

**Table S1: Enhancement of the oncolytic activity** of magnetic viral complexes relative to naked virus and the influence of magnetic field and FCS. Data are graphically presented in figure 9C.

Sample	magnetic field		no magnetic field	
	7.5 % FCS	50 % FCS	7.5 % FCS	50 % FCS
	<i>IC<sub>50</sub><sup>virus</sup> / IC<sub>50</sub><sup>MNP-VP</sup> in McA cells</i>			
VSV	1	1	1	1
PEI-Mag2-VSV	2.5	7.9	1.6	6.0
SO-Mag6-11.5-VSV	1.6	7.0	1.8	5.7
	<i>IC<sub>50</sub><sup>virus</sup> / IC<sub>50</sub><sup>MNP-VP</sup> in RDB cells</i>			
Ad	1	1	1	1
PEI-Mag2-Ad	11.8	27.8	1.2	3.8
SO-Mag6-11.5-Ad	27.5	43.6	2.8	4.5

**Table S2:  $r_2$  and  $r_2^*$  relaxivities of the MNP assemblies.** The table shows the  $r_2$  and  $r_2^*$  relaxivity data of the free MNPs and all magnetic viral complex assemblies in liver-mimicking agarose phantoms, and the ratios of the nanoassembly relaxivity normalized to the relaxivity of free MNPs ( $r_2/r_2(\text{MNP})$  and  $r_2^*/r_2^*(\text{MNP})$ , respectively, green) and the  $r_2^*/r_2$  ratios (red). All measurements were performed using a clinical 3 T MRI system from Philips.

Sample	PEI-Mag2					SO-Mag6-11.5				
	$r_2$	ratio	$r_2^*$	ratio	$r_2^*/r_2$	$r_2$	ratio	$r_2^*$	ratio	$r_2^*/r_2$
	[mM <sup>-1</sup> Fe s <sup>-1</sup> ]	[%]	[mM <sup>-1</sup> Fe s <sup>-1</sup> ]	[%]		[mM <sup>-1</sup> Fe s <sup>-1</sup> ]	[%]	[mM <sup>-1</sup> Fe s <sup>-1</sup> ]	[%]	
MNP	238 ± 11	100	476 ± 58	100	2.0	274 ± 10	100	857 ± 12	100	3.1
MNP in McA	55 ± 5 (4.5 pg Fe/cell)	23	584 ± 17 (4.5 pg Fe/cell)	123	10.6	37 ± 3 (5.4 pg Fe/cell)	14	788 ± 12 (5.4 pg Fe/cell)	92	21.3
MNP-VSV in McA	23 ± 3 (3.2 pg Fe/cell)	10	518 ± 8 (3.2 pg Fe/cell)	109	22.5	57 ± 2 (2.5 pg Fe/cell)	21	1494 ± 42 (2.5 pg Fe/cell)	174	26.2
MNP in RDB	19 ± 1 (17.3 pg Fe/cell)	8	560 ± 23 (17.3 pg Fe/cell)	118	29.5	38 ± 2 (15.9 pg Fe/cell)	14	1203 ± 118 (15.9 pg Fe/cell)	140	31.7
MNP-Ad	124 ± 13	52	542 ± 19	114	4.4	18 ± 2	7	1004 ± 32	117	55.8
MNP-Ad in RDB	21 ± 3 (6.7 pg Fe/cell)	9	757 ± 22 (6.7 pg Fe/cell)	159	36.0	8 ± 6 (7.4 pg Fe/cell)	3	412 ± 26 (7.4 pg Fe/cell)	48	51.5

**Figure S1:  $r_2$  and  $r_2^*$  relaxivity plots.** The panels **E** and **F** are overlays of the panels in figure 8 to demonstrate the comparability of the data acquired on clinical 1.5 T and 3 T systems. Panel **E** is the overlay of the panels **A** and **C**, the transverse relaxation and panel **F** is the overlay of the spin-spin relaxation in panels **B** and **D** of figure 8. Free MNPs are plotted in black, cell internalized MNPs in red, and free complexes in blue and cell internalized complexes in purple.

