

Table S2. Table list of evidences.

	Study type	N of patients	Histology	Setting	Type of alteration	Main findings
Zhou et al (35585646)	Prospective	14	3 adenocarcinoma and 11 squamous cell carcinoma NSCLC	neoadjuvant	HR pathway genes	HR pathway mutations occurred more frequently in better-responded neo-adjuvant immunotherapy patients regardless of the treatment regimen and clinic pathologic characteristics.
Gao et al (35547263)	Retrospective and <i>in-silico</i>	42 patients plus 698 patients extrapolate from public dataset	Lung adenocarcinoma	Non metastatic for the cohort of 42 patients; NA for the cohort of patients derived from public dataset	Mutations of DNA mismatch repair pathway	High-risk patients had more mutations of DNA mismatch repair pathway
Huang et al (35535347)	<i>In-silico</i>	TCGA database	NSCLC	NA	NEIL3	Immunotherapeutic nonresponders had elevated NEIL3 levels
Ma et al (35521981)	Retrospective	340 patients	Lung adenocarcinoma	Limited and advanced stage	ATM	ATM-positive mutations (PIK3CA-positive and EGFR-negative mutation status) are strongly associated with high levels of TMB
Della Corte et al (35346313)	Prospective plus <i>in-silico</i>	3 patients plus TCGA dataset (511 lung adenocarcinoma)	NSCLC	Advanced, pre-treated	DDR genes	Comprehensive genomic profile analysis found somatic mutations and

		ma and 501 lung squamous carcinoma)				germline rare variants in DNA damage response (DDR) genes in long responders patients. In TCGA dataset, DDR mutant NSCLC displayed high STING pathway gene expression.
Li et al (35346207)	Retrospective	248 patients	Lung adenocarcinoma	NA	DDR pathway	DDR pathway was associated with high PD-L1 expression
Olivares-Hernández et al (35203569)	Retrospective	73 patients	NSCLC	Advanced	MMR pathway	They found a relationship between MMR system and response rate
Zhang et al (35087742)	Retrospective plus <i>in-silico</i>	5227 patients plus OAK and POPLAR dataset	NSCLC	Advanced	PALB2	No difference in PFS between PALB2 mutated and PALB2 wt patients
Zhang et al (35042953)	<i>in-silico</i>	1745 patients	NSCLC	Advanced	HRR pathway, ATM, ATR, ARID2	HRR pathway, ATM, ATR, ARID2 are associated with better PFS in patients treated with immunotherapy
Xiao et al (34988170)	Retrospective	2876	NSCLC	NA	HRR pathway	An association between DDR genes and TMB was found. Patients with del-sDDRmut significantly improved mPFS and mOS compared to wild-type DDR patients
Ramdani et al (34673351)	Retrospective	56	NSCLC	Advanced	ARID1A	ARID1A mutations was observed in the

						non-responder group.
Xiong et al (34630387)	<i>in-silico</i>	853	NSCLC	Advanced	DDR pathway	Comutations in DDR Pathways Predict Atezolizumab Response in NSCLC
Zhang et al (33968765)	<i>in-silico</i>	106	NSCLC	Advanced	NOTCH and DDR Pathways	co-occurrence of NOTCH and co-DDR pathway reflect a better immunotherapy efficacy in advanced NSCLC
Sun et al (33778001)	<i>in-silico</i> (TCGA database)	1328	Lung adenocarcinoma	NA	FANCD2 as a principal mediator of ferroptosis	Combination of TMB and FANCD2 expression increased the precision of predicting the therapeutic response
Aiello et al (32983959)	Prospective	45	NSCLC	Advanced	ERCC-1	C8092A polymorphic genotype of ERCC-1 was associated with a longer PFS
Sun et al (32791957)	<i>in-silico</i>	240	NSCLC	NA	ARID1A	ARID1A and ARID1B were associated with better RR and prolonged PFS
Zhao et al (32554069)	Retrospective	346	NSCLC	Advanced	FANCA	FANCA mutated patients had a worst overall survival when treated with immunotherapy
Shim et al (32320754)	Retrospective	198 plus 89	NSCLC	Advanced	HRR pathway	HR deficiency was associated with longer PFS
Chen et al (31539077)	<i>in-silico</i>	2020	NSCLC	NA	TP53, ATM	TP53 and ATM comutation was associated with better OS than a single mutation

						and no mutation among patients with any cancer
Ricciuti et al (32332016)	Prospective	266	NSCLC	Advanced	DDR pathway	DDR-positive patients had a significantly higher ORR, longer PFS and OS