Supplementary Tables and Figures

Table S1. Fitted model of lesion size (in mm) from Abrasion-Diseased and Abrasion-Control treatments in the black spot laboratory experiment. We fit a linear mixed effects model with the interaction between day and treatment and a random effect for sea urchin ID (random effect variance: 0.49). Note that the coefficients for both the Day (Abraded-Diseased) and Day (Abraded-Control) are the slope for Day for that treatment , not the difference between treatments. The difference in the Day coefficient between these two treatments was highly significant (coef. 0.092±0.012; $P = 2.35x10^{-13}$).

Predictor	Coefficient	SE	DF	t-value	P-value
Intercept	5.83	0.22	62.78	26.9	<2.00E-16
Abraded-Diseased	-1.55	0.32	68.66	-4.84	7.83E-06
Day (Abraded-Control)	-0.021	0.0075	268.24	-2.75	0.00641
Day (Abraded-Diseased)	0.072	0.0093	267.8	7.70	2.75E-13

Table S2. Fitted model of black spot prevalence from the field study. We fit a generalized linear model with a binomial distribution and a logit link, with julian Days since September 20, urchin density, Diseased/Control (Diseased was the reference level), Distance to transect center (in m) and an interaction between Diseased/Control and Distance. Note that the coefficients for both the Distance (Diseased) and Distance (Control) show the slope for that treatment, not the difference between treatments. The difference between treatments in Distance slopes was not significant (coef: 0.10±0.23; P = 0.66). We initially fit a mixed effects model with Survey_ID as a random effect, the random effect variance was estimated to be 0, so we did not include Survey_ID.

Predictor	**Estimate**	**SE**	**Z**	**P-value**
Intercept (Diseased)	-2.72	0.37	-7.27	3.68E-13
Control	-0.32	0.53	-0.62	0.54
Distance (Diseased)	**-0.37**	**0.13**	**-2.93**	**0.0034**
Distance (Control)	*-0.27*	*0.19*	*-1.37*	*0.17*
Days since Sept 20	-0.0081	0.0034	-2.39	0.017
Urchin density	-0.055	0.019	-2.92	0.0036

Table S3. Fitted model for the wasting experiment. We fit a mixed effects Cox's proportional hazard model with Injury and Diseased-Control treatments as predictors and tank as a random effect (variance: 8.21×10^{-05}); Diseased and Abrasion were the reference levels.

Predictor	**Coef**	**SE**	**Z**	**P**
Control	**-0.0016**	**0.22**	**-0.01**	**0.99**
Uninjured	**-0.49**	**0.27**	**-1.79**	**0.074**
Spine Clipping	**-0.24**	**0.25**	**-0.94**	**0.35**

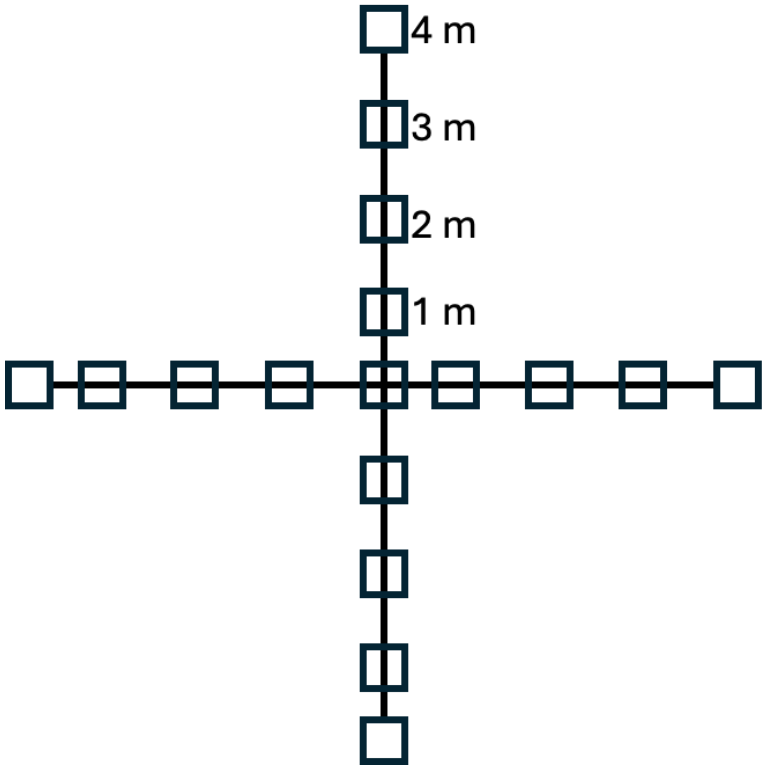

Figure S1. Diagram of field survey plots. The focal urchin (diseased or healthy) was at the cross of the two 4m transects (at a distance of 0m). Each square was 0.5 x 0.5 m quadrat in which urchins were counted and assessed for black spot disease. There were 17 survey plots (9 diseased, 8 control) that were sampled one or more times.

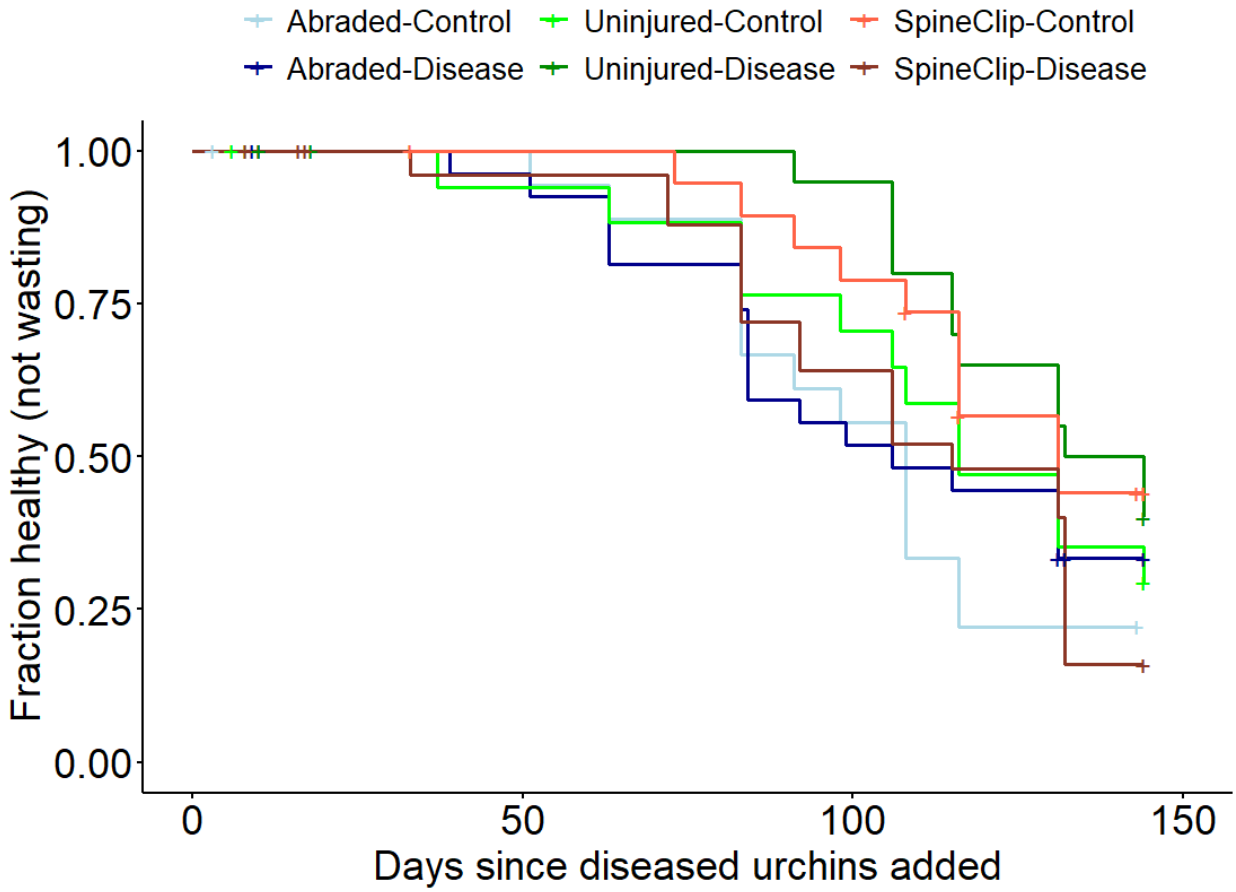

Figure S2. The fraction of urchins remaining healthy (without wasting symptoms) plotted against time, beginning when the diseased urchins were added. Each colored line shows the fraction of urchins remaining healthy in a single injury-disease treatment (2-3 tanks combined) of 20-31 urchins. The "+" symbols indicate individuals that died and were censored on that day, excluding the symbols on days 143-4 which were the end of the experiment. The fitted model is shown in Table S3.

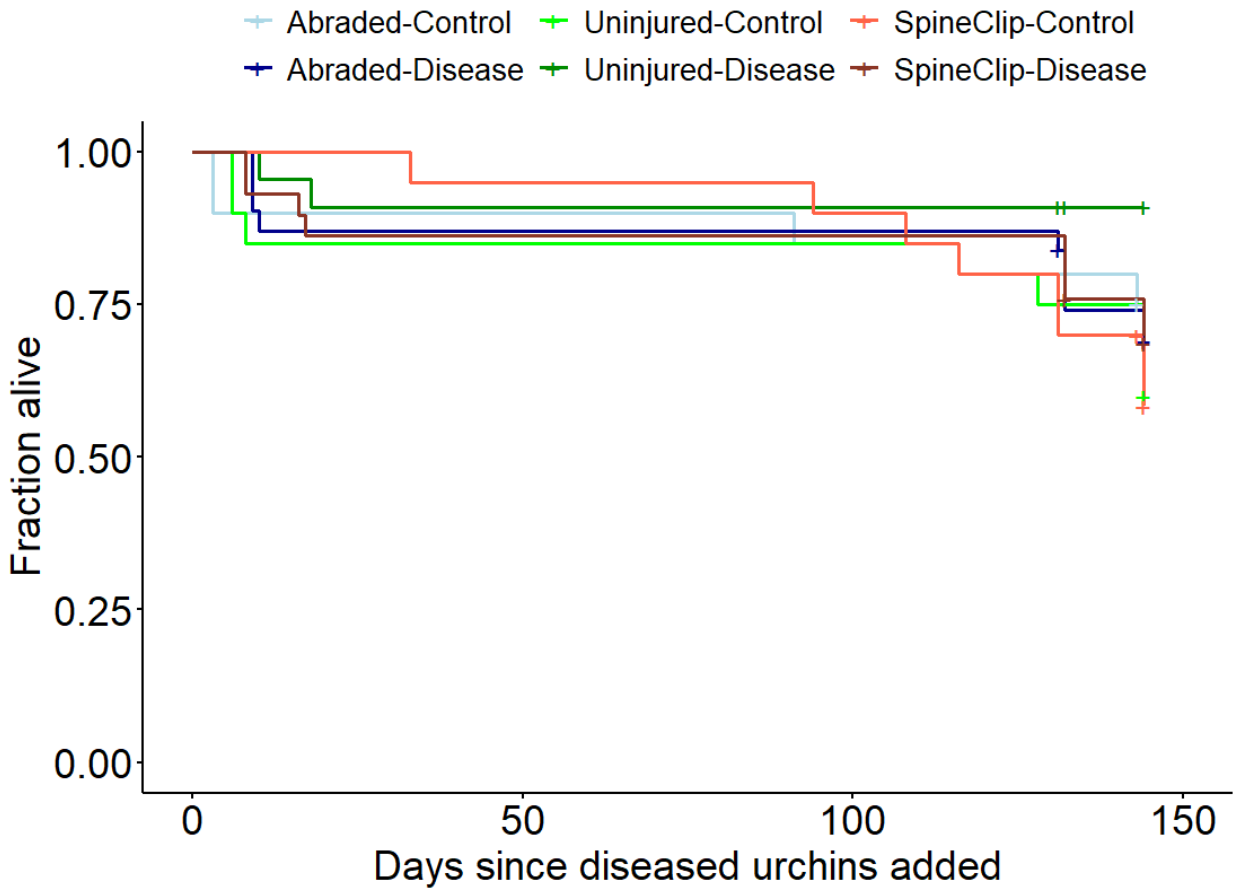

Figure S3. Survival plot of sea urchins in the wasting experiment in each injury-disease treatment plotted against time. Urchins that died in the first 30 days after the start of the experiment were excluded to exclude mortality attributed to acclimation stress. Each colored line shows the fraction of urchins remaining healthy in a single injury-disease treatment (2-3 tanks combined) of 17-26 urchins. There was no significant difference in survival among the 6 treatments (Cox's proportional hazard with tank as a random effect: $\chi^2 = 2.33$, df = 5, P = 0.80), or among disease and control treatments with the 3 injury groups combined(Cox's proportional hazard with tank as a random effect: $\chi^2 = 2.68$, df = 1, P = 0.10; note that the Control group had non-significantly higher mortality).

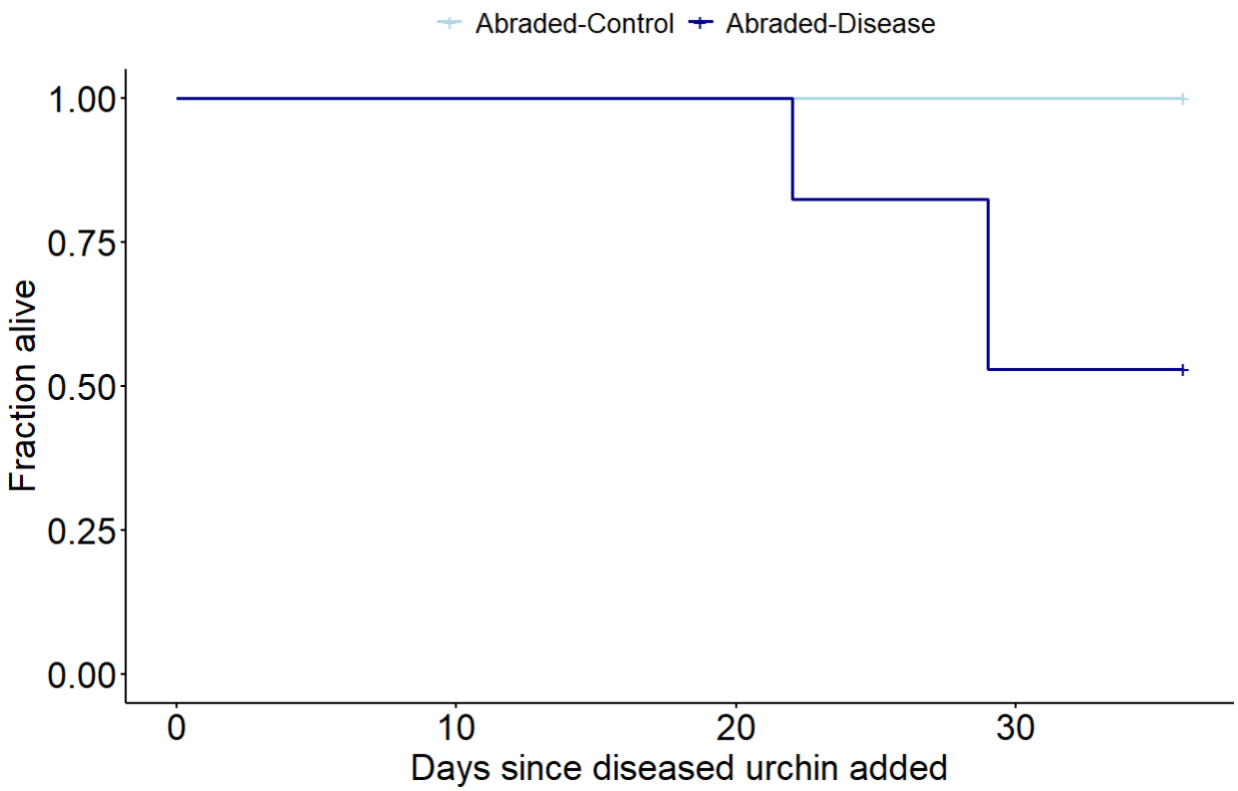

Figure S4. Survival of plot of sea urchins in the black spot experiment in each treatment plotted against time. There were 18 sea urchins in the Abraded-Control group and 17 in the Abraded-Disease group.