Tab. S1 Primer sequences of genes

Genes	Forward primer (5' to 3') (bp)	Reverse primer (5' to 3') (bp)
GAPDH	GGACCTGACCTGCCGTCTAG	GTAGCCCAGGATGCCCTTGA
OGG1	ATTCCAAGGTGTGCGACTGCTG	GATGCGGGCGATGTTGTTGTTG
XRCC1	CAAGGCAGGCGAGAAGACCATC	CACCAGCACCTCCACGAAAGC
ERCC1	CCTACGCCGAATATGCCATCTCAC	CCGAGGGCTCACAATGATGCTG
PCNA	GAAGGTGTTGGAGGCACTCAAGG	GCAGCGGTAGGTGTCGAAGC
PARP1	AGGGCAGCAGCGACTCTCAG	TCCAGCAGGTTGTCAAGCATTTCC
APE1	CTGCCCCACCTCTTGATTGC	GATCATGCTCCTCCTCGCCT
MTH1	CAGATCGTGTTTGAGTTCGTG	AGTACCCGTGGAATTTCTTCTT
p53	GGAGCACTAAGCGAGCACTGTC	GCCTCATTCAGCTCTCGGAACATC
DNA pol-β	AGTCCCTGGTTCTGAACACTCTGG	TTCTGTGAGCATGTCGGTGATTCC

Tab.S2 Target site sequence

Name	Sequence（5'-3'）
XRCC1-gRNA1	TCTCCGGCATGTCAACGTCGTGG
XRCC1-gRNA2	GGCTGCTGCAGGACACGACATGG
XRCC1-gRNA3	ACTCGGTGAGGGACCTGCATGGG

Tab.S3 Experimental primer sequence

Name	Primer	Sequence（5'-3'）
sgRNA#1 (XRCC1)	Forward	CACCGTCTCCGGCATGTCAACGTCG
	Reverse	AAACCGACGTTGACATGCCGGAGAC
sgRNA#2 (XRCC1)	Forward	CACCGGCTGCTGCAGGACACGACA
	Reverse	AAACTGTCGTGTCCTGCAGCAGCC
sgRNA#3 (XRCC1)	Forward	CACCGACTCGGTGAGGGACCTGCAT
	Reverse	AAACATGCAGGTCCCTCACCGAGTC

Fig.S1 Electricity Transfer Conditions results of BEAS-2B cell.

(A-B) 550V, 30ms,1pulse under Visible light and fluorescence respectively;

(C-D) 600V, 30ms,1pulse under Visible light and fluorescence respectively;

(E-F) 650V, 30ms,1pulse under Visible light and fluorescence respectively.

Tab. S4 Clone knockout results

Clone name	Sequence length	Deletion sequence
21# clone	70bp	CGTTGACATGCCGGAGATCCGCCTCCGCCATGTCG
	68bp	TGTCCTGCAGCAGCCAGGACTCGGTGAGGGACCTG
		TTGACATGCCGGAGATCCGCCTCCGCCATGTCGTG
		TCCTGCAGCAGCCAGGACTCGGTGAGGGACCTG
38# clone	70bp	GTTGACATGCCGGAGATCCGCCTCCGCCATGTCGT
	70bp	GTCCTGCAGCAGCCAGGACTCGGTGAGGGACCTGC
		GTTGACATGCCGGAGATCCGCCTCCGCCATGTCGT
		GTCCTGCAGCAGCCAGGACTCGGTGAGGGACCTGC

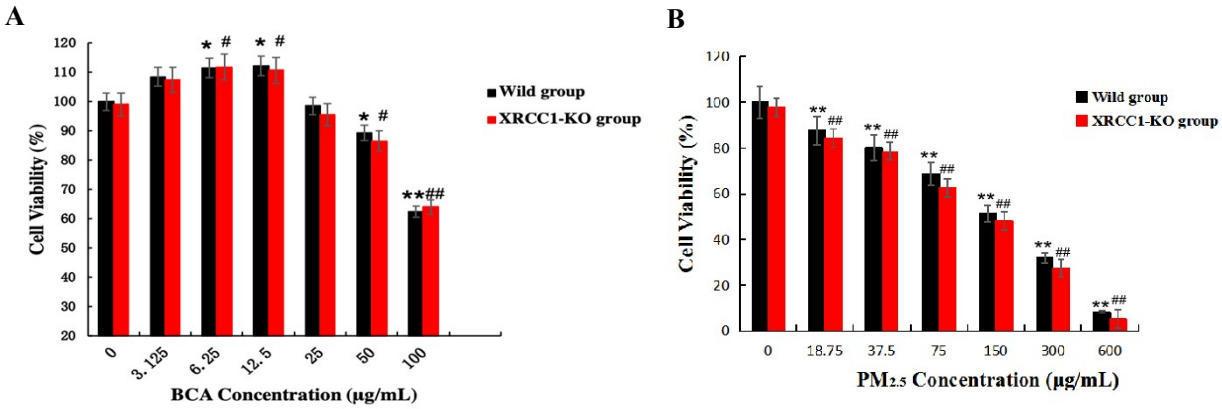

Fig. S2 Preliminary study on the establishment of PM2.5 exposure-BCA protective cell model in vitro. (A) Evaluation of $PM_{2.5}$ -induced cytotoxicity. The concentration gradient of $PM_{2.5}$ was 600 μg/mL, 300 μg/mL, 150 μg/mL, 75 μg/mL, 37.5 μg/mL, 18.75 μg/mL. BEAS-2B and XRCC1-KO cells were exposed for 24 h, and the optimal concentration was determined by CCK-8 method. The IC_{50} values of $PM_{2.5}$ were 152.47 μg/mL in WT group and 147.50 μg/mL in KO group. For convenience, $PM_{2.5}$ damage model was constructed with 150 μg/mL as the concentration of $PM_{2.5}$. **(B)** Evaluatio of BCA cytotoxicity. The concentration gradient of BCA was 100 μg/mL、50 μg/mL、25 μg/mL、12.5 μg/mL、6.25 μg/mL、3.125 μg/mL. BEAS-2B and XRCC1-KO cells were exposed for 24 h, and the optimal concentration was determined by CCK-8 method. The results indicated that the safe dose range of BCA was 0-50 μg/mL, which were used for the subsequent in vitro model construction.