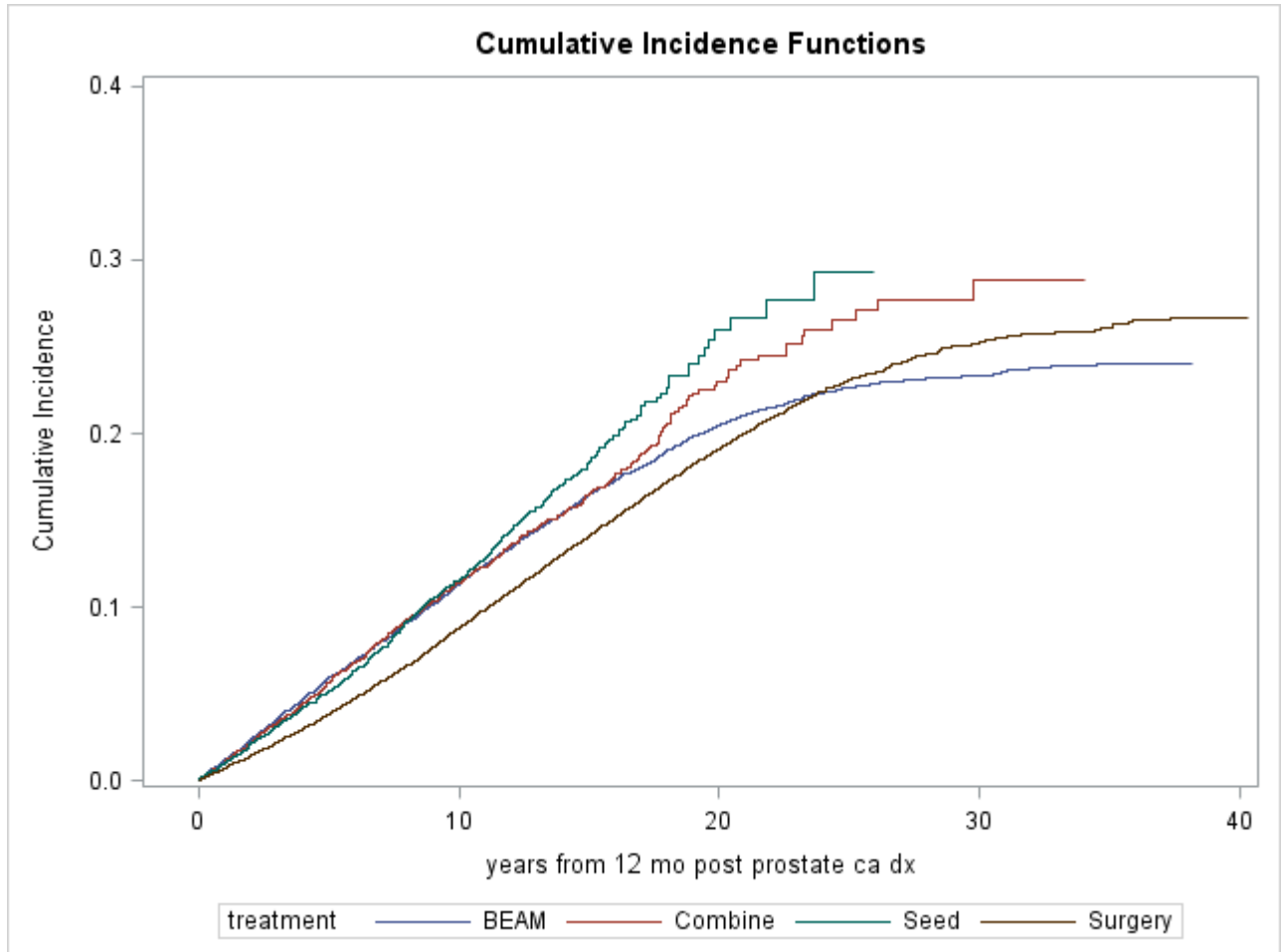**Supplement C.** Cumulative incidence analysis

1. Cumulative incidence of any second malignancy, from 12 months post-prostate ca diagnosis

Gray's test comparing latency between treatment groups, in the presence of the competing risk of death: p<0.0001
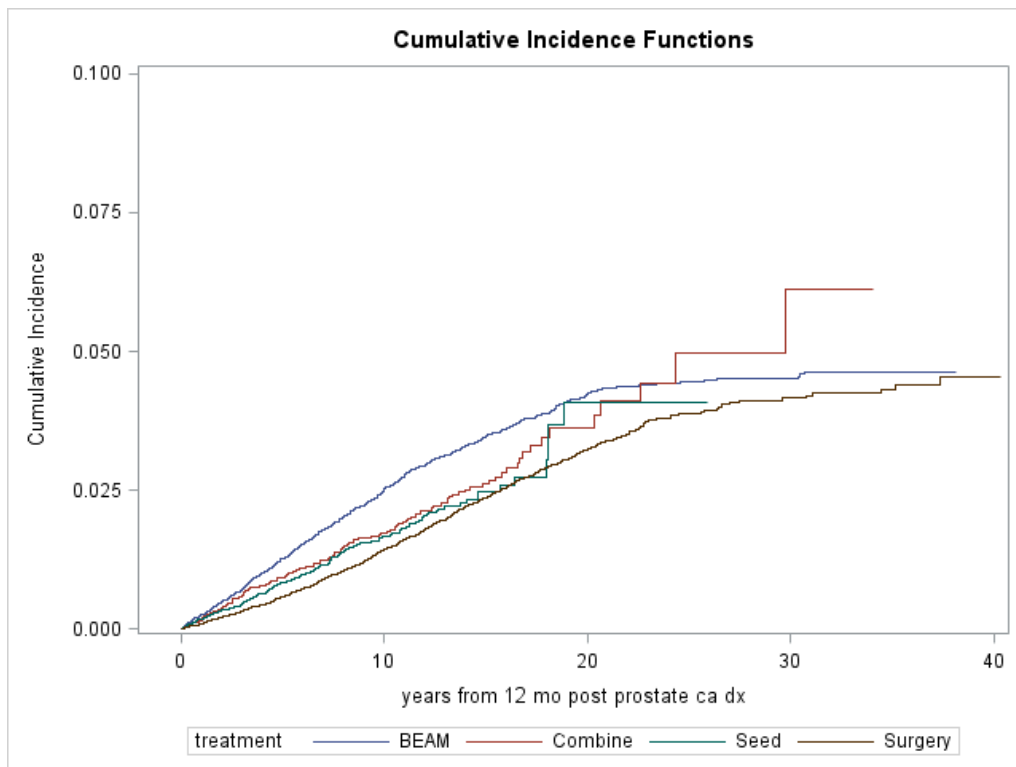
BEAM: N=36225, 4807 second malignancies, 13586 competing risks (deaths), 17832 censored

Combined: N=9010, 1018 second malignancies, 1385 competing risks (deaths), 6607 censored

Seed: N=13001, 1298 second malignancies, 992 competing risks (deaths), 10711 censored

Surgery: N=92679, 9796 second malignancies, 16208 competing risks (deaths), 66675 censored

2. Cumulative incidence of lung second malignancy, from 12 months post-prostate ca diagnosis

Gray's test comparing cumulative incidence between treatment groups, in the presence of the competing risk of death: p<0.0001
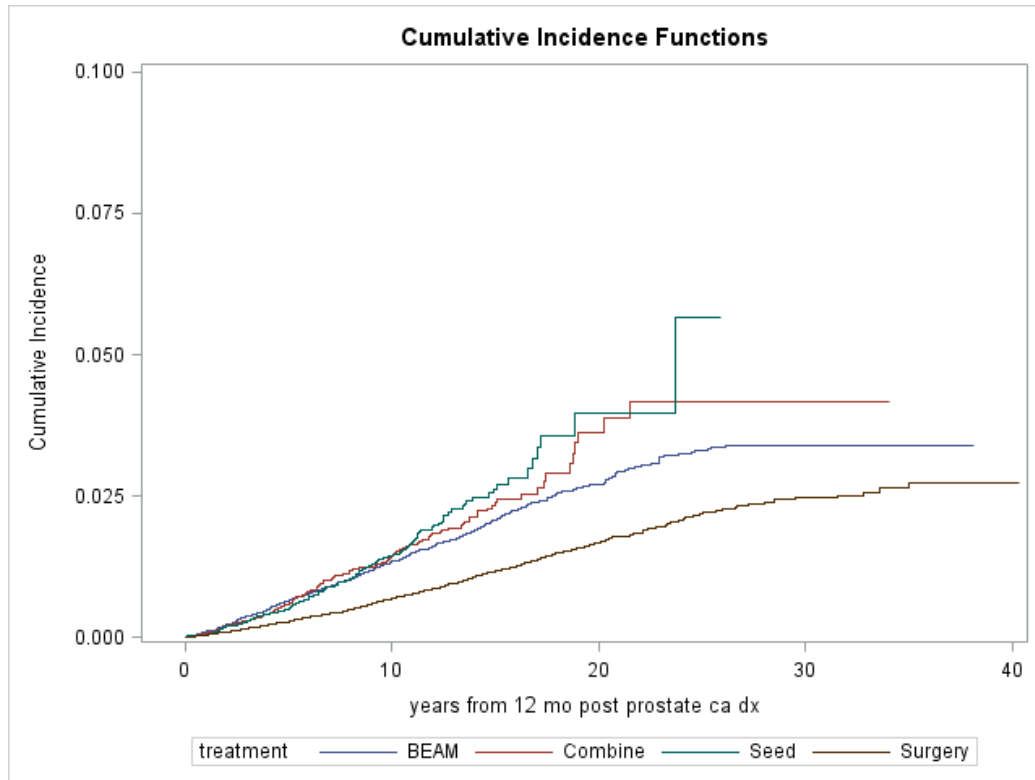
BEAM: N=36225, 1000 lung second malignancies, 17393 competing risks (other second malignancy or death), 17832 censored

Combined: N=9010, 166 lung second malignancies, 2237 competing risks (other second malignancy or death), 6607 censored

Seed: N=13001, 186 lung second malignancies, 2104 competing risks (other second malignancy or death), 10711 censored

Surgery: N=92679, 1620 lung second malignancies, 24384 competing risks (other second malignancy or death), 66675 censored

3. Cumulative incidence of bladder second malignancy, from 12 months post-prostate ca diagnosis

Gray's test comparing cumulative incidence between treatment groups, in the presence of the competing risk of death: p<0.0001
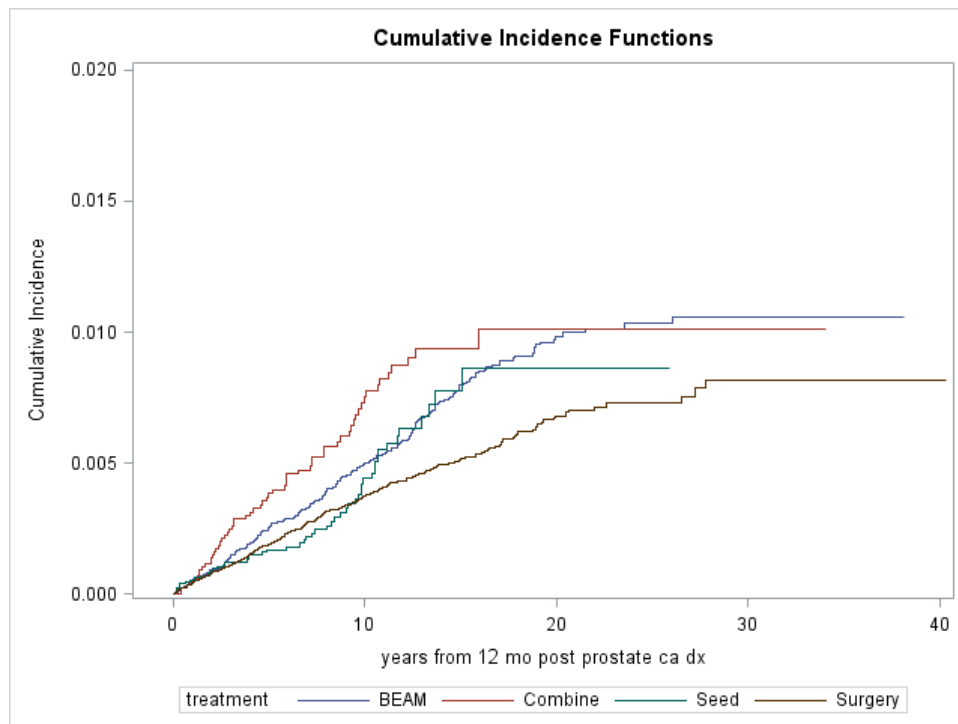
BEAM: N=36225, 625 bladder second malignancies, 17768 competing risks (other second malignancy or death), 17832 censored

Combined: N=9010, 137 bladder second malignancies, 2266 competing risks (other second malignancy or death), 6607 censored

Seed: N=13001, 170 bladder second malignancies, 2120 competing risks (other second malignancy or death), 10711 censored

Surgery: N=92679, 828 bladder second malignancies, 25176 competing risks (other second malignancy or death), 66675 censored

4. Cumulative incidence of rectum second malignancy, from 12 months post-prostate ca diagnosis

Gray's test comparing cumulative incidence between treatment groups, in the presence of the competing risk of death: p<0.0001

BEAM: N=36225, 219 rectum second malignancies, 18174 competing risks (other second malignancy or death), 17832 censored

Combined: N=9010, 59 rectum second malignancies, 2344 competing risks (other second malignancy or death), 6607 censored

Seed: N=13001, 49 rectum second malignancies, 2241 competing risks (other second malignancy or death), 10711 censored

Surgery: N=92679, 370 rectum second malignancies, 25634 competing risks (other second malignancy or death), 66675 censored