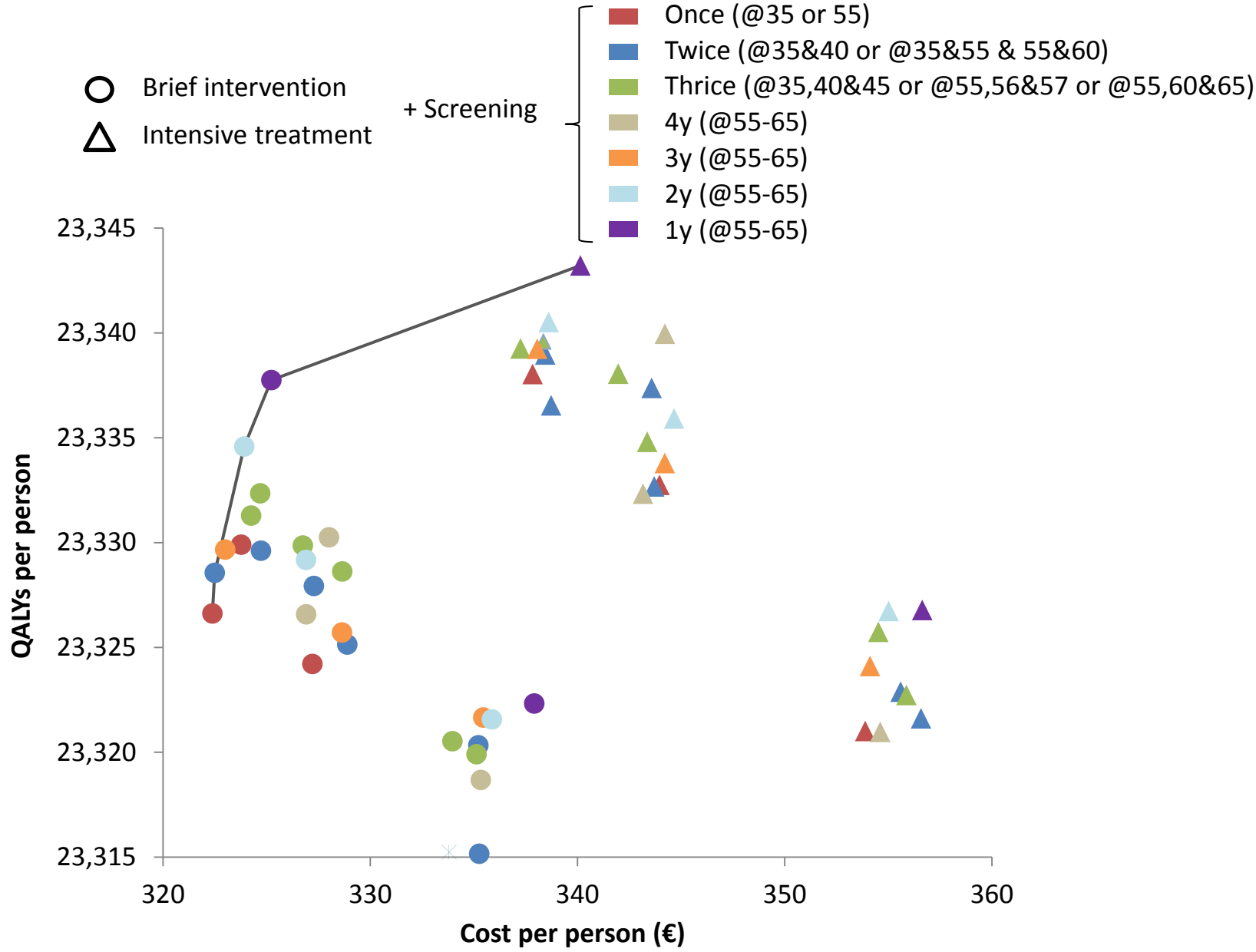


RESULTS Twice smoking cessation + screening by frequency and age



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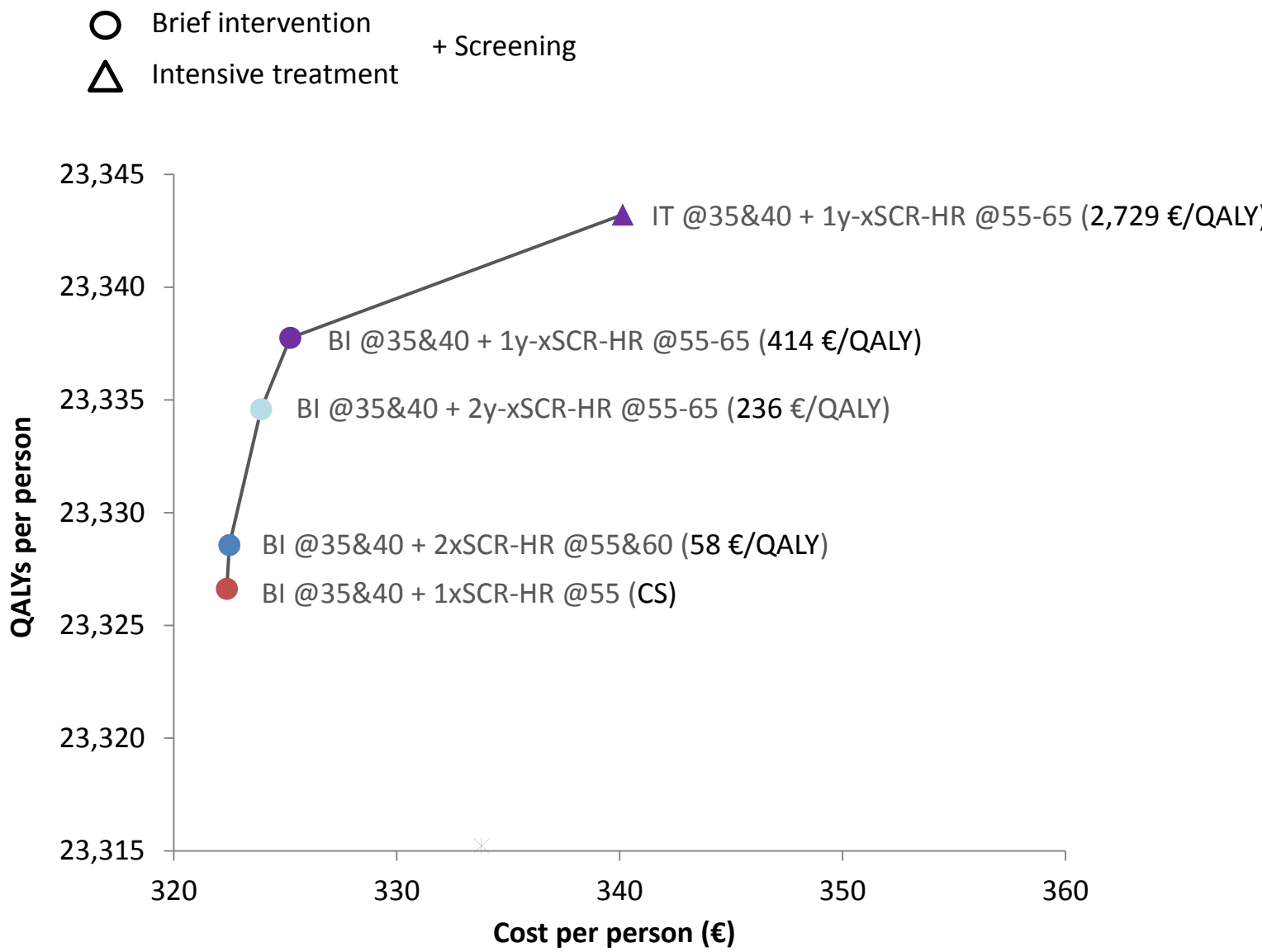

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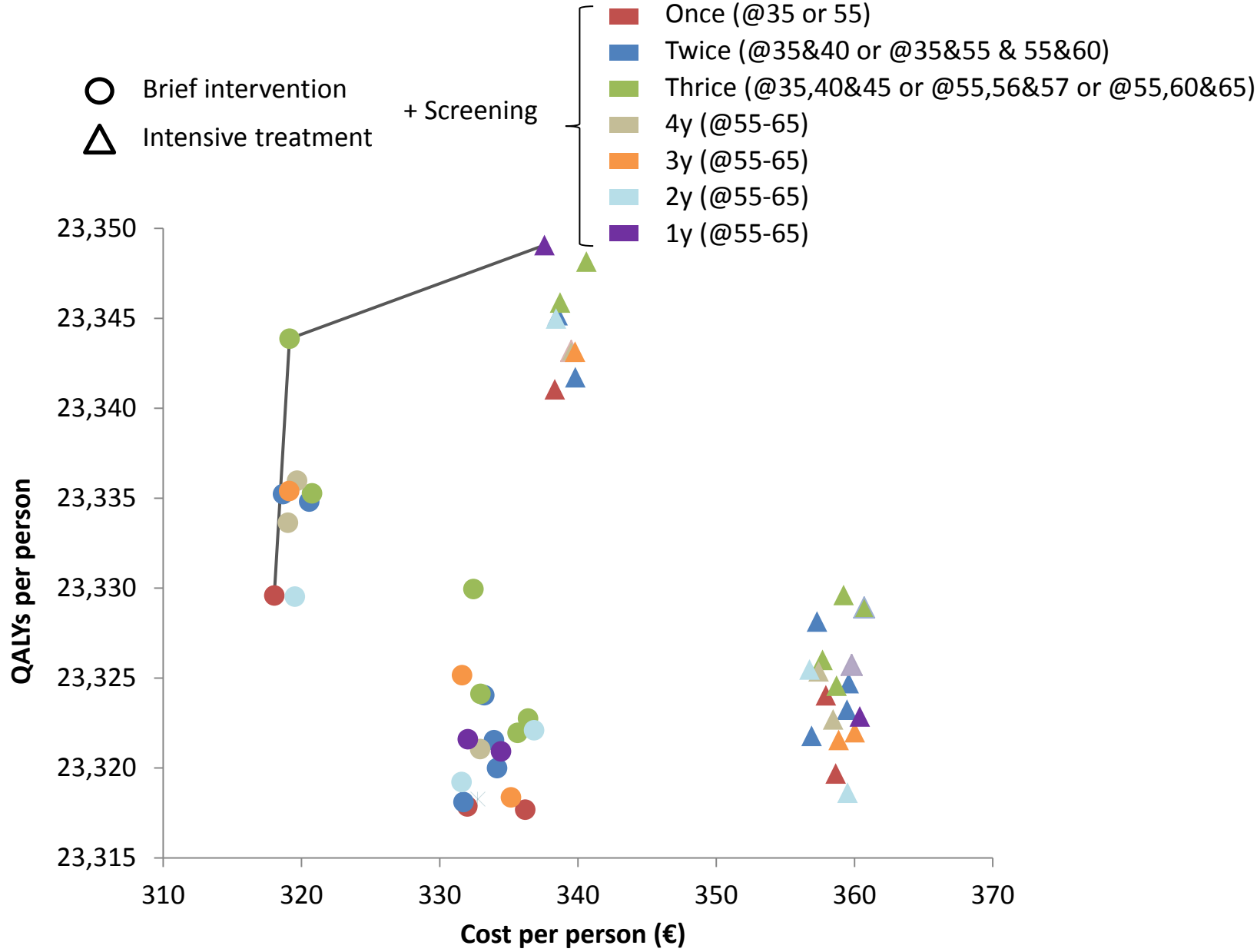

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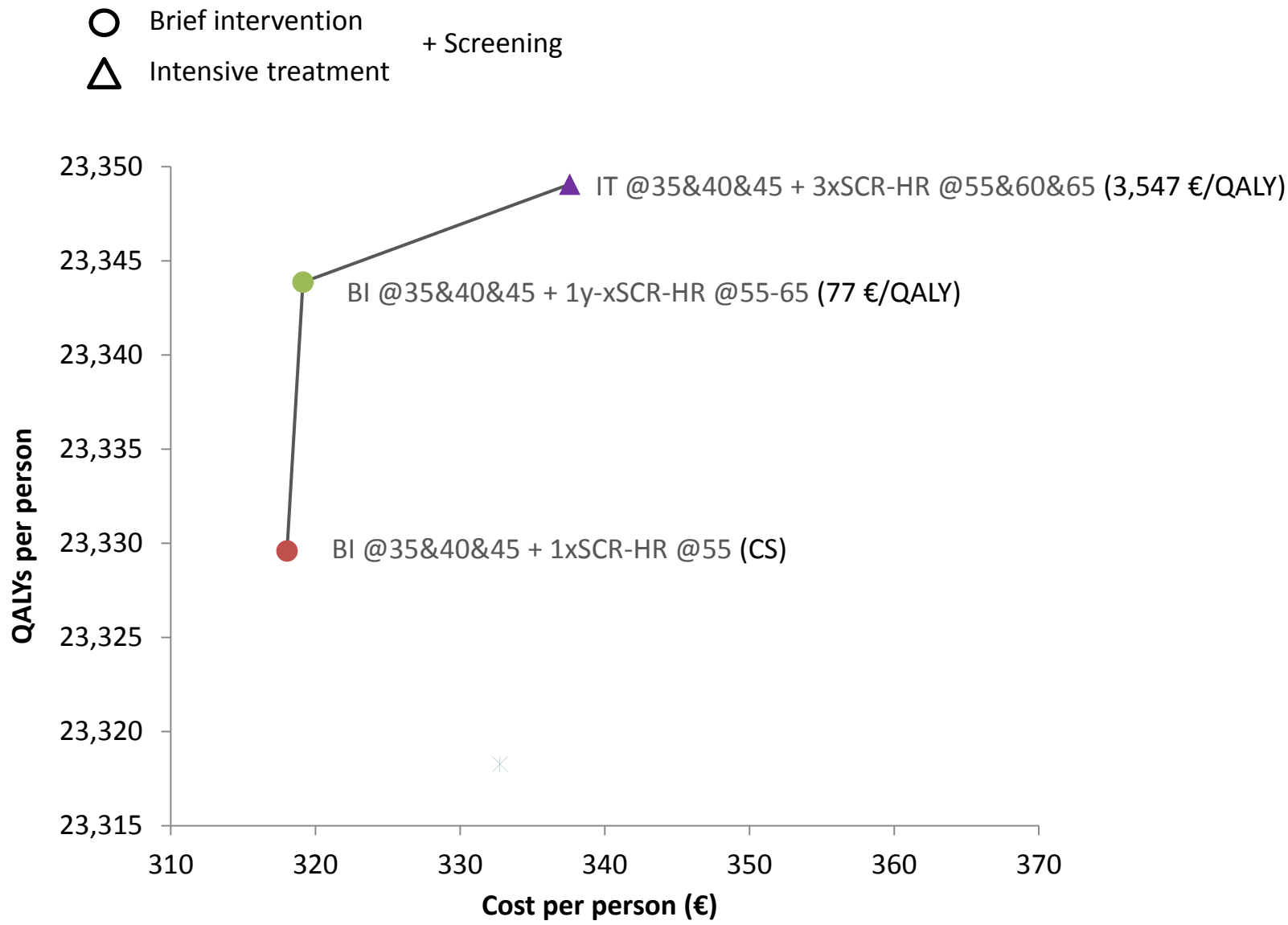

CONCLUSIONS

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☞Lung cancer is a high burden in terms of health and economic cost, and there exist preventive measures to reduce its incidence and mortality.

☞Unique LC model in Europe to assess the cost-effectiveness of LC preventive strategies, combining both smoking cessation and LC screening.

CONCLUSIONS

☞Smoking cessation interventions alone are mainly more effective and cost-effective than screening interventions alone.

☞Early smoking cessation intervention at age 35 is more favourable than at age 55.

☞Increasing frequency of smoking cessation interventions reduces the frequency of screening interventions.

CONCLUSIONS

☞The most cost-effective smoking cessation strategy is the intensive treatment **thrice** at 5-year intervals starting at age 35, which would reduce lung cancer incidence by 11.6%.

☞A smoking cessation strategy consisting of 3 brief interventions at 5-year intervals starting at age 35 is cost-saving respect to the no-intervention scenario, reducing incidence by 7%.

CONCLUSIONS

☞The most cost-effective combined strategy is composed of 3 intensive treatment at 5-year intervals starting at age 35 and 3 screening interventions on high risk population at ages 55, 60, and 65.

☞Such strategy would reduce lung cancer incidence by 12.1%.

☞Screening interventions contribute with a marginal reduction, but it is still more cost-effective than performing a smoking cessation intervention alone.

CONCLUSIONS

☞Still pending to perform other sensitivity analyses on other assumed parameters, such as coverage or screening sensitivity.

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GRÀCIES!

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