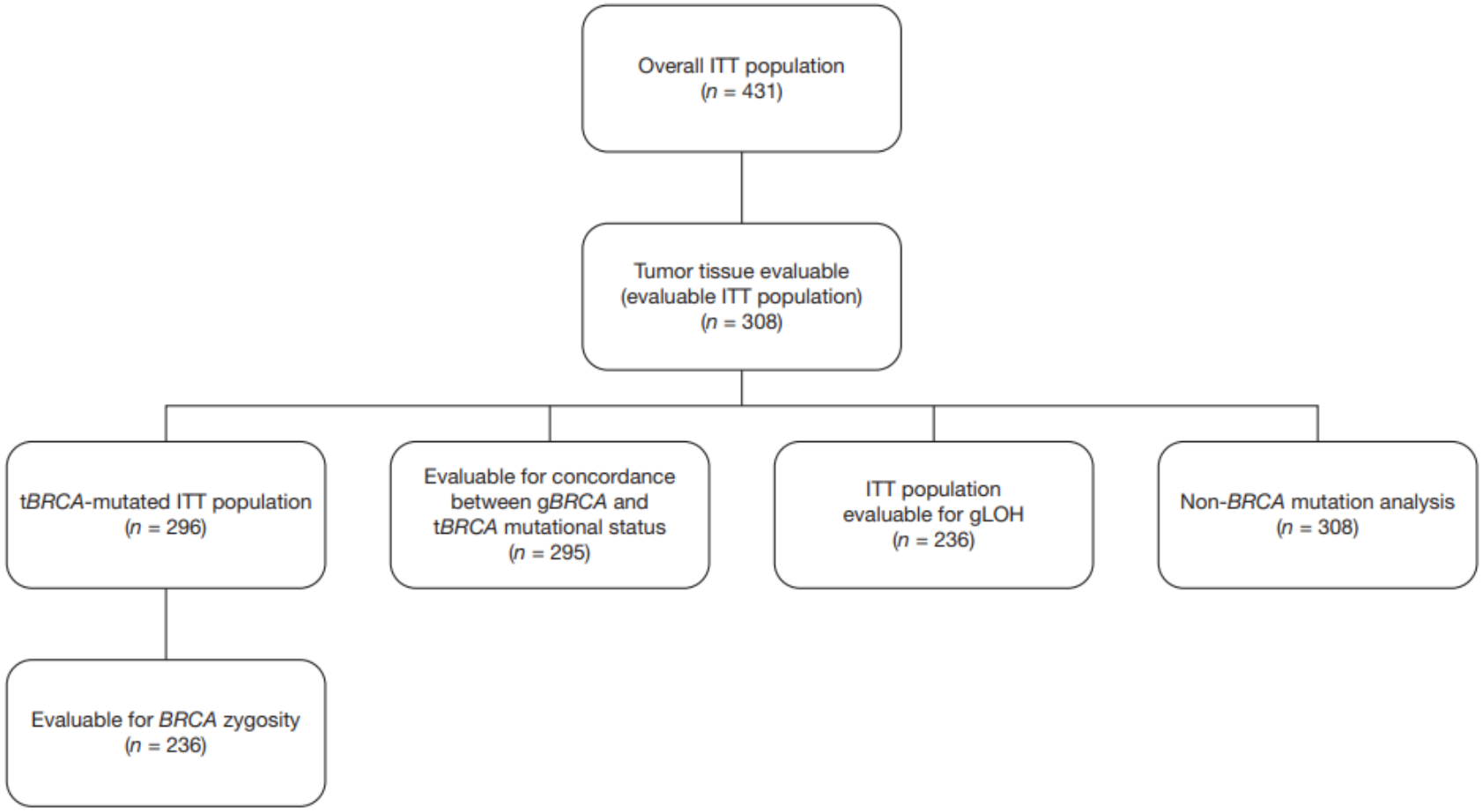
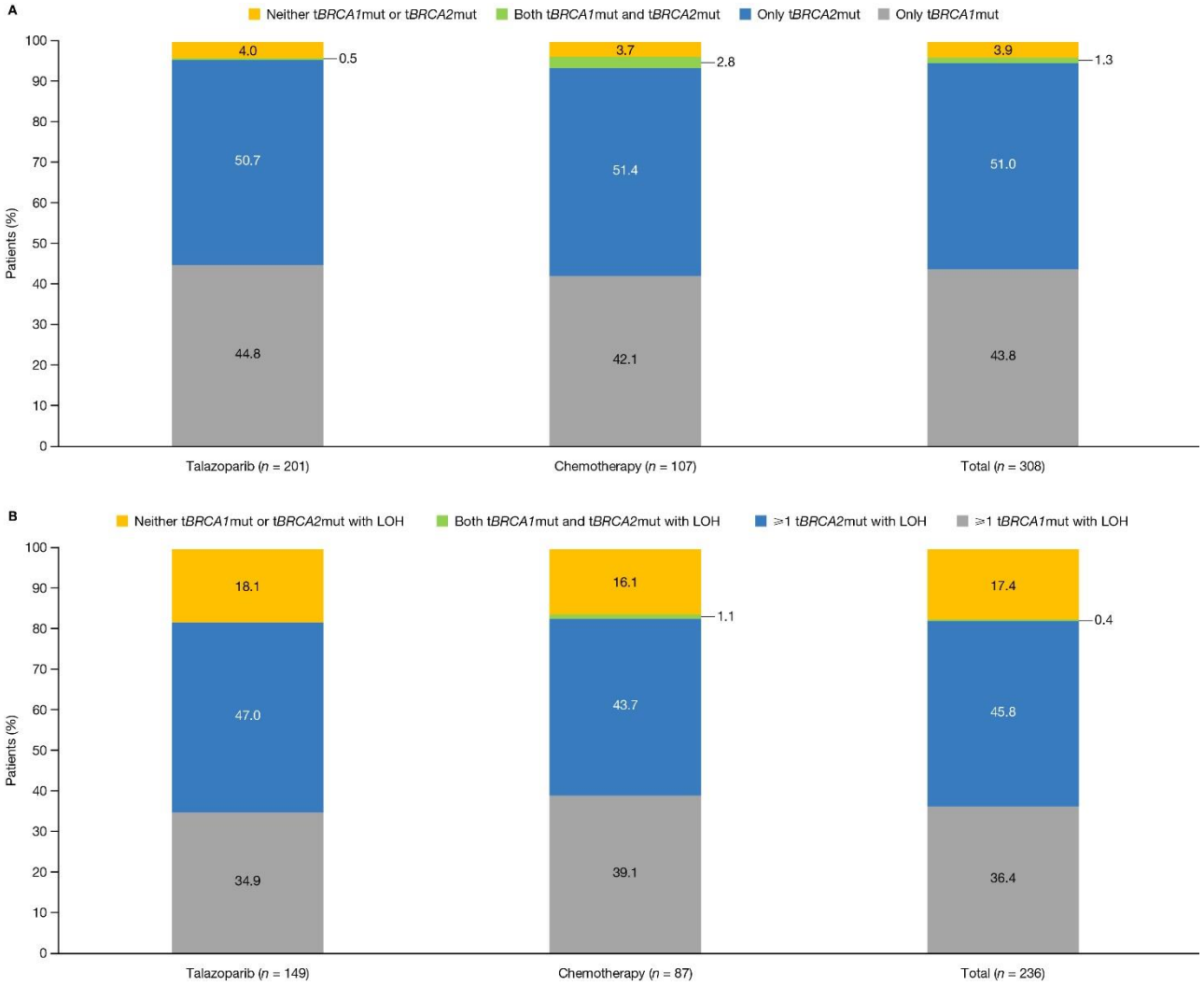
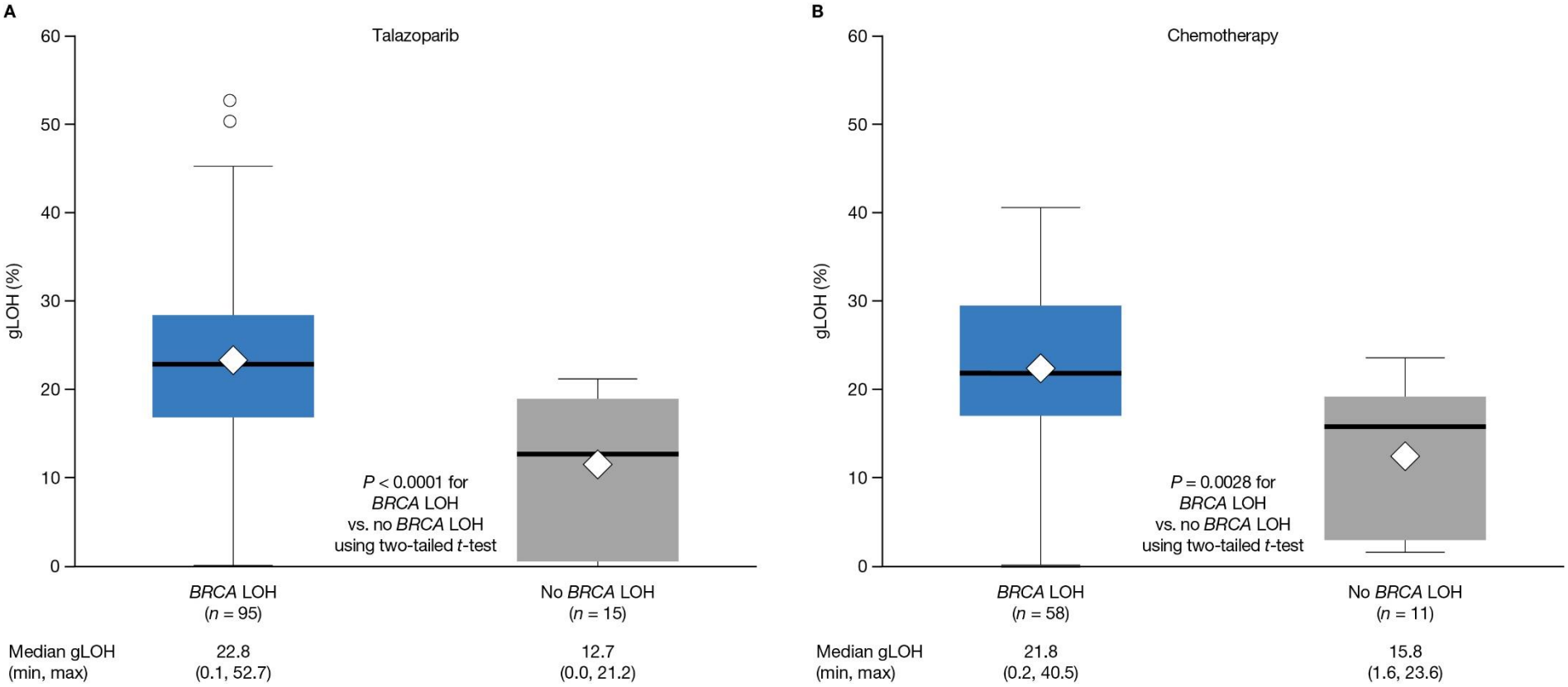
Supplementary Figure S1. Proportion of patients evaluable for biomarker analysis.



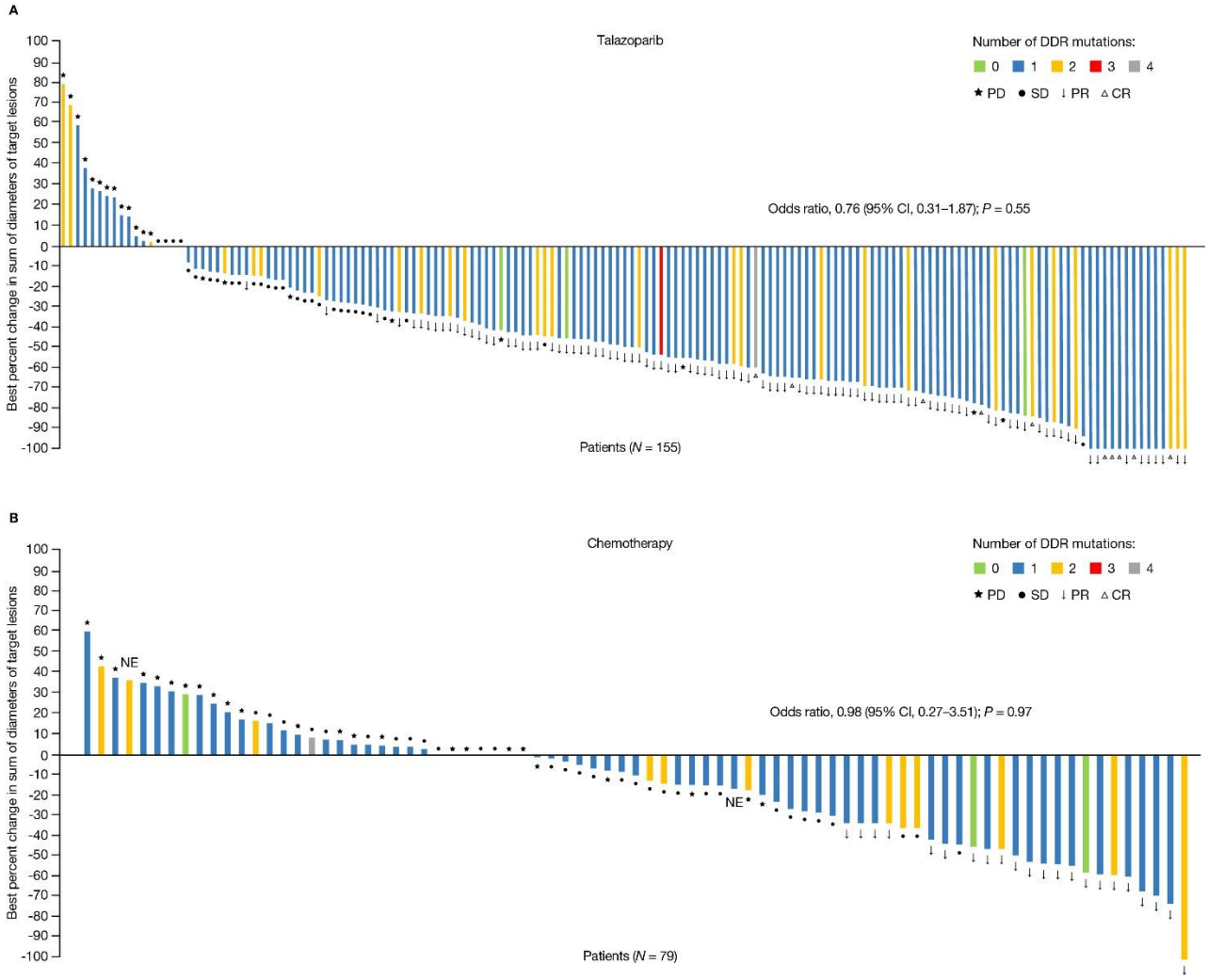
Supplementary Figure S2. Tumor *BRCA* mutations: **A,** evaluable ITT population; **B,** t*BRCA* loss of heterozygosity in the ITT population evaluable for *BRCA* zygosity.



Supplementary Figure S3. Tumor gLOH by *BRCA* LOH status for evaluable ITT population: **A,** talazoparib; **B,** chemotherapy.



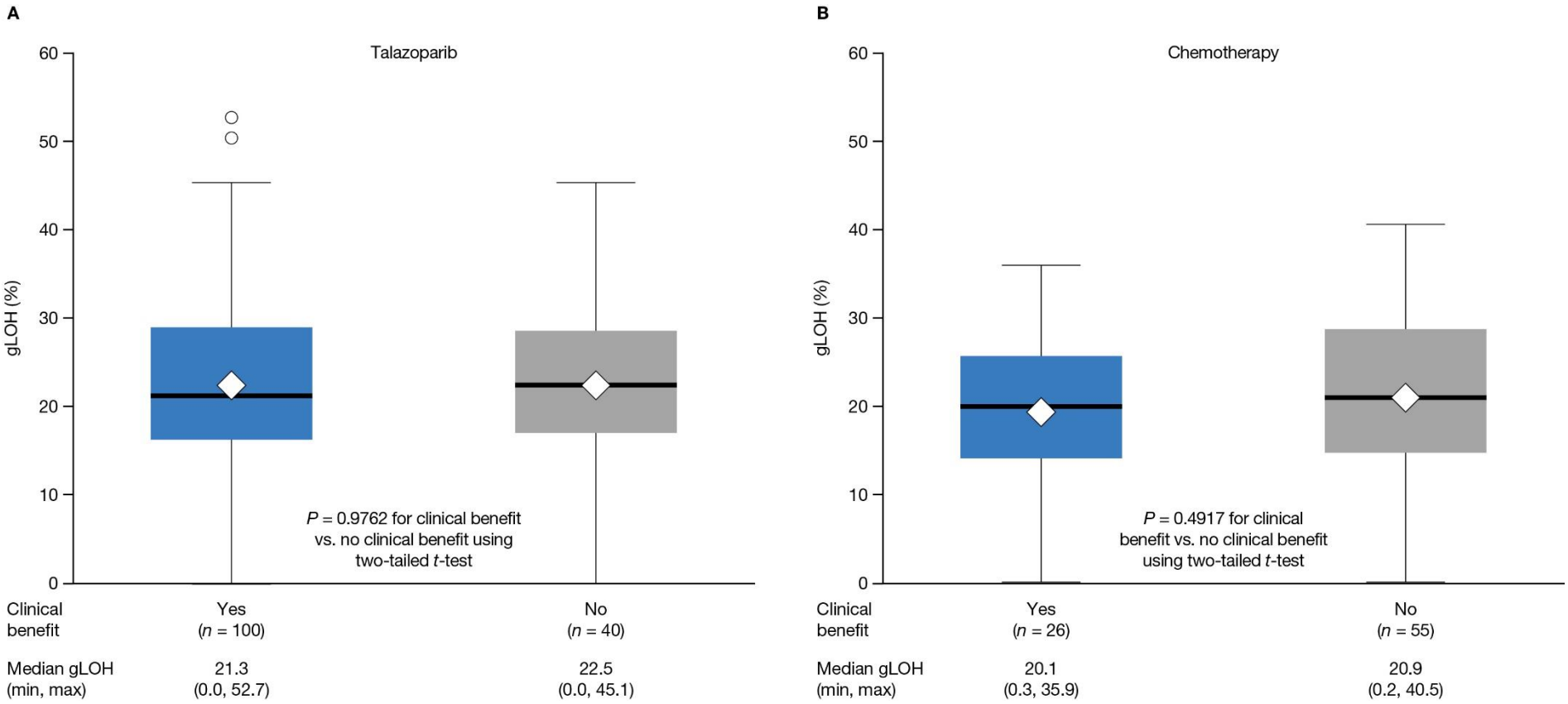
Supplementary Figure S4. Best percent change of sum of diameters of target lesions from baseline over time by investigator assessment by number of DDR gene mutations: **A,** talazoparib; **B,** chemotherapy (evaluable ITT population with measurable disease).



Odds ratio based on logistic regression of 1 vs. ≥2 DDR mutations.

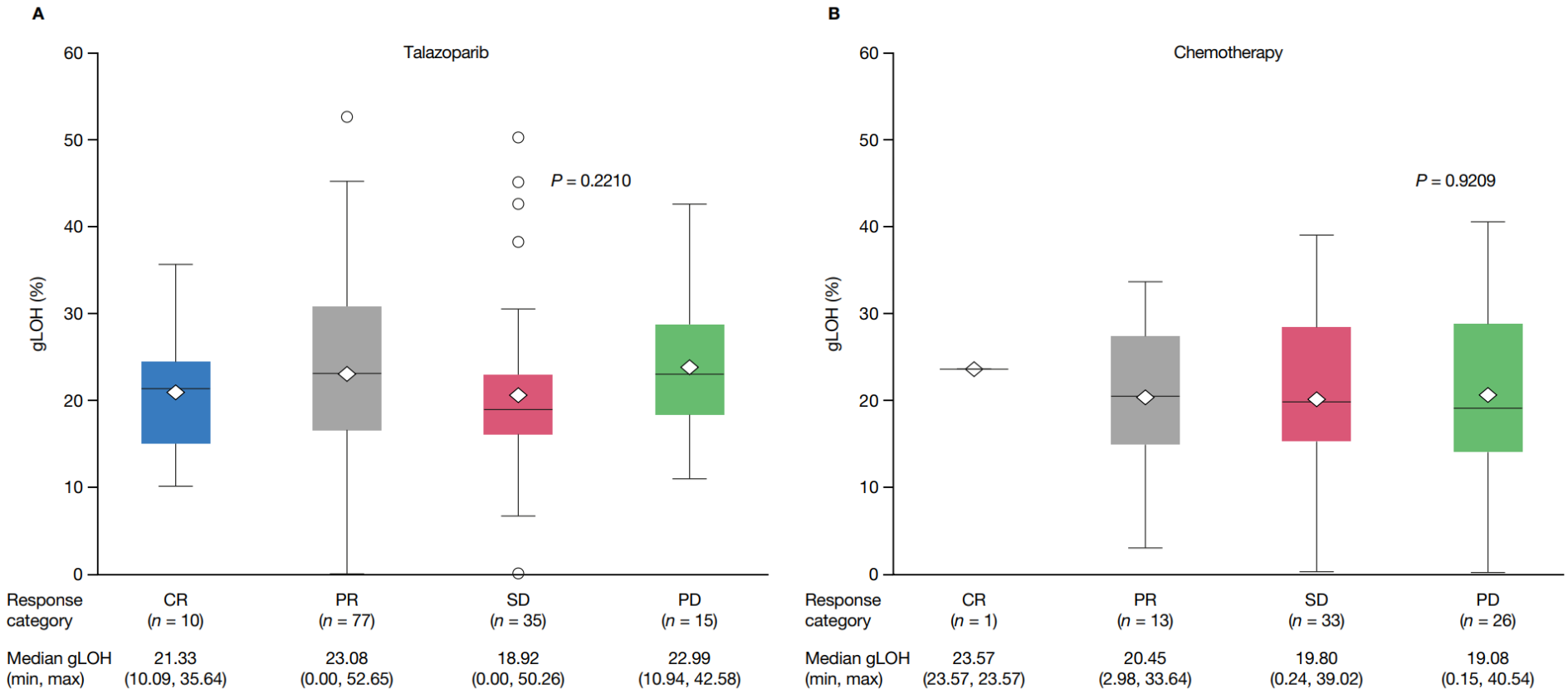
Number of DDR mutations is sum of known and likely pathogenic variants in the following genes, excluding copy number changes: *ARID1A*, *ATR*, *ATM*, *BARD1*, *BRCA1, BRCA2, BRD4*, *BRIP1*, *CDK12*, *CHEK2*, *FANCA*, *FANCC*, *FANCG*, *NBN*, *PALB2*, *RAD51B*, and *STAG2*.

Supplementary Figure S5. gLOH by clinical benefit status – ITT population evaluable for clinical benefit and gLOH: **A,** talazoparib; **B,** chemotherapy.



Clinical benefit assessment was based on target, non-target, and new lesions per RECIST 1.1, and confirmation of CR, PR, and SD was not required. Clinical benefit (Yes/No) was defined as the proportion of patients with a best overall response of CR, PR, or SD lasting ≥24 weeks from randomization per RECIST 1.1 as determined by investigator.

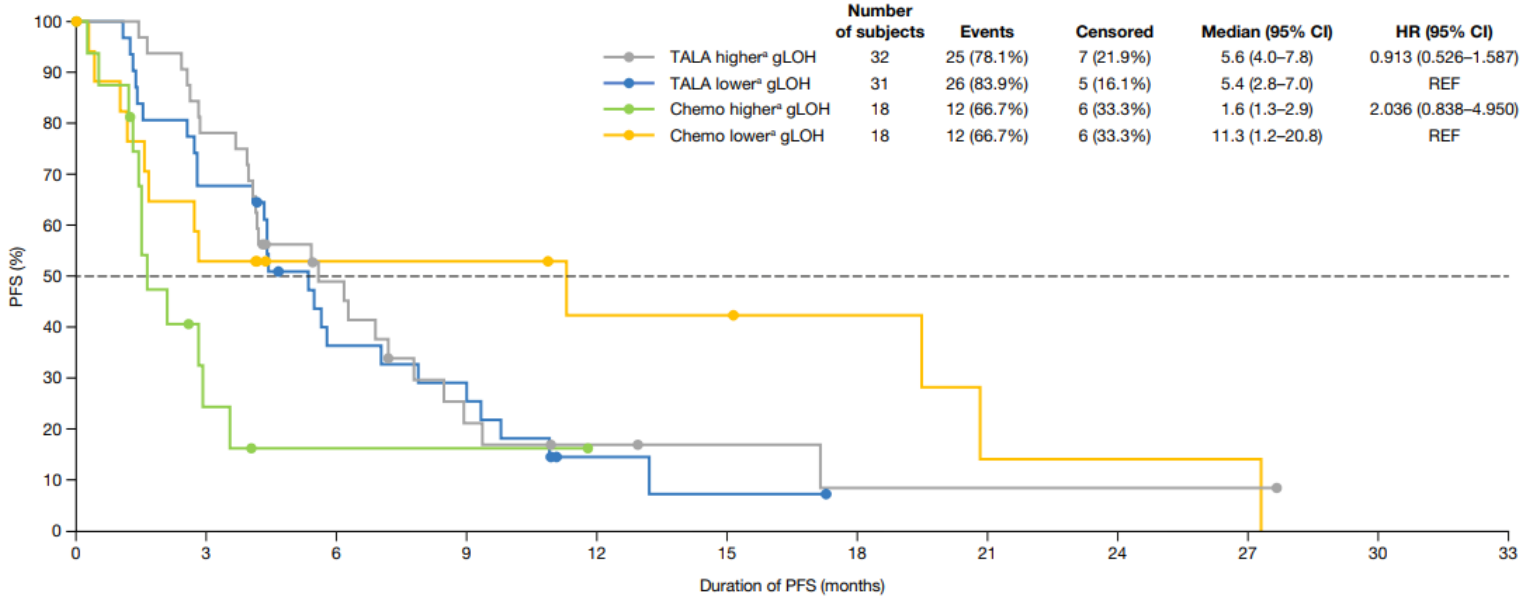
Supplementary Figure S6. gLOH by best overall response for unconfirmed CR/PR based on investigator assessment – evaluable ITT population with gLOH results.



Abbreviation: PD, progressive disease.

Jonckheere-Terpstra trend test was used for statistical comparison of gLOH, across the response groups.

Supplementary Figure S7. Kaplan–Meier curves for duration of radiographic PFS by IRF assessment – evaluable ITT population with TNBC.



TALA higher[a] gLOH: Ev/Cum	0/0	7/7	9/16	7/23	1/24	0/24	1/25	0/25	0/25	0/25	0/25	0/25
Patients at risk	32	25	13	5	3	2	1	1	1	1	0	0
TALA lower[a] gLOH: Ev/Cum	0/0	10/10	9/19	2/21	4/25	1/26	0/26	0/26	0/26	0/26	0/26	0/26
Patients at risk	31	21	10	8	2	1	0	0	0	0	0	0
Chemo higher[a] gLOH: Ev/Cum	0/0	11/11	1/12	0/12	0/12	0/12	0/12	0/12	0/12	0/12	0/12	0/12
Patients at risk	18	3	1	1	0	0	0	0	0	0	0	0
Chemo lower[a] gLOH: Ev/Cum	0/0	8/8	0/8	0/8	1/9	0/9	0/9	2/11	0/11	0/11	1/12	0/12
Patients at risk	18	9	6	6	4	4	3	1	1	1	0	0

Abbreviations: Chemo, chemotherapy; Cum, cumulative; Ev, events; REF, reference; TALA, talazoparib.

[a]Higher and lower indicate that gLOH is at or above or below the median, respectively. Hazard ratio is based on unstratified Cox regression model and is relative to talazoparib gLOH<median or chemotherapy gLOH<median with <1 favoring higher gLOH.