Patient Preferences for Lung Cancer Interception Therapy

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Background and Objectives

- Lung cancer (LC) is the third most-common cancer diagnosed in the US[1] and leading cause of cancer-related death, accounting for nearly one-quarter of all deaths from cancer[1]
- Systemic interception therapy may reduce the probability of developing LC, intercepting lung lesions before they develop into cancer
- Little evidence exists on whether people at high risk of developing LC would be willing to accept interception therapy, given relative uncertainty of future benefits and upfront risks of treatment

Approach

- Develop and administer discrete-choice experiment (DCE) to quantify preferences for a LC interception therapy (4x/yr injection over 3yr) (Fig. 1)

Objectives

- Estimate preference weights, conditional relative attribute importance, and marginal rates of substitution between upfront adverse events/ treatment burden and potential future benefits
- Explore associations between preferences and individual demographic and clinical characteristics

Study Design and Methods

- Respondents: eligible for LC screening with low-dose computed tomography[2] (age 50 to 80, 20 pack-year smoking history, current smoker or quit in past 15 years); no history of LC, dementia, mild cognitive impairment, or schizophrenia; US resident; over-sampled non-white participants
- n= 23 Qualitative interviews to identify DCE attributes (Table 1)
- n = 803 completed DCE surveys
- Respondents chose between experimentally-designed pairs of hypothetical treatment profiles or a no treatment option in 8 choice tasks (Figure 1)
- Participants were randomly assigned to see varying levels of baseline risk of developing lung cancer (6%, 10%, 16%)
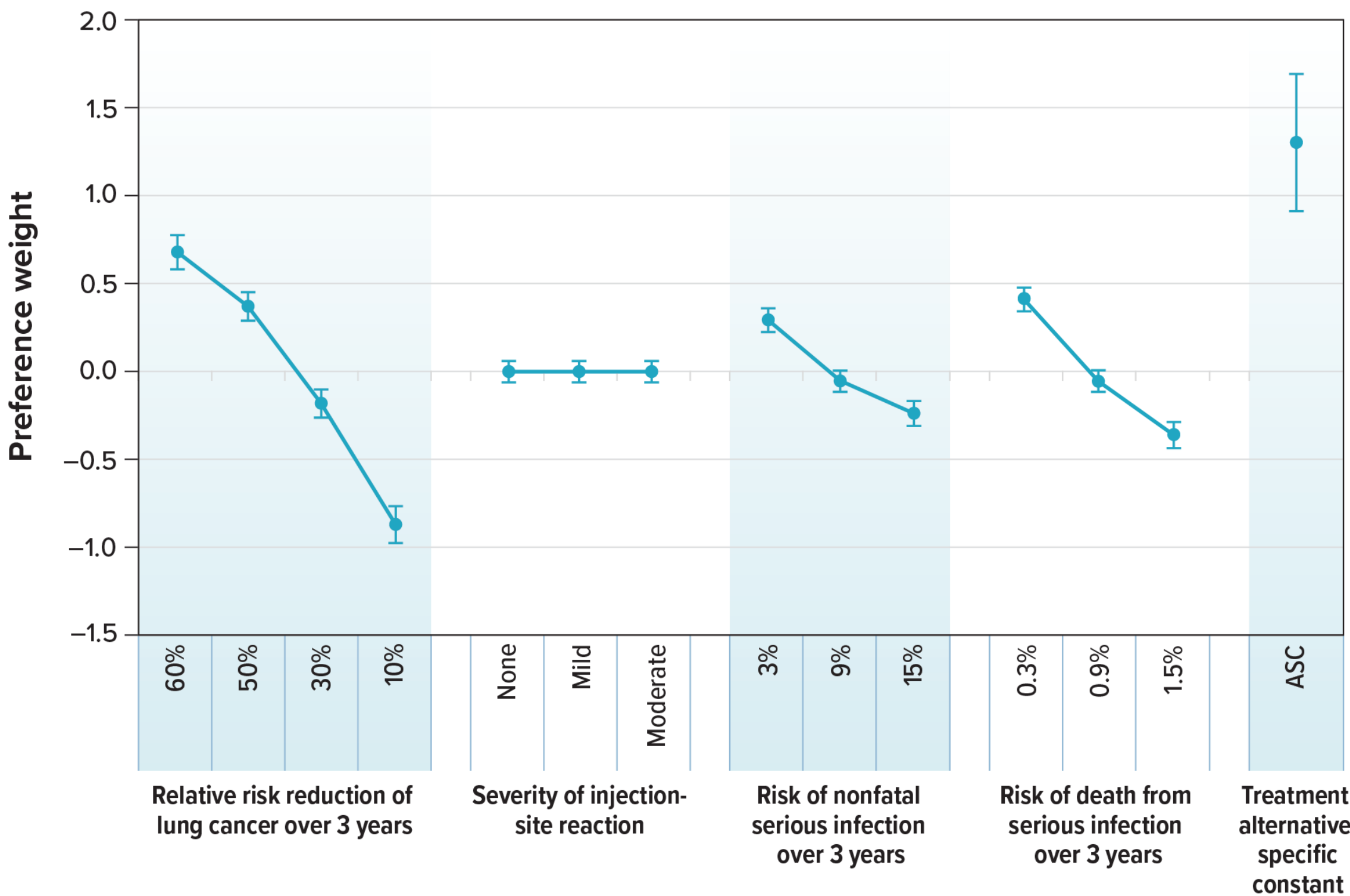
Analysis

- DCE data analyzed with random parameters logit (RPL) and latent class models; Characteristics of respondents who chose 'No Treatment' in all DCE analyzed with a logit model

Table 1. Attributes and Levels Used in DCE

Respondent-facing attribute label	Levels
Risk of lung cancer over 3 years[a]	60% reduction from baseline
	50% reduction from baseline
	30% reduction from baseline
	10% reduction from baseline
Severity of injection-site reaction	None
	Mild
	Moderate
Risk of nonfatal serious infection over 3 years	3%
	9%
	15%
Risk of death from serious infection over 3 years	0.3%
	0.9%
	1.5%

Figure 1. Example DCE Choice Task Assuming 6% Baseline Risk of LC

[a] In the online survey, relative risk reduction of lung cancer for 3 years was presented as an absolute level of risk of developing lung cancer over 3 years of treatment, specific to the baseline risk of lung cancer that was randomly presented to the respondents (6%, 10%, or 16%). For example, for baseline risk at 10%, the corresponding levels of risk of lung cancer over 3 years presented to the respondents were 4%, 5%, 7%, and 9%, respectively.

Sample Demographics
- 44.5% Current smoker who tried quitting
- 38.7% former smoker
- 16.8% current smoker who never tried quitting
- Mean age: 63 years
- 62% Female
- 93% Have insurance
- 21% Unable to work, unemployed
- 33% Employed

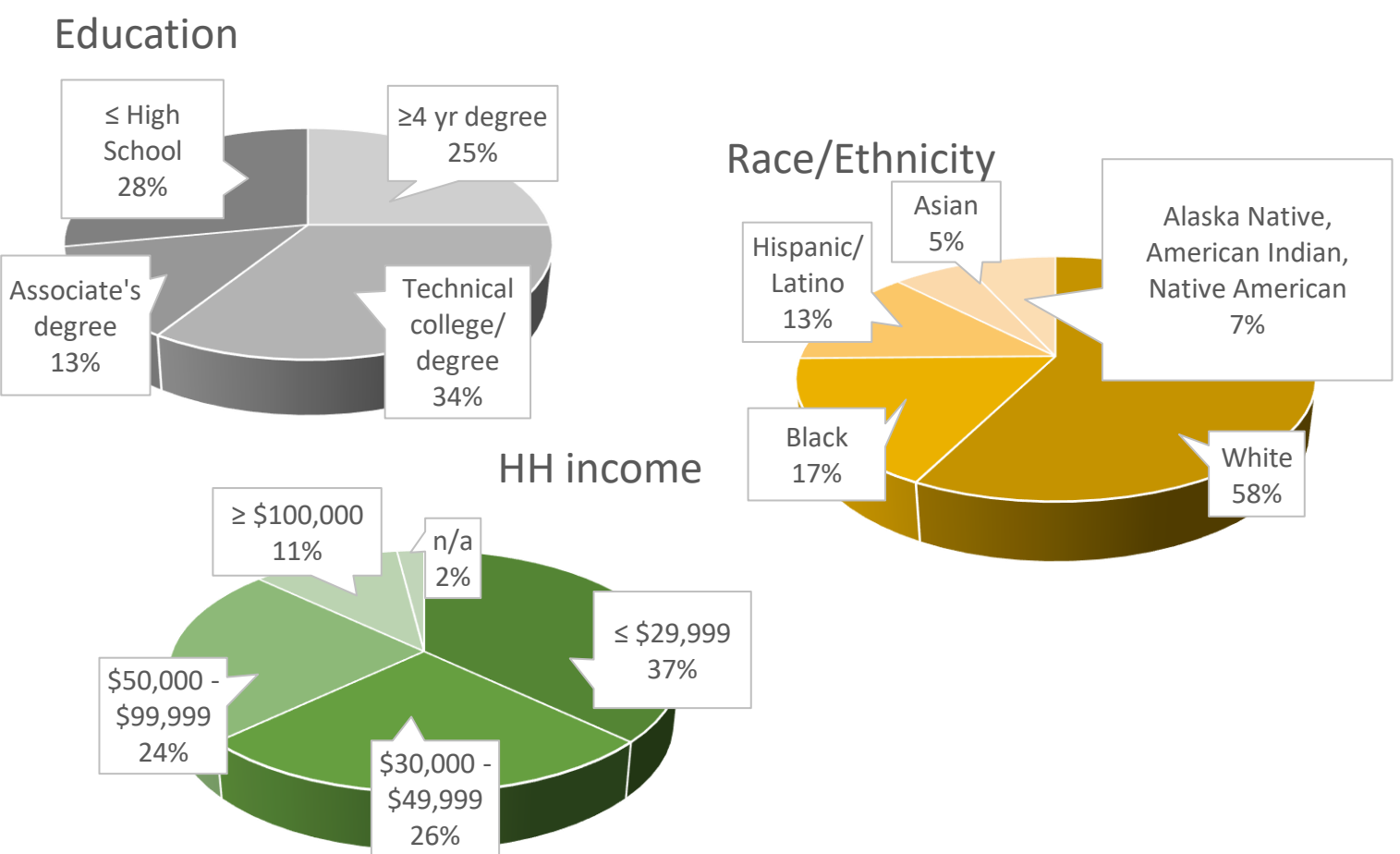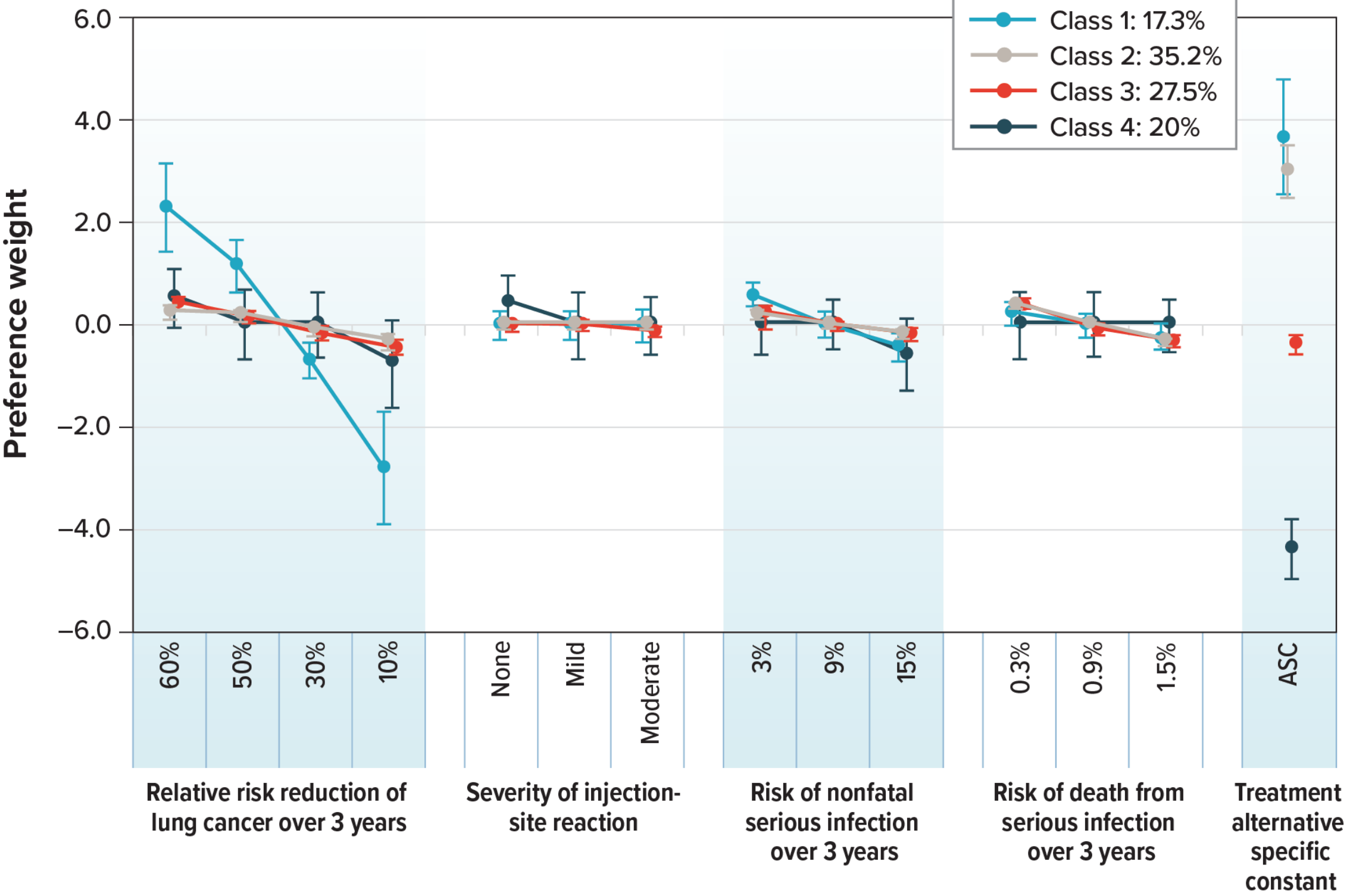Figure 2. Preference Weights from RPL Model (N=803)

Figure 3. Preference Weights by Class from Latent Class Model (N=803)

Note: Alternative Specific Constant (ASC): represents relative desirability of treatment (if positive) or no treatment (if negative)

Logit analysis analyzing characteristics of respondents who always selected "No Treatment" in DCE choices

Factors associated with *higher* likelihood of selecting NO treatment (OR > 1)

- White[a]
- Higher age
- Current smokers who never tried to quit
- Previous smokers who have quit
- Has not received COVID vaccine
- Has not had exams checking for skin cancer and precancerous moles
- Higher total concern score for 3 side effects of interception treatment

COVID = coronavirus disease 2019; OR = odds ratio
Note: Statistical significance is for P value ≤ 0.05.
[a] Variables became insignificant at the 5% level after controlling for other health behavior or risk preference variables; [b] Other risk factors include family history of LC, personal history of other cancers, COPD

Participant characteristics by latent class membership

Factors associated with Class 1 (*Pro-treatment*)
- Took more measures to avoid getting COVID-19
- Lower concern scores over the side effects of the treatment

Factors associated with Class 3 (*Treatment hesitant*)
- Risk averse (monetary gambling task)

Ref. group: Class 2 (*pro-treatment and tradeoff*)
Statistical significance is for P value ≤ 0.05.

Factors associated with Class 4 (*No treatment*)
- Non-African American or Black
- Has never tried to quit cigarettes
- Unemployed/disabled/unable to work
- No serious infection experience
- Agreed less that smoking causes lung cancer
- Extremely risk averse (monetary gambling task)
- Higher concern scores over treatment side effects

Results

- On average, respondents were willing to accept LC interception therapy with the benefits and risks presented in the survey (Fig. 2, positive coefficient for ASC)
- However, 16% of respondents selected 'No Treatment' for all DCE questions
- Preferences did not vary between groups who saw different randomly assigned levels of baseline risk
- Conditional on the levels presented, relative risk reduction of LC was the most-important attribute, followed by risk of death from serious infection and risk of nonfatal serious infection (Fig. 2)
- Severity of injection-site reactions did not significantly influence choice of treatment
- Respondents were willing to accept:
  - increases in risk of nonfatal serious infection up to a risk of 15% for a 15 percentage-point improvement in relative LC risk reduction
  - increases in risk of death from serious infection up to a risk of 1.5% for a 23 percentage-point improvement in relative LC risk reduction
- In latent class analysis, four preference classes identified: Pro-treatment (1), Pro-treatment with tradeoffs (2), Treatment hesitant (3), No treatment (4) (Fig. 3)

Conclusions

- Study provides insight into the relative importance individuals with high risk of developing LC place on interception treatment for LC
- On average, adults at high risk of developing LC are willing to accept upfront risk of treatment for uncertain future benefits
- The results highlight heterogeneity of preferences across sample
- Targeted approach to offering interception therapy may result in greatest uptake
- Future research into whether health beliefs associated with 'No treatment' are amenable to education should be conducted

1. CDC. Centers for Disease Control and Prevention. Lung cancer statistics. 2022. https://www.cdc.gov/cancer/lung/statistics/index.htm. Accessed 22 November 2022.
2. US Preventive Services Task Force. Screening for Lung Cancer: US Preventive Services Task Force Recommendation Statement. JAMA. 2021;325(10):962–970. doi:10.1001/jama.2021.1117