

**Supplementary Table 1. TMB and MSI**

	All (n = 23)	SCC (n = 16)	Non-SCC NMSC (n = 7)
<b>TMB</b>			
Median (range) (mut/Mb)	9.0	9.0 (3.1–91.7)	8.6 (4.7–21.9)
High*	7 (30.4%)	5 (31.3%)	2 (28.6%)
Low*	16 (69.6%)	11 (68.7%)	5 (71.4%)
<b>MSI</b>			
Median (range) (%)	2.7 (0.88–5.36)	2.12 (0.88–5.15)	2.97 (1.85–5.36)
High**	0 (0%)	0 (0%)	0 (0%)
Low**	23 (100%)	16 (100%)	7 (100%)

\* cutoff 10mut/Mb, \*\* cutoff 20%

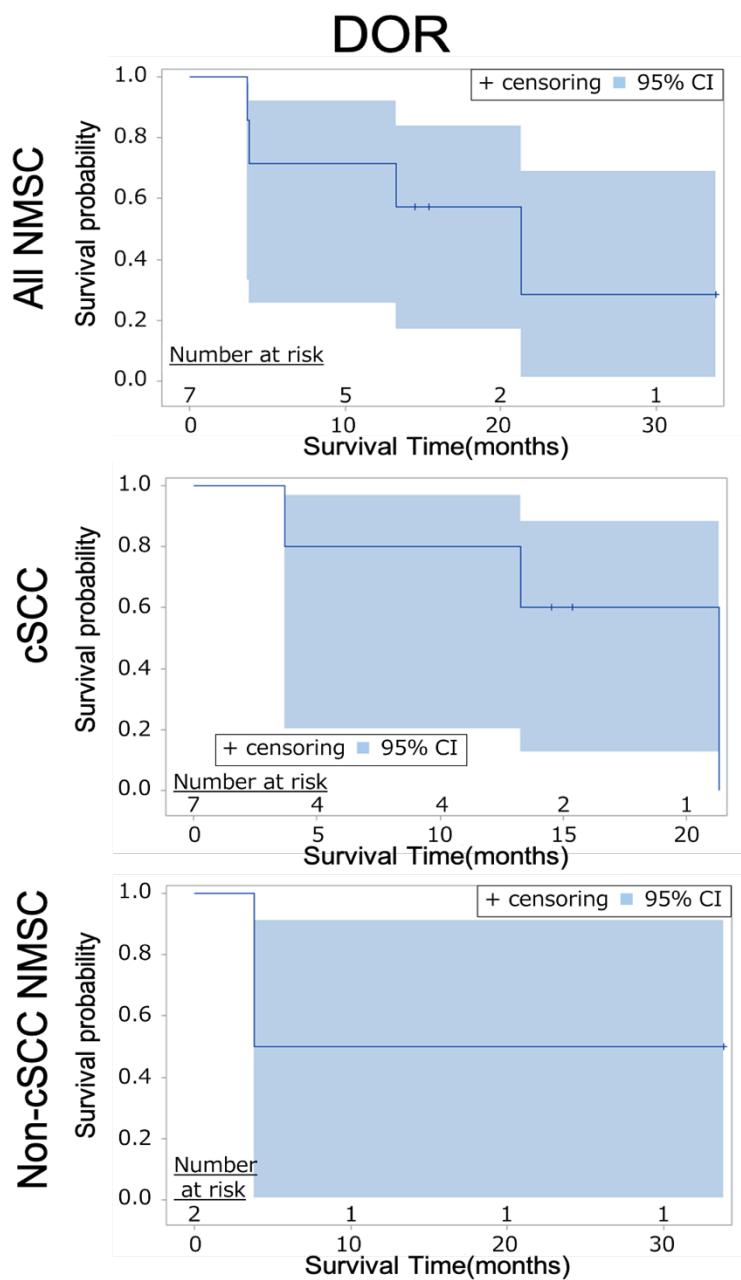
SCC, squamous cell carcinoma; NMSC, non-melanoma skin cancer; TMB, tumour mutational burden; MSI, microsatellite instability

**Supplementary Table 2. Subgroup analysis of response for each factor**

Sub-group	N	Response (%)	Non-response (%)	p-value
<b>SCC</b>				
<b>TMB (mut/Mb)</b>	16			
≥10	5	3 (60.0)	2 (40)	0.2445
<10	11	2 (18.2)	9 (87.5)	
<b>Previous systemic therapy</b>	20			
+	4	1 (25.0)	3 (75.0)	1.0000
-	16	4 (25.0)	12 (75.0)	
<b>Sun exposed areas</b>	20			
Exposed	6	2 (33.3)	4 (66.7)	0.6126
Non-exposed	14	3 (21.4)	11 (78.6)	
<b>Age</b>	20			
70>	10	3 (30.0)	7 (70.0)	1.0000
70≤	10	2 (20.0)	8 (80.0)	
<b>Sex</b>	20			
male	13	3 (23.1)	10 (76.9)	1.0000
female	7	2 (28.6)	5 (71.4)	
<b>Non-SCC NMSC</b>				
<b>TMB (mut/Mb)</b>	7			
≥10	2	0 (0)	2 (100)	0.5238
<10	5	2 (40.0)	3 (60.0)	
<b>Previous systemic therapy</b>	11			
+	3	0 (0.0)	3 (100)	1.0000
-	8	2 (25.0)	6 (75.0)	
<b>Sun exposed areas</b>	20			
Exposed	2	0 (0)	2 (100)	1.0000
Non-exposed	9	2 (22.2)	7 (77.8)	

<b>Age</b>	11			
70>	5	2 (0)	3 (100)	0.1818
70≤	6	0 (33.3)	6 (66.7)	
<b>Sex</b>	11			
male	8	2 (25.0)	6 (75.0)	1.0000
female	3	0 (0)	3 (100)	
<b>Cancer type</b>	31			
SCC	20	5 (25.0)	15 (75.0)	1.0000
Non-SCC	11	2 (18.2))	9 (81.8)	

SCC, squamous cell carcinoma; TMB, tumor mutational burden; NMSC, non-melanoma skin cancer



GOR, duration of response; NMSC, non-melanoma skin cancer; cSCC, cutaneous squamous cell carcinoma

#### Supplementary Figure 1

Kaplan-Meier curves show duration of response among responders (CR/PR) assessed by BICR in all NMSCs, cSCC, and non-cSCC NMSCs. Median DOR was **21.3 months** (95% CI, 3.7–NR) for all NMSCs, **21.3 months** (95% CI, 3.7–NR) for cSCC, and **NR** (95% CI, 3.8–NR) for non-cSCC NMSCs. Tick marks indicate censored observations. DOR was defined as the time from the first documented response to disease progression or death.