

Enabling Data Privacy in Health Economic Microsimulation Models By Using Subject-level Synthetic Data

Milana Ivkovic and Tobias Grand

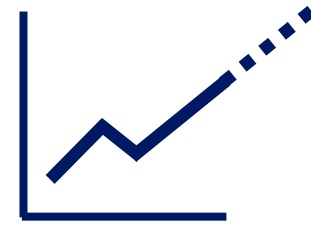
Novo Nordisk A/S

Conflicts of interest

- Milana Ivkovic and Tobias Grand are employed at Novo Nordisk A/S, which sponsored this research.
- STEP 1 clinical trial was sponsored by Novo Nordisk A/S

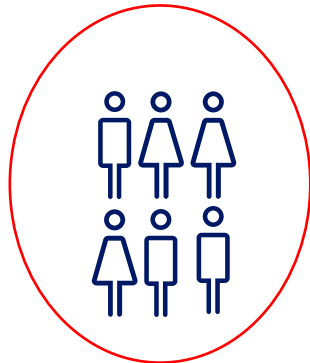


Cohort model

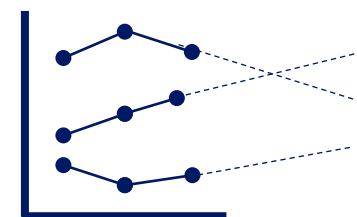
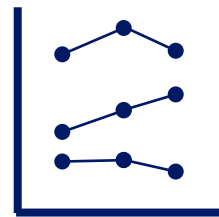


QALY
COST

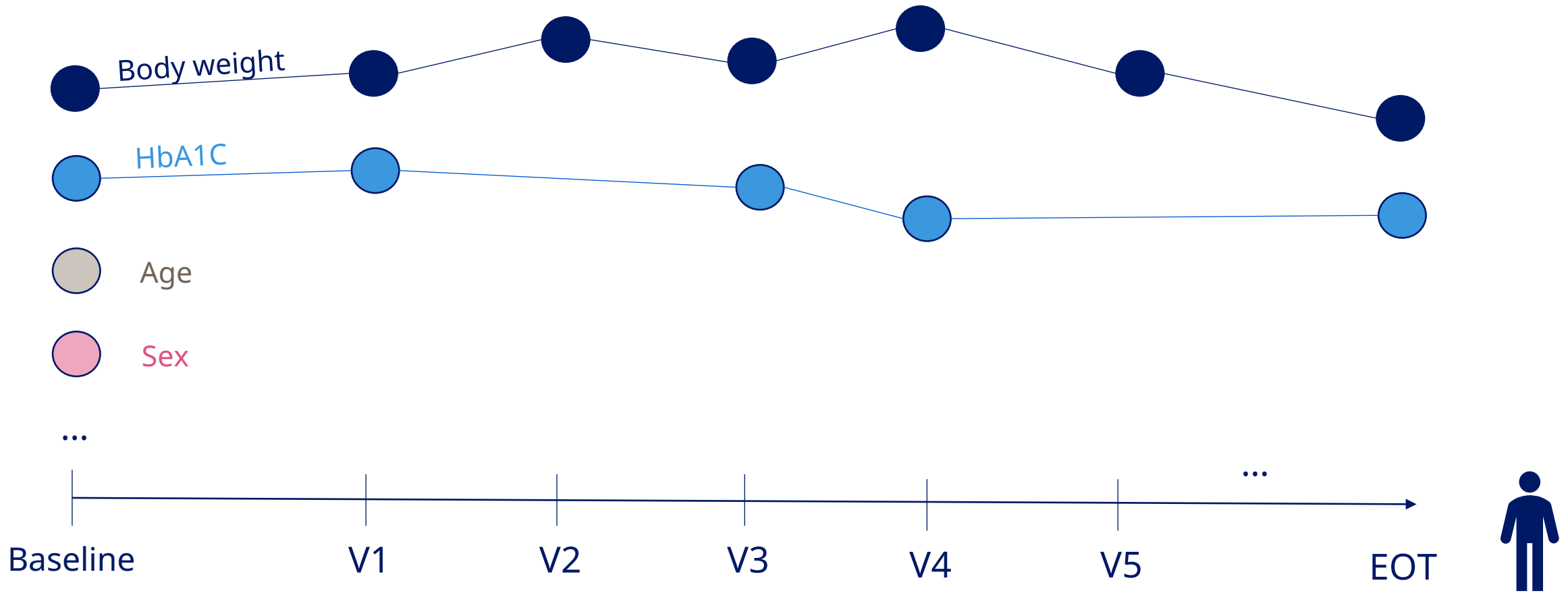
???



Microsimulation model



QALY COST
QALY COST
QALY COST



Data for synthesis taken from STEP 1: a PhIII trial assessing the effect of semaglutide 2.4 mg OW in subjects with overweight and obesity without diabetes over 68 weeks.

Wilding JPH, Batterham RL, Calanna S, Davies M, Van Gaal LF, Lingvay I, McGowan BM, Rosenstock J, Tran MTD, Wadden TA, Wharton S, Yokote K, Zeuthen N, Kushner RF; STEP 1 Study Group. Once-Weekly Semaglutide in Adults with Overweight or Obesity. *N Engl J Med.* 2021 Mar 18;384(11):989.



synthesizing...



| Sex | Age | Treatment | Body weight | Outcome |
|-----|-----|-----------|-------------|---------|
| F | 51 | Sema | 92.2 | 89.1 |
| F | 43 | Placebo | 101.2 | 100.3 |
| M | 41 | Placebo | 99.7 | 98.3 |
| F | 64 | Sema | 110.2 | 100.8 |
| M | 37 | Placebo | 96.4 | 95.3 |
| F | 54 | Sema | 132.1 | 119.7 |
| F | 52 | Sema | 105.3 | 104.1 |

| Sex | Age | Treatment | Body weight | Outcome |
|-----|-----|-----------|-------------|---------|
| M | 49 | Placebo | 94.1 | 92.2 |
| F | 45 | Sema | 99.2 | 95.1 |
| M | 40 | Sema | 112.3 | 98.7 |
| F | 62 | Sema | 88.3 | 85.6 |
| F | 37 | Placebo | 95.0 | 96.1 |
| M | 51 | Sema | 127.4 | 105.2 |
| F | 55 | Sema | 102.2 | 96.6 |

Note: tables created for illustration, not based on STEP 1!

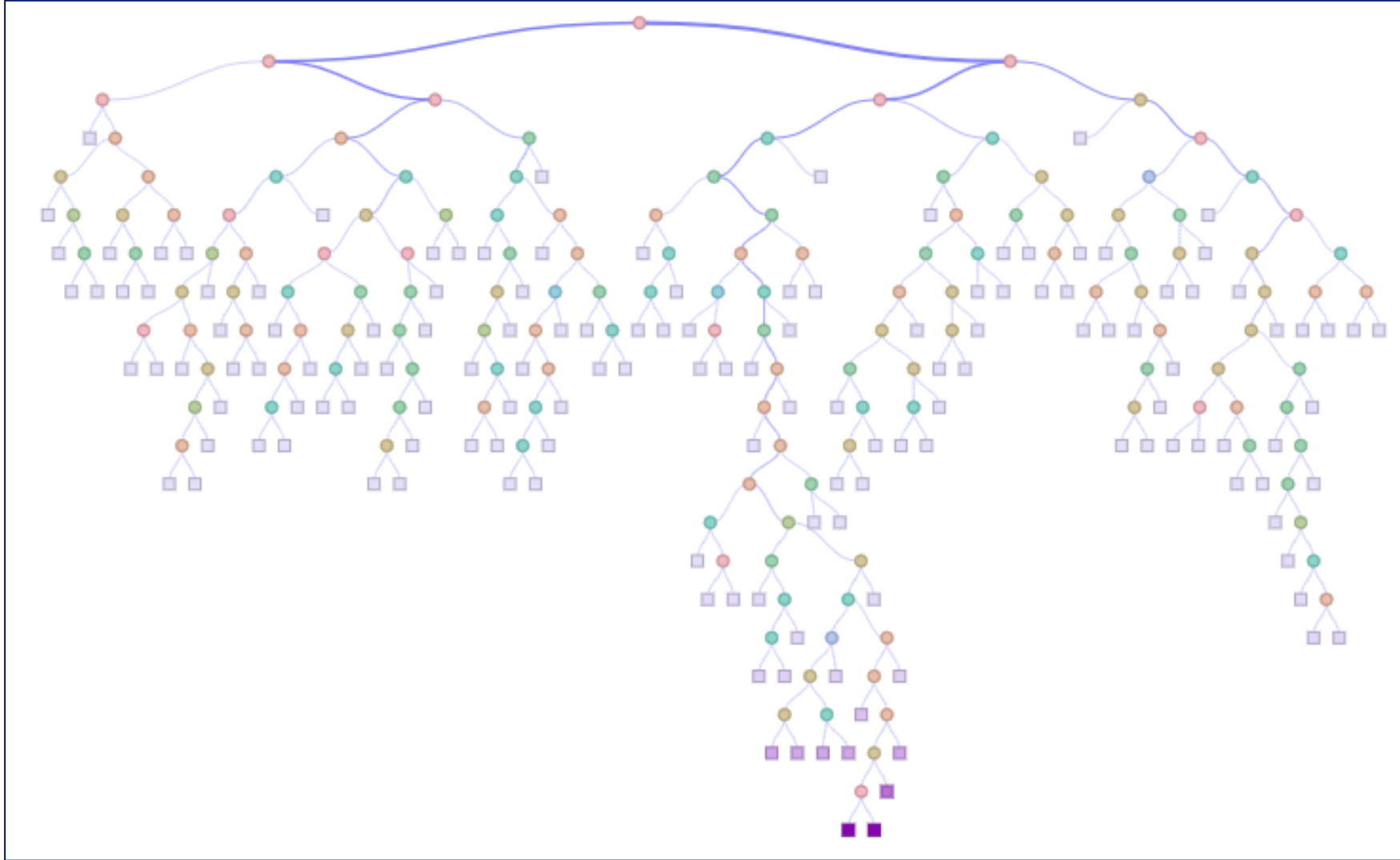
<https://www.synthpop.org.uk/>

Reiter, J.P. (2005). Using CART to generate partially synthetic, public use microdata. *Journal of Official Statistics*, 21(3), 441–462.

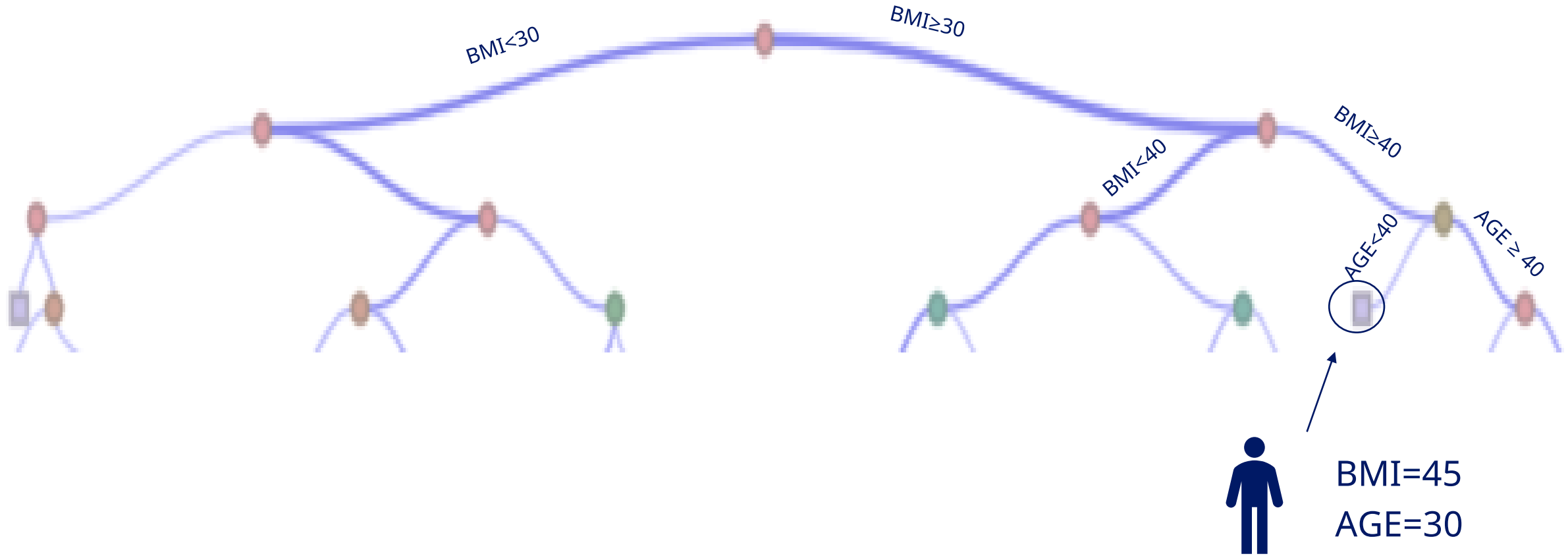
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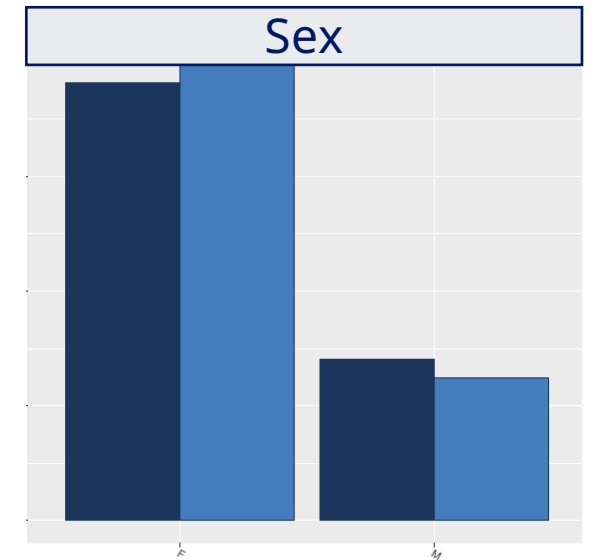
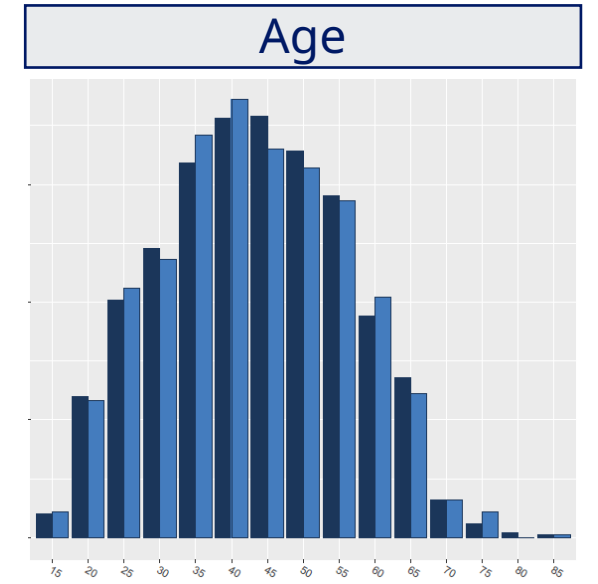
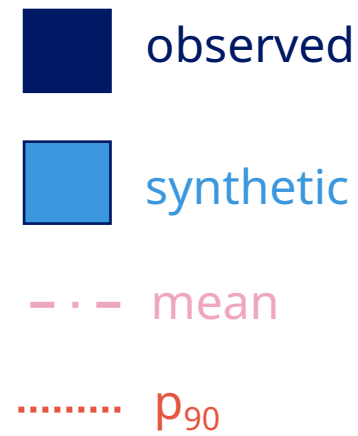
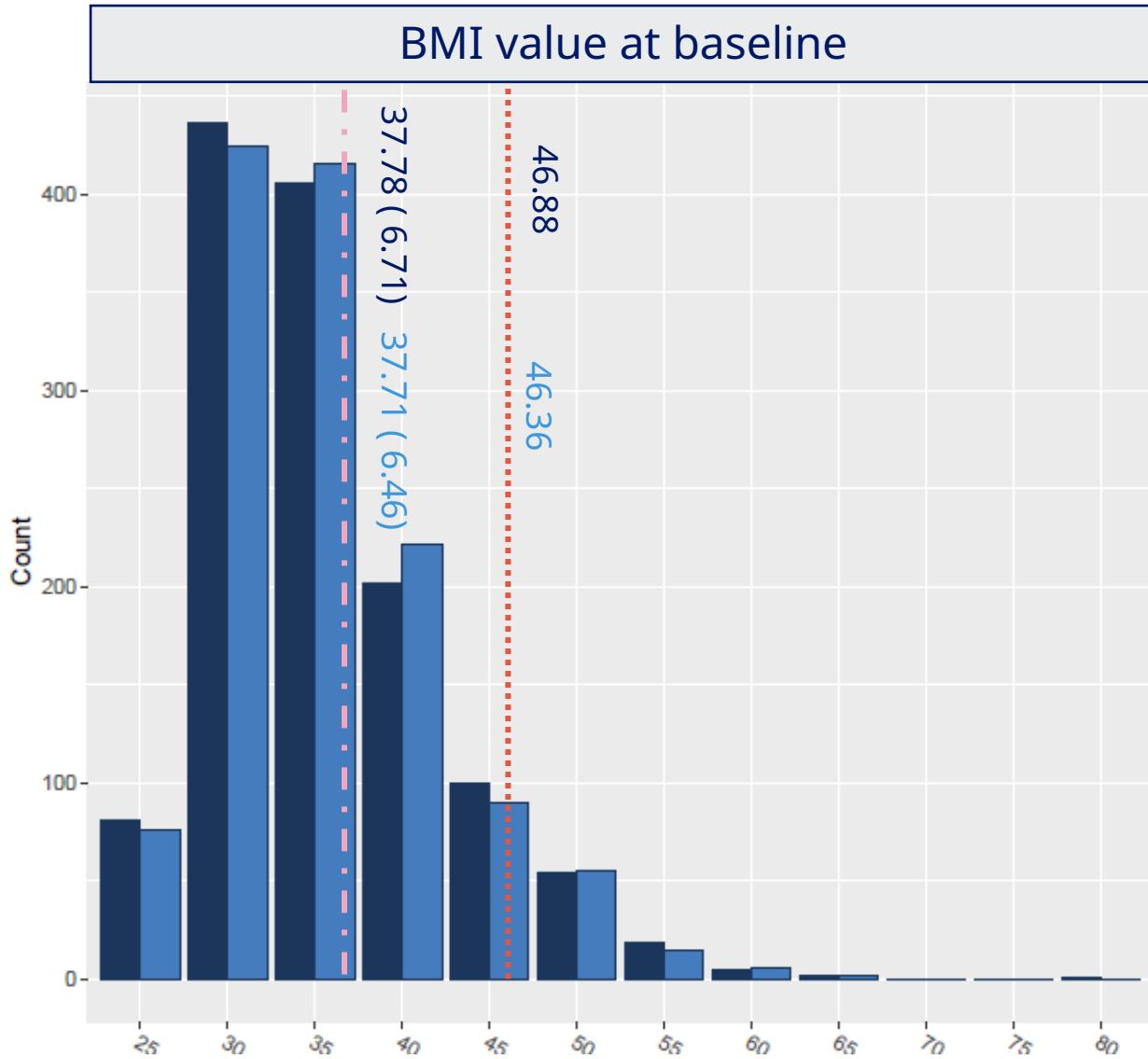


CART

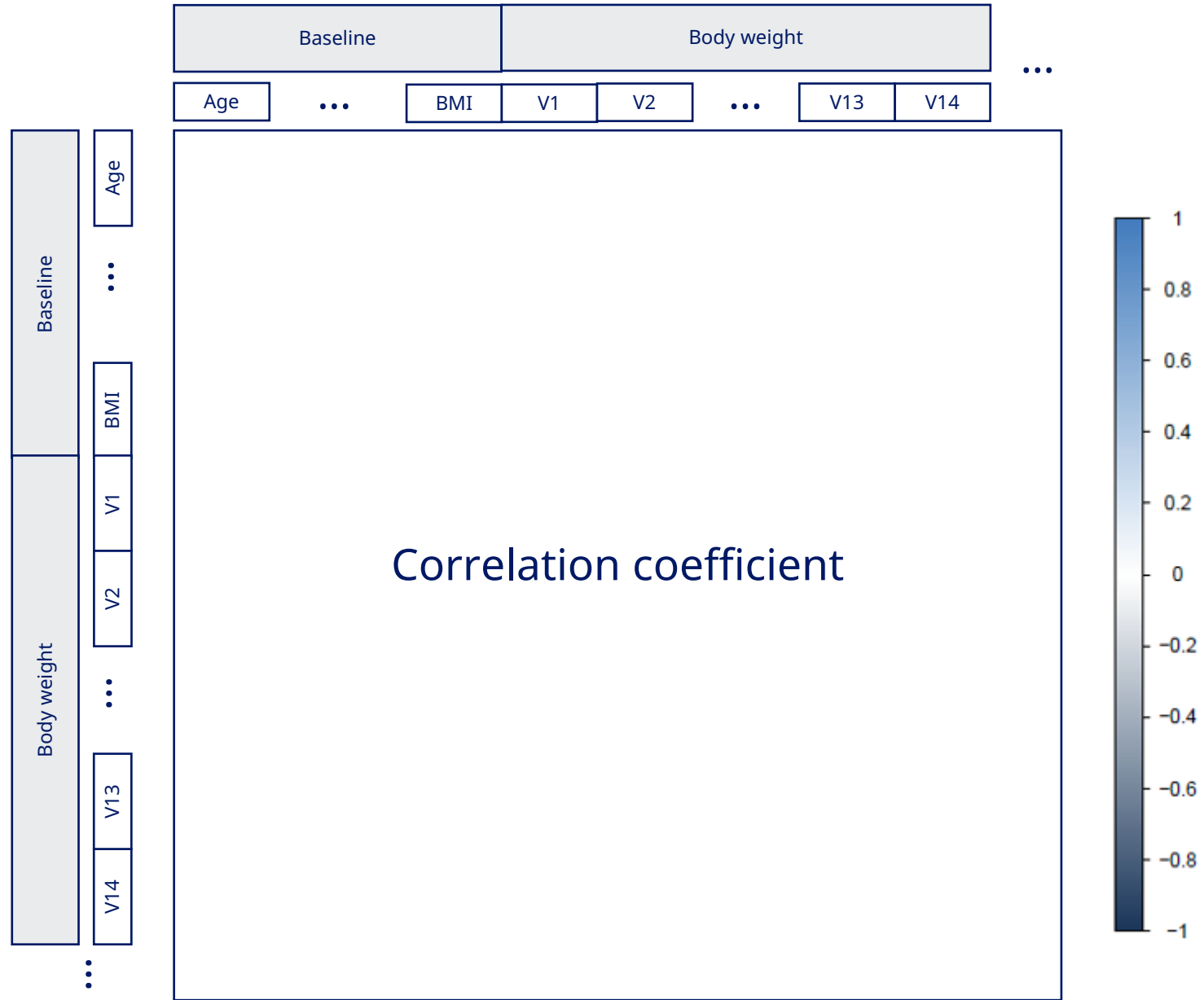


CART example - body weight at visit 2

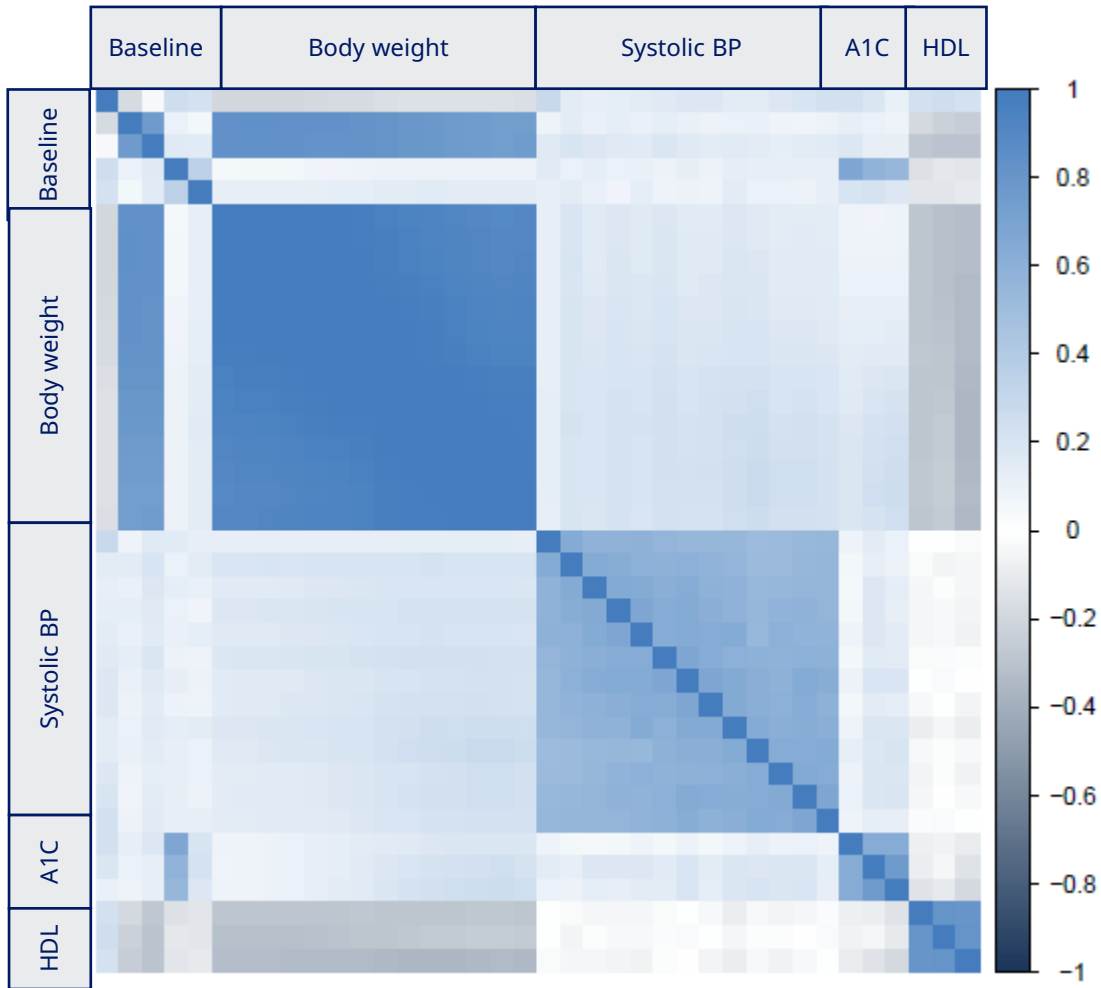




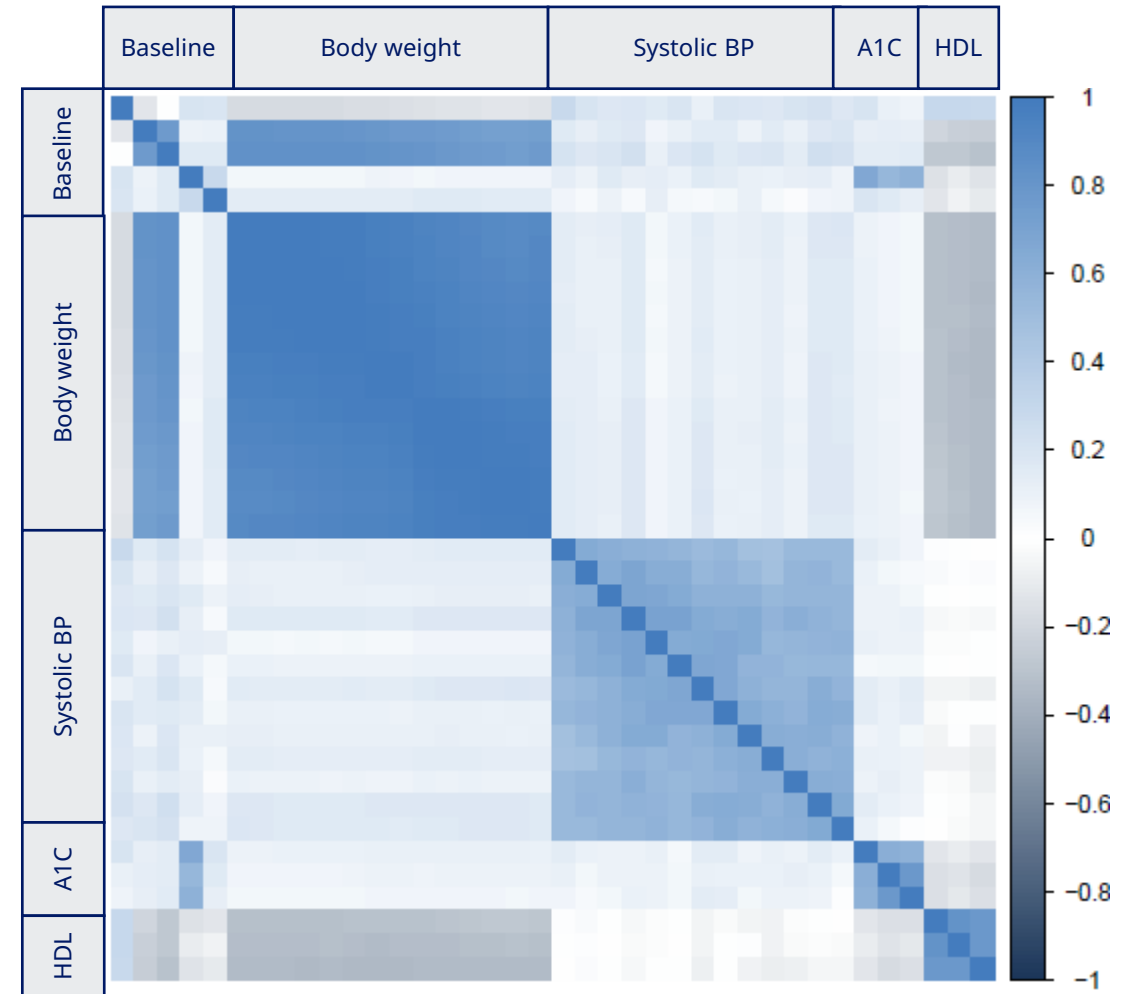
All plots on this and following slide are for the semaglutide 2.4 mg treatment group.



Original correlation matrix



Synthetic correlation matrix



Baseline: Age, BMI, Waist circumference, HBA1C, Fasting Plasma Glucose measurements.

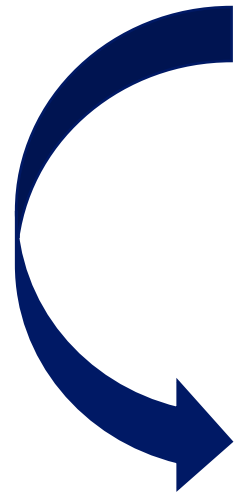
Body weight and Systolic BP: measurements across 14 and 13 visits, resp.

A1C and HDL: measurements across 3 visits.

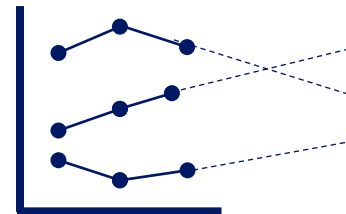
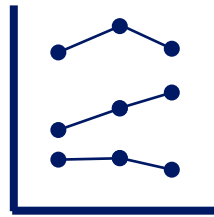
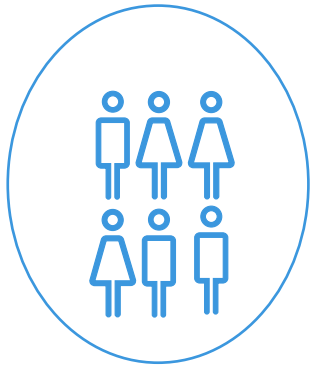
The end?



synthesizing...



Microsimulation model



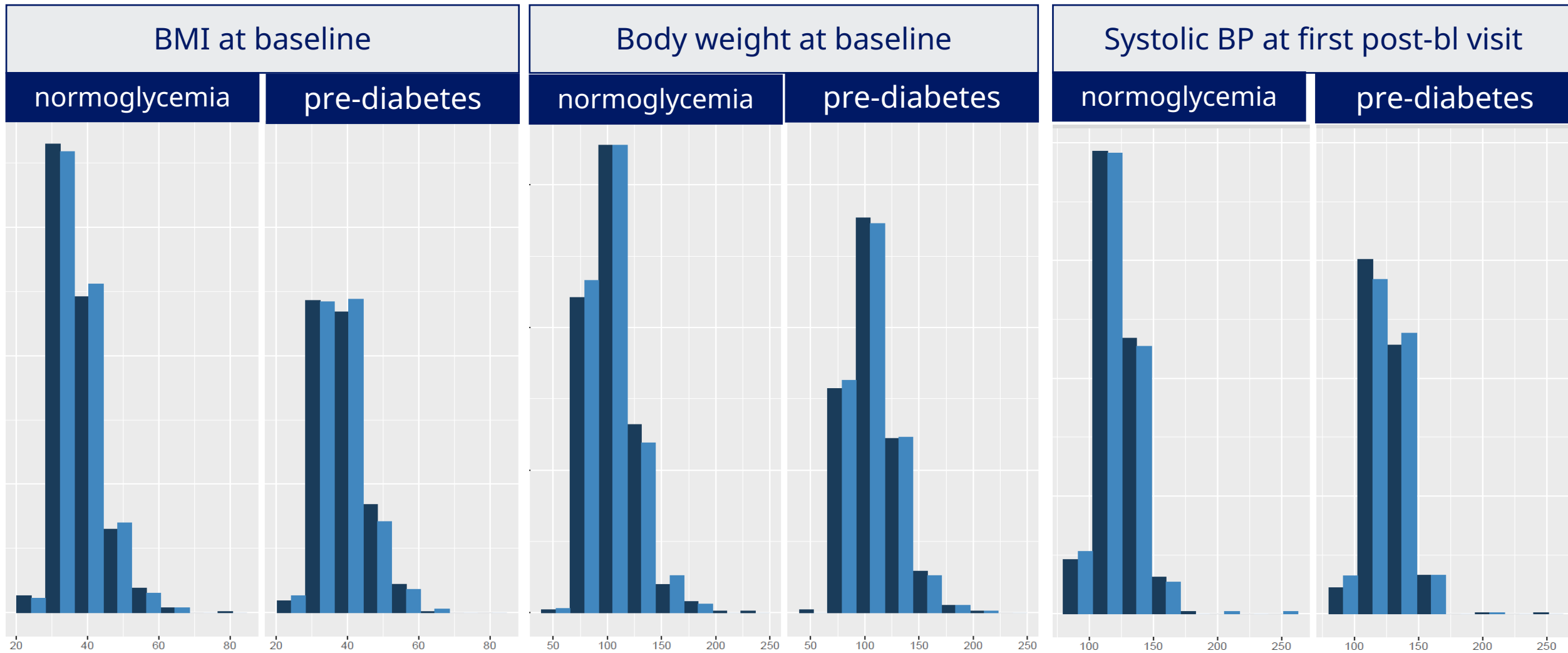
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|------|------|
| QALY | COST |
| QALY | COST |
| QALY | COST |

Thank you!

Contact information

In case of questions, please contact Milana at mqiv@novonordisk.com.

Appendix: subgroup results



BL – baseline

Results for each parameter shown for subjects with normoglycemia at baseline (left) and pre-diabetes at baseline (right).