Silver-Coated Zero-Valent Iron Nanoparticles Enhance Cancer Therapy in Mice Through Lysosome-Dependent Dual Programed Cell Death Pathways: Triggering Simultaneous Apoptosis and Autophagy Only in Cancerous Cells

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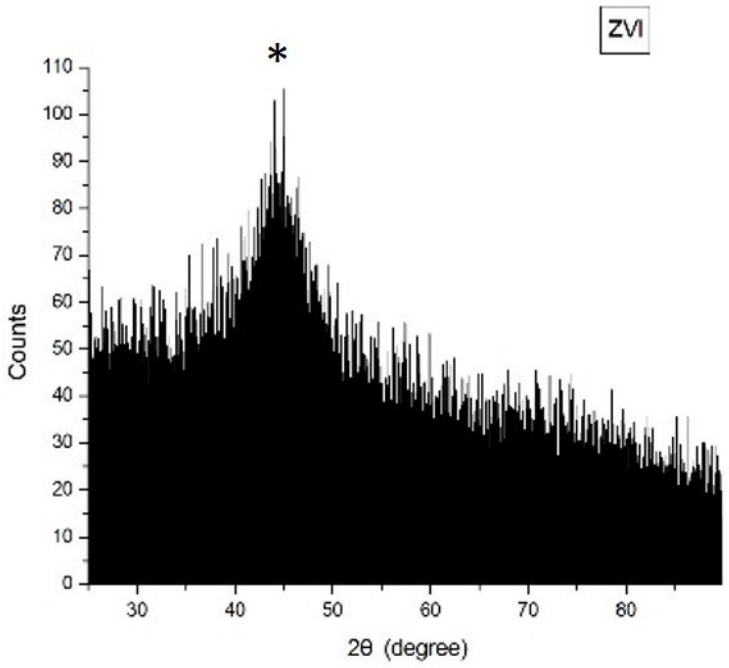
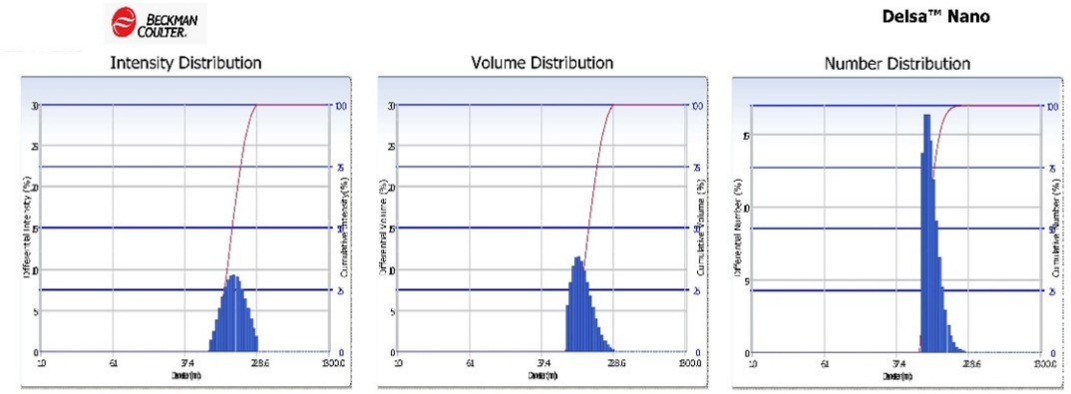
Results



Supplementary Fig. 1. XRD characterization of ZVI NPs. The XRD profile of ZVI NPs showed a major feature peak at 2 θ = 45° points (*).



Cumulants Results

Diameter	(d)	: 124.1	(nm)
Polydispersity Index	(P.I.)	: 0.082	
Diffusion Const.	(D)	: 3.901e-008	(cm²/sec)
Residual		: 4.177e-003	(O.K)

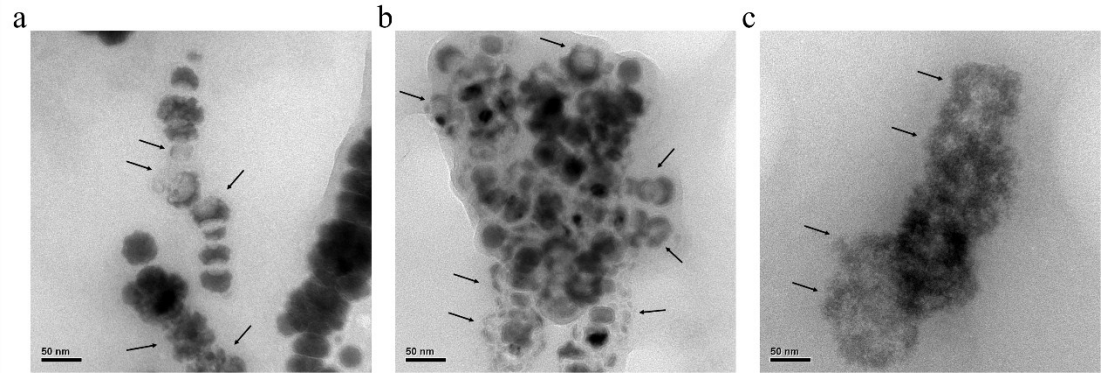
Measurement Condition

Temperature	: 24.4	(°C)
Diluent Name	: WATER	
Refractive Index	: 1.3329	
Viscosity	: 0.9001	(cP)
Scattering Intensity	: 13055	(cps)

Distribution Results (Contin)

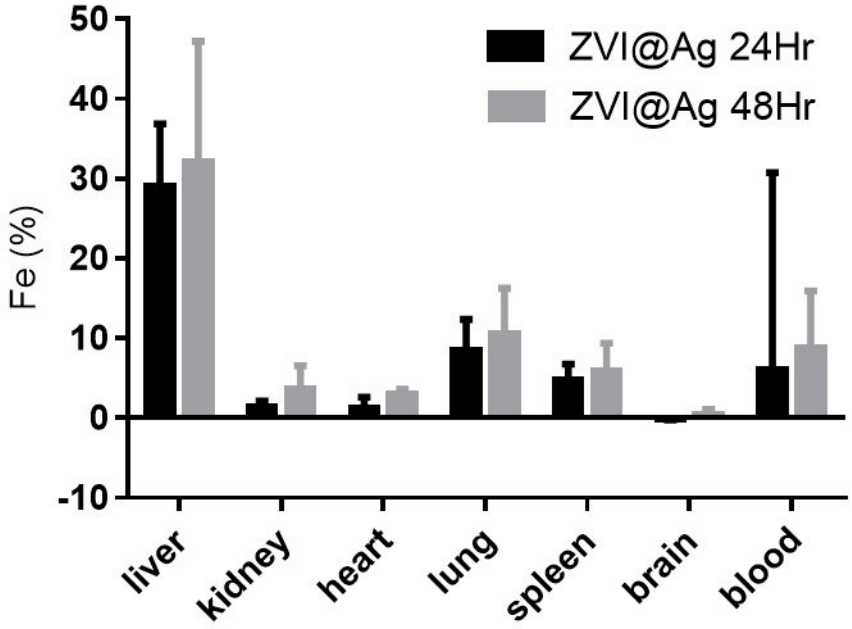
Intensity Distribution			Volume Distribution			Number Distribution		
Peak	Diameter (nm)	Std. Dev.	Peak	Diameter (nm)	Std. Dev.	Peak	Diameter (nm)	Std. Dev.
1	133.4	36.9	1	107.6	28.3	1	92.4	19.3
2	0.0	0.0	2	0.0	0.0	2	0.0	0.0
3	0.0	0.0	3	0.0	0.0	3	0.0	0.0
4	0.0	0.0	4	0.0	0.0	4	0.0	0.0
5	0.0	0.0	5	0.0	0.0	5	0.0	0.0
Average	133.4	36.9	Average	107.6	28.3	Average	92.4	19.3

Supplementary Fig. 2. The hydrodynamic size distribution of ZVI@Ag NPs. The hydrodynamic sizes of the ZVI@Ag NPs showed a single peak at 133.4±36.9 nm for intensity distribution, 107.6±28.3 nm for volume distribution, and 92.4±19.3 nm for number distribution. The polydispersity index was 0.082, suggesting the mono-dispersive nature of the NPs.



Supplementary Fig. 3. Intracellular structural transformation of ZVI@Ag NPs at different time points after exposed to OEC-M1 cancer cell. The structure of ZVI@Ag NPs showed a time-dependent loss of integrity (black arrows) and hollowing of the

internal ZVI component with degradation of the Ag shell into finite electron dense dots. (a) 1 h after NPs exposure. (b) 8 h after NPs exposure. (c) 24 h after NPs exposure. Scale bar = 50 nm



Supplementary Fig. 4. Biodistribution of the ZVI@Ag NPs at 24 h and 48 h after single dose intravenous injection (40mg/kg) into NOD/SCID mice. (n = 3 in each group). The results showed that NPs mainly distributed in the reticuloendothelial system in both time points and there are still about 9% of the NPs remained in the circulation.

NP Type	Size (nm)	Fe atomic (%)	O atomic (%)	O/Fe	IC_{50} in OEC-M1 (µg/mL)
ZVI	71.98 ± 18.82	73.70	26.30	0.357	3.58
ZVI@Ag	84.86 ± 17.35	87.38	11.34	0.130	1.01
ZVI@Ag (oxidized)	90.28 ± 25.71	43.90	3572	0.814	20.45
ZVI@Au	95.92 ± 8.55	73.10	18.20	0.249	6.94
Amor-ZVI	15.34 ± 1.39	76.13	23.87	0.314	3.16
ZVI@Fe_3O_4	18.76 ± 2.11	54.30	45.70	0.842	> 50

Supplementary Table 1. Size, elemental composition, oxygen-to-iron ratio (O/Fe), and IC_{50} of the ZVI NPs.