Design and Development of a Polymeric-based Curcumin Nanoparticle for Drug Delivery enhancement and Potential Incorporation into Nerve Conduits

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Table S1. Optimization of the encapsulation efficiency (EE%) with different molar ratios of TA and PVP to curcumin. A plateau in EE% was achieved at molar ratio 1: 2: 0.021 (Cur: TA: PVP).

Molar ratio of formulation (Cur: TA:PVP)	Water (mL)	Ethanol 95% (mL)	Hydrodynamic Size Average (nm)	Zeta Potential (mV)	Polydispersity Index (PDI)	Encapsulation Efficiency (%)
1: 1: 0.01	14	1	150	-23	0.5	36
1: 1.3: 0.014	14	1	148	-35	0.4	35
1: 1.7: 0.018	14	1	169	-38	0.4	52
1: 2: 0.021	14	1	207	-33	0.5	66
1: 2.3: 0.025	14	1	230	-40	0.5	68
1: 2.7: 0.028	14	1	208	-38	0.5	68
1: 3: 0.032	14	1	229	-26	0.6	66

Table S2. FTIR spectra of Cur, CurNP, and TA-PVP.

Literature characteristic absorption band range [1-5]	**Assignment of absorption bands**	**Cur (cm^{-1}) [3,4}**	**CurNP (cm^{-1})**	**TA-PVP (cm^{-1}) [1,2,5]**
3550 – 3200	O-H stretch	3508	3650	-
1730 – 1705	C=O stretch	-	1718	1718
1670 – 1600	C=C stretch	1628	1628	1655
1350 – 1480	benzene ring stretches	1597	1597	-
1465 – 1380	C-H bend	1428	1428	-
1452 – 1420	Aromatic C-C bend	-	1450	1450
1310 – 1250	Aromatic C-O stretch	1278	1278	-
1300 – 1100	C-O stretch	-	1197	1197
1050 – 1020	C-O-C stretch	1024	1030	1030
800 – 646	C=C benzene ring distortion	-	760	760
570 – 650	N-C=O bend	-	647	647



Figure S1. Image of curcumin dispersed in water in its free versus encapsulated form. Free curcumin exhibits significant precipitation in water while CurNPs have notably increased colloidal stability.

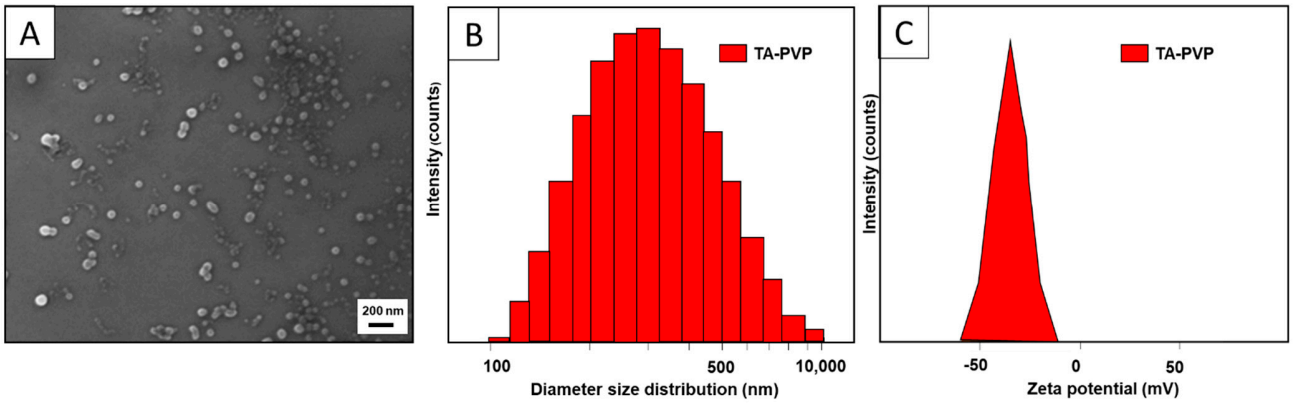


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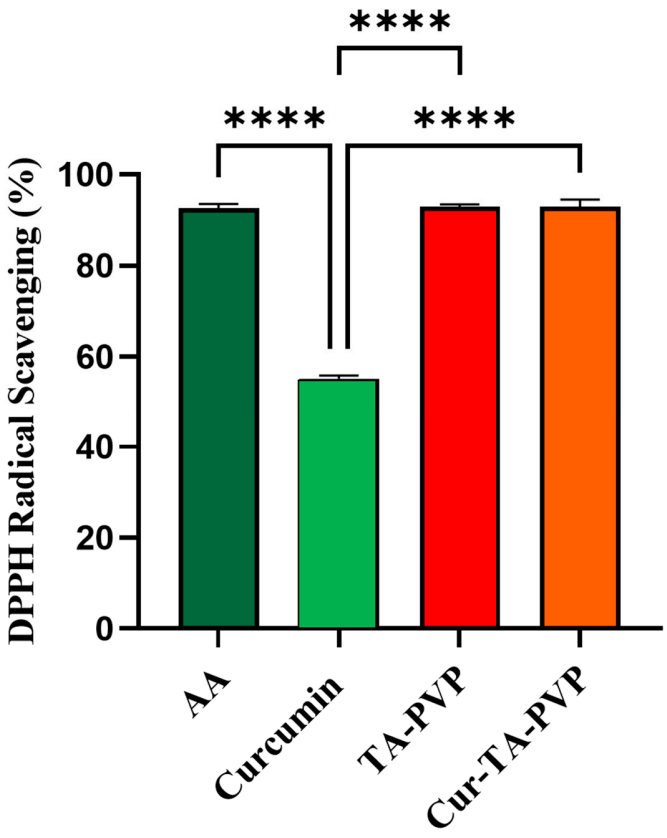


Figure S3. DPPH radical scavenging activity of treatments. Treatments were prepared to a final concentration corresponding to 5 μM of curcumin, and 5 μM of ascorbic acid (positive control). Data are represented as the mean ± standard deviation (n=3). Statistical analysis was performed using one-way ANOVA (****$p<0.0001$).

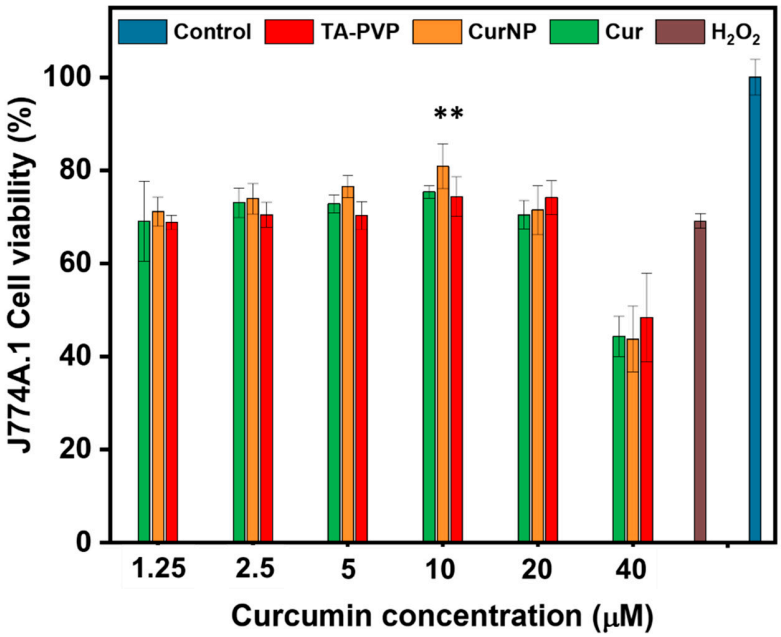


Figure S4. H_2O_2-induced oxidative stress and cell rescue by treatments on J774A.1 murine macrophages. Cells were pre-treated with CurNPs, TA-PVP, or free curcumin for 6 hours, and then treated with fresh media containing 100 μM H_2O_2 for 18 hours. Cells were then treated with 10% resazurin for 2 hours, and fluorescence was read at an ex/em of 560/ 590 nm. There appears to be some protection against oxidative stress when cells are treated with 10 μM of CurNPs. Data are represented as mean ± standard deviation (n=3). A one-way ANOVA was performed to determine any statistically significant differences compared to the H_2O_2 control (**$p<0.01$).

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