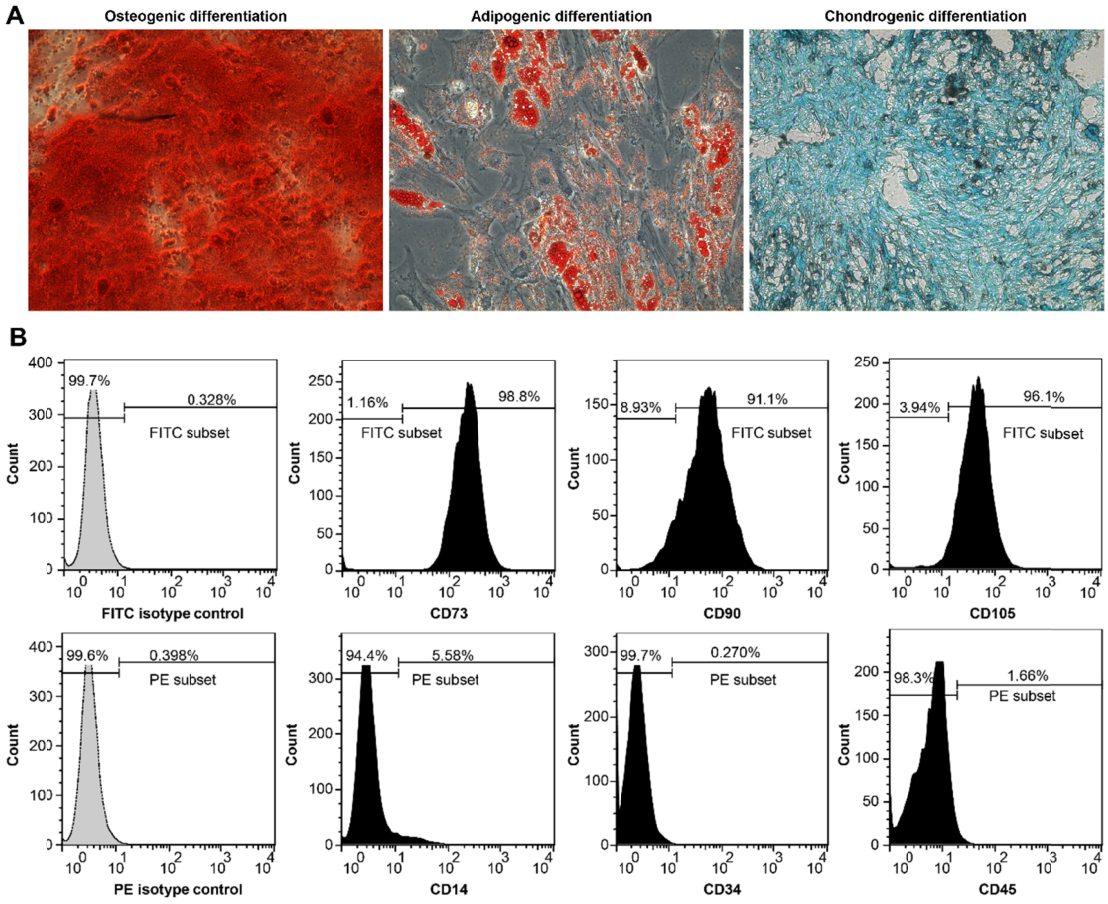

Figure S1. Characterize BMMSCs isolated from healthy donors' bone marrow

(a) The potential of adipogenic, osteogenic, and cartilage differentiation of BMMSCs was verified. (b) Expression of CD73, CD90, and CD105 and lack of CD14, CD34, and CD45 were assessed by flow cytometry.

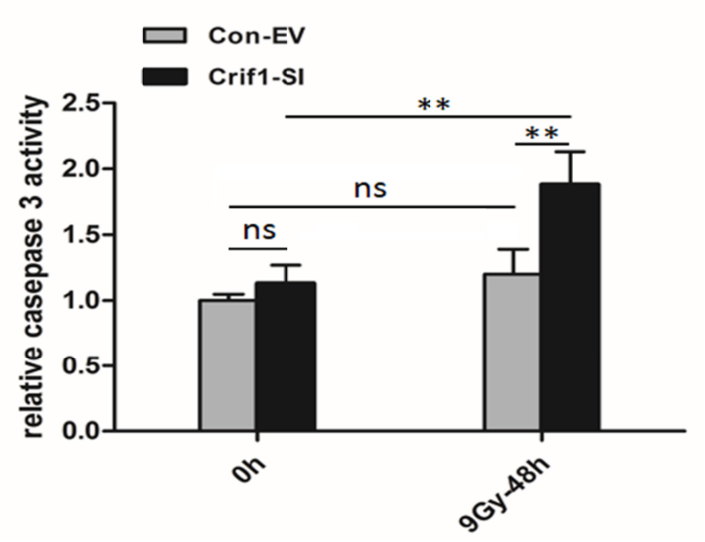

Figure S2. The caspase 3 activity of *Crif1*- deficient BMMSCs (Crif1-SI) and control cells (Con-EV) at 48 h after irradiation was examined. BMMSCs transfected with Crif1 shRNA are referred as Crif1-SI, and BMMSCs transfected with empty control vectors are referred as Con-EV. The experiments were performed in triplicate in the same cell line, and representative images are shown. Data represent the mean ± SEM. * $p < 0.05$, ** $p < 0.01$, ns (not significant), compared to the control

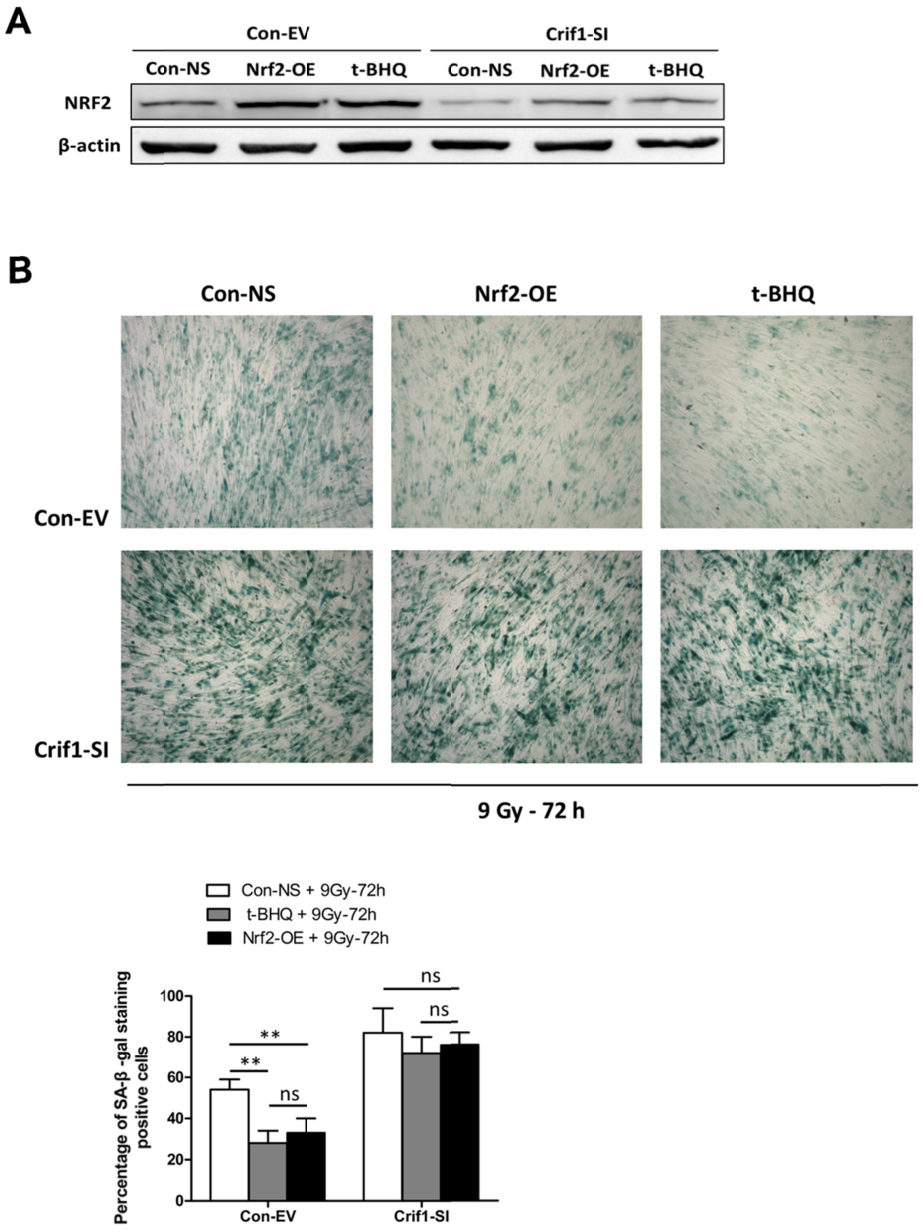

Figure S3. The level of cell senescence was examined when activating NRF2 through *tert*-butylhydroquinone (t-BHQ) or *Nrf2* overexpression vectors in BMMSCs before irradiation. (a) Western blot results of NRF2 in *Crif1*-deficient BMMSCs (Crif1-SI) and control cells (Con-EV) treated with 100 mmol/L t-BHQ for 12 h, or 5 μg *Nrf2* overexpression vectors (Nrf2-OE) or nonspecific control (Con-NS) for 48 h. (b)Senescence was examined in *Crif1*-deficient BMMSCs (Crif1-SI) and control cells (Con-EV) 72 h after 9 Gy irradiation using SA-β-Gal staining (up panel) and

quantification (down panel). The cells were treated with 100 mmol/L t-BHQ for 12 h or 5 μg *Nrf2* overexpression vectors (Nrf2-OE) or non-specificity control (Con-NS) for 48 h before irradiation. The experiments were performed in triplicate in the same cell line, and representative images are shown. Data represent the mean ± SEM. * $p < 0.05$, ** $p < 0.01$, ns(not significant), compared to the control

Table S1. Interference sequences for sh*Crif1*

	sh*Crif1*
Forward	GATCCAAGAACGCGAATGGTACCCGATTCAAGAGATCGGGTAC-CATTCGCGTTCTTTTTTTG
Reverse	AATTCAAAAAAAGAACGCGAATGGTACCCGATCTCTTGAATCG-GGTACCATTCGCGTTCTTG

Table S2. Sequences of amplification primers used for *Crif1* overexpression

	Crif1 overexpression
Forward	ATAGGATCCACCATGGCGGCGTCCGTGCGA
Reverse	CGCCTCGAGCCTCAGGAGCTGGGTGCCC

Table S3. Sequences of forward and reverse primers used for qPCR

Gene	Forward	Reverse
Crif1	GGCCCAGGCTGACAAGGAG-AG	GCGCCTCCTTCTTCCGTT-TCTGT
Nrf2	ACACGGTCCACAGCTCATC-	AGCCACTTTATTCTTACC-CCTCCTA
Ho1	AAGACTGCGTTCCTGCTCA-AC	AAAGCCCTACAGCAACTG-TCG
Gclc	GCAAACCATCCTGACTACAA-GCAAG	GCTGGCTGAGAGGCATG-GTAC
Ggt1	GGGGCACTGCTCACCTGTCT-GTC	CCCCAGCAGCTCCCACC-AC
β-actin	ACCCCGTGCTGCTGA CCGAG	TCCCGGCCAGCCAGGTC-CA