

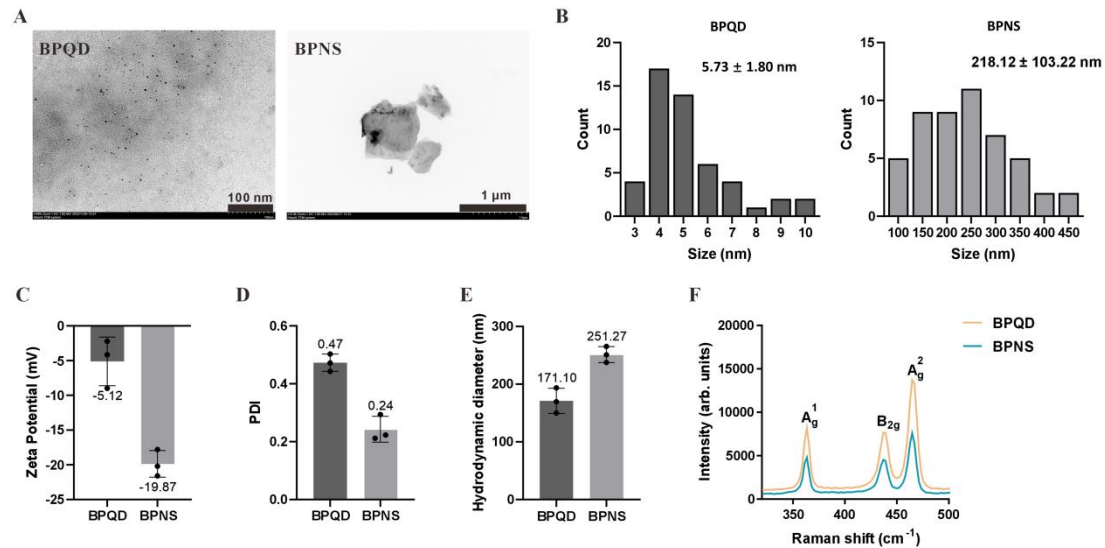


Fig S1. The Characterization of BPNM. (A) The transmission electron microscopy characterization of BPNM. (B) The statistical histogram of BPNM, BPQD particle size range is 5.73 ± 1.80 nm, BPNS particle size range is 218.12 ± 103.22 nm. (C-E) The zeta potential (n=3), polydispersity index (n=3), and hydrodynamic size of BPNM in complete culture medium (n=3). (F) Raman spectra of BPNM.

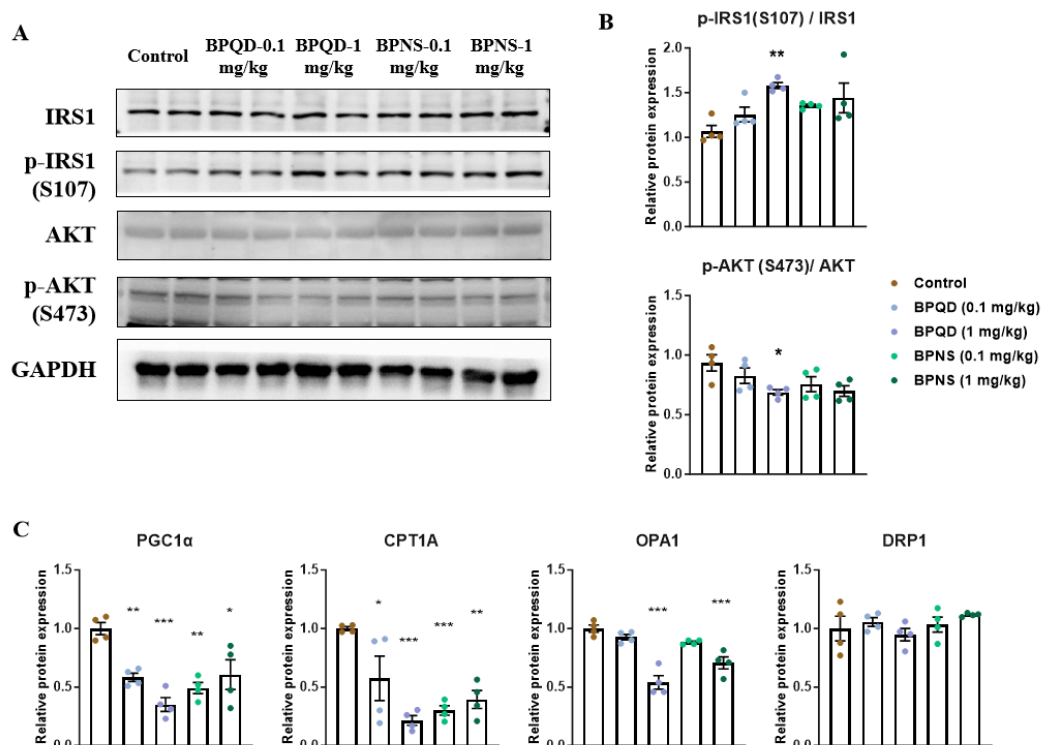


Fig S2. (A-B) WB protein bands and quantitative analysis of liver insulin pathway-related proteins (n = 4). (C) Quantitative analysis of the WB protein bands in Figure 6E (n = 4). * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$ compared with the control group.

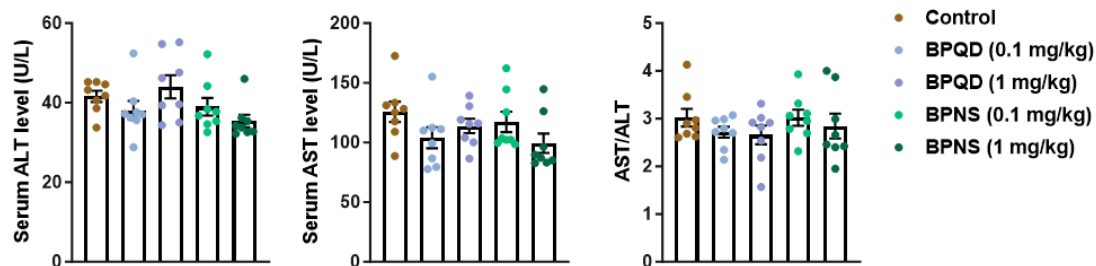


Fig S3. Exposure to black phosphorus nanomaterials does not affect the enzymatic activities of liver function-related ALT and AST ($n \geq 7$).

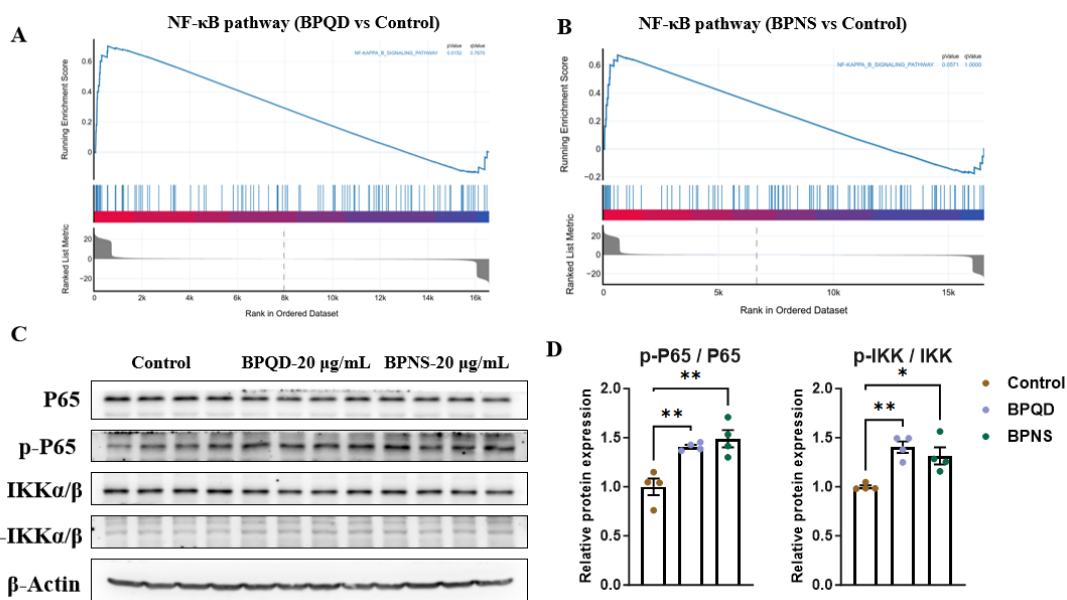


Fig S4. (A-B) Enrichment analysis of the NF- κ B signaling pathway in hepatic transcriptome data. (C-D) WB analysis of key protein expression in the NF- κ B pathway ($n = 4$). * $P < 0.05$, and ** $P < 0.01$ compared with the control group.

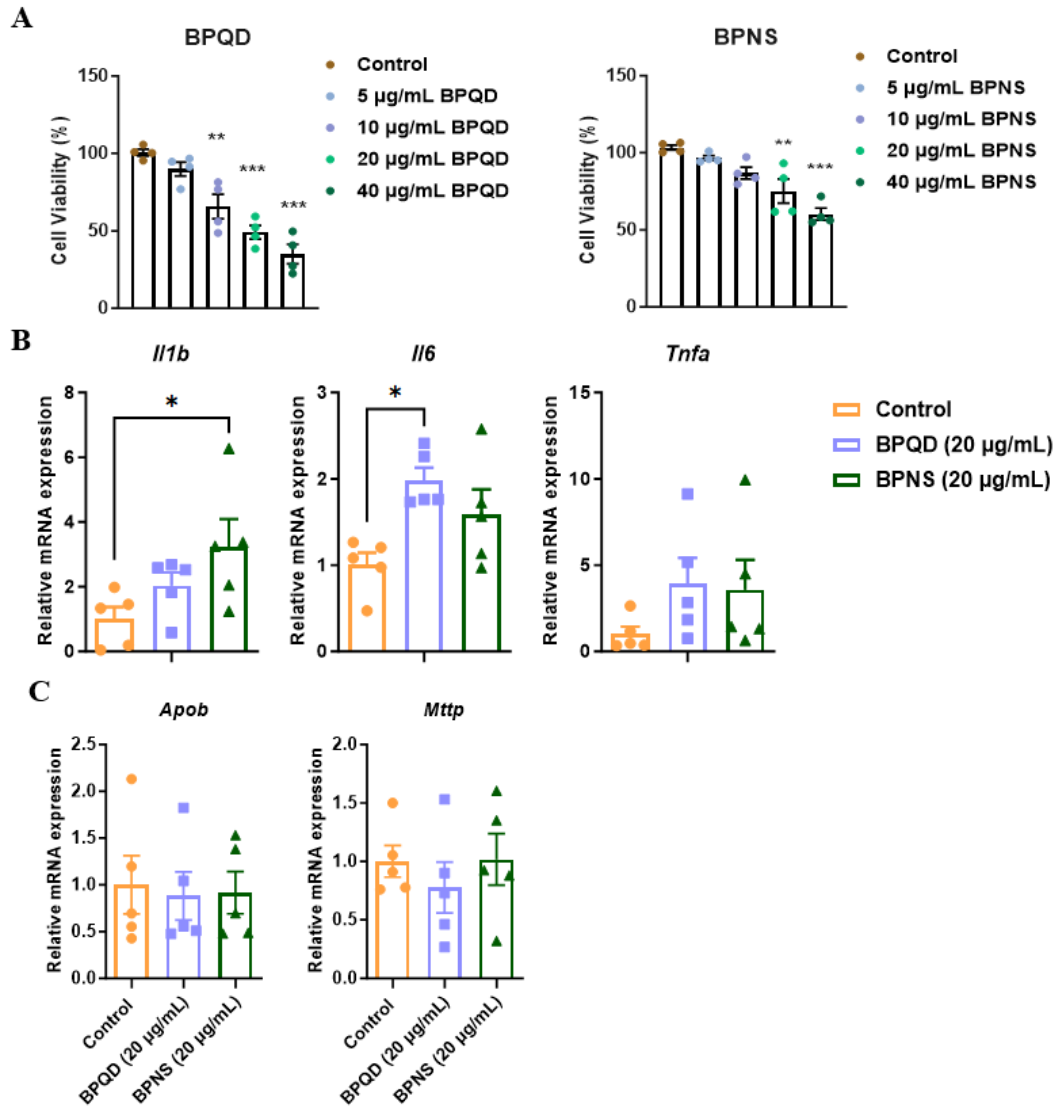


Fig S5. (A) AML12 cells were treated with BPNM at different concentrations for 24 h, and cell viability was assessed using the MTT assay ($n = 4$). (B) The transcriptional levels of inflammatory factors in AML12 cells ($n = 5$). (C) The transcriptional levels of *Apob* and *Mttp* in AML12 cells ($n = 5$). $*P < 0.05$, $**P < 0.01$, and $***P < 0.001$ compared with the control group.

27 **Table S1. List of oligos used for qPCR assays**

Gene	Oligo Forward(5'-3')	Oligo Reverse(5'-3')
<i>mt-Co1</i>	GCCCCAGATATAGCATTCCC	GTTTCATCCTGTTCTGCTCC
<i>Ndufv1</i>	GTGGAGGAAGAGATGTCTGTGC	ATGAGCCACCAGGAATCACAGC
<i>Actb</i>	CATTGCTGACAGGATGCAGAAGG	TGCTGGAAGGTGGACAGTGAGG
<i>Il1b</i>	TGGACCTTCCAGGATGAGGACA	GTTTCATCTCGGAGCCTGTAGTG
<i>Il6</i>	TACCACTTCACAAGTCGGAGGC	CTGCAAGTGCATCATCGTTGTTC
<i>Tnfa</i>	GGTGCCTATGTCTCAGCCTCTT	GCCATAGAACTGATGAGAGGGAG
<i>Apob</i>	GCATGAGTATGCCAATGGTCTCC	CTGGTTGCCATCTGAAGCCATG
<i>Mttp</i>	CCAGGAAAGGTTCTCTATGCC	GACTCTCTGATGTCGTTGCTTGC

28

29