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Author Correction: pH-sensitive micelles for the intracellular co-delivery of curcumin and Pluronic L61 unimers for synergistic reversal effect of multidrug resistance

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This Article contains errors.

The image used for Figure 2 is incorrect. The correct Figure 2 and its accompanying legend appear below.

Consequently, the particle size and zeta potential reported in Table 1 is incorrect. A corrected version of Table 1 appears below.

In Figure 8, the panels for 8A and 8B are incorrect. The correct Figure 8 and its accompanying legend appear below.

In Figure 15, the blots for beta-actin and P-gp were inadvertently duplicated from Figure 12, which affected the quantification. A corrected version of Figure 15 and its accompanying legend appear below.

In Figure 18, the blots provided are incorrect. A corrected version of Figure 18 is presented below, and a quantitative analysis of P-gp and Cle-PARP expression has been added. The Figure legend has been revised accordingly.

Consequently, the text in the Results and Discussion,

“As shown in Fig. 18, P-gp expression was decreased in MCF-7/ADR cells, with the exception of the cells treated with the Saline, DOX solution and F-pHSM/DOX formulation. Both the F-pHSM-L61/CUR and F-pHSM-L61/CUR/DOX could significantly reduce P-gp level observed in the tumor tissue due to the synergistic P-gp expression inhibition of L61 and CUR compared with the tumor treated with the individual formulations. To confirm whether the enhanced anti-tumor effect of F-pHSM-L61/CUR/DOX in vivo was related to the pro-apoptosis activity, apoptosis related protein Cle-PARP was measured by western blotting. As shown in Fig. 18, compared with that of control groups (saline, F-pHSM-L61/CUR, F-pHSM-L61 and F-pHSM/CUR), the bands in groups administrated with free drugs, F-pHSM/CUR/DOX, F-pHSM-L61/DOX and F-pHSM-L61/CUR/DOX were more evident.

should read:

“As shown in Fig. 18, all treatments conferred a reduction in P-gp level. Among the tested groups, F-pHSM-L61/CUR/DOX significantly reduced the P-gp level observed in the tumor tissue, which might be due to the synergistic P-gp expression inhibition effect of L61 and CUR. Additionally, F-pHSM-L61/CUR showed a comparable inhibition effect as F-pHSM-L61/CUR/DOX, which is consistent with there being a strong synergistic action

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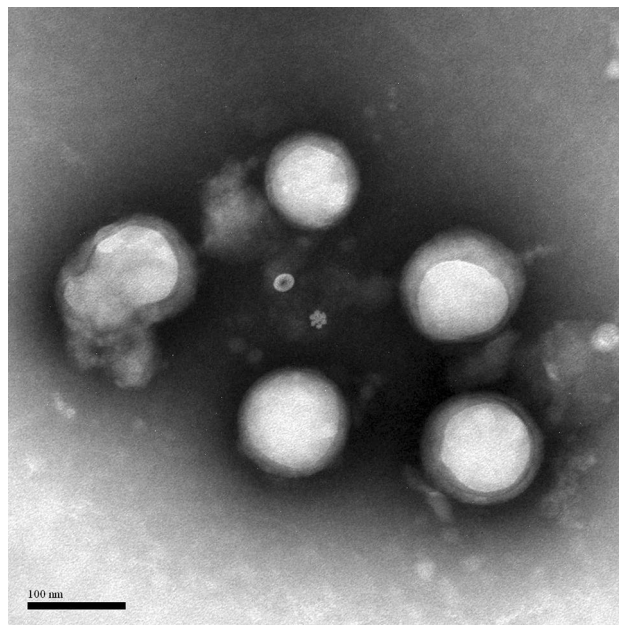


Figure 2. TEM images of F-pHSM-L61/CUR/DOX.

Formulations	Particle size (nm)	ξ potential (mv)	PDI	DOX	
				DL%	EE%
F-pHSM-L61/CUR/DOX	221.3 \pm 5.3	-6.18 \pm 0.21	0.193 \pm 0.028	4.03 \pm 0.12	80.6 \pm 1.22
F-pHSM/CUR/DOX	218.7 \pm 4.8	-6.23 \pm 0.17	0.152 \pm 0.022	4.05 \pm 0.16	81.1 \pm 1.56
F-pHSM-L61/DOX	193.5 \pm 3.4	-5.72 \pm 0.23	0.129 \pm 0.031	4.49 \pm 0.12	90.0 \pm 1.17
F-pHSM/DOX	179.1 \pm 3.1	-5.98 \pm 0.19	0.134 \pm 0.015	4.57 \pm 0.12	91.4 \pm 1.21

Table 1. Physicochemical characterization of DOX-loaded polymeric mixed micelles (n = 3).

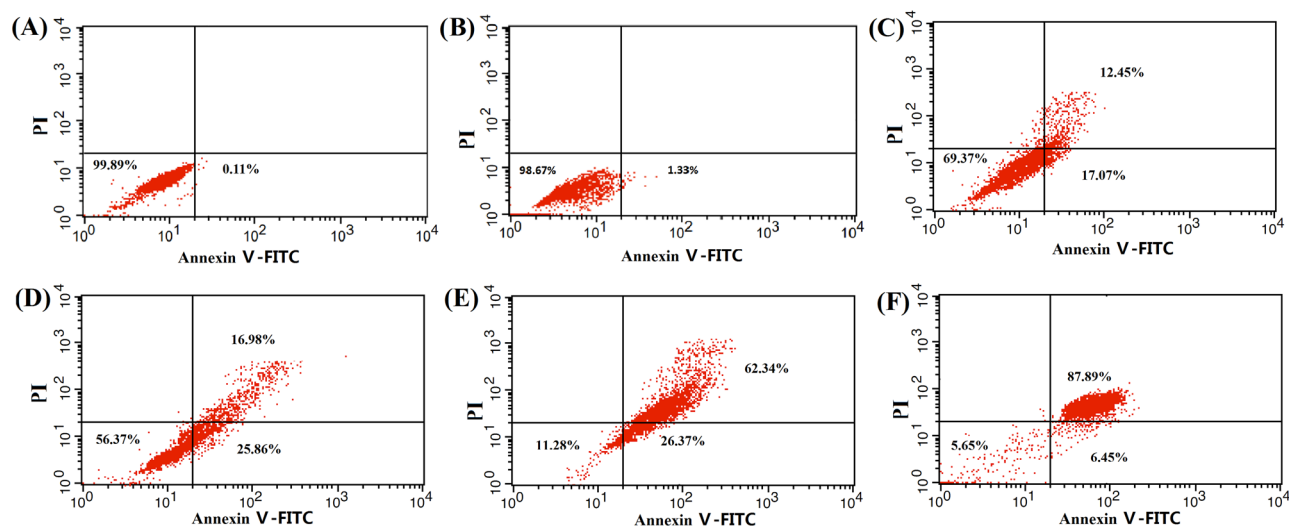


Figure 8. Synergistic effect of micelle-encapsulated Pluronic L61 unimers and curcumin on apoptosis of MCF-7/ADR cells treated with saline (A), F-pHSM (B), F-pHSM/DOX (C), F-pHSM/CUR/DOX (D), F-pHSM-L61/DOX (E) and F-pHSM-L61/CUR/DOX (F).

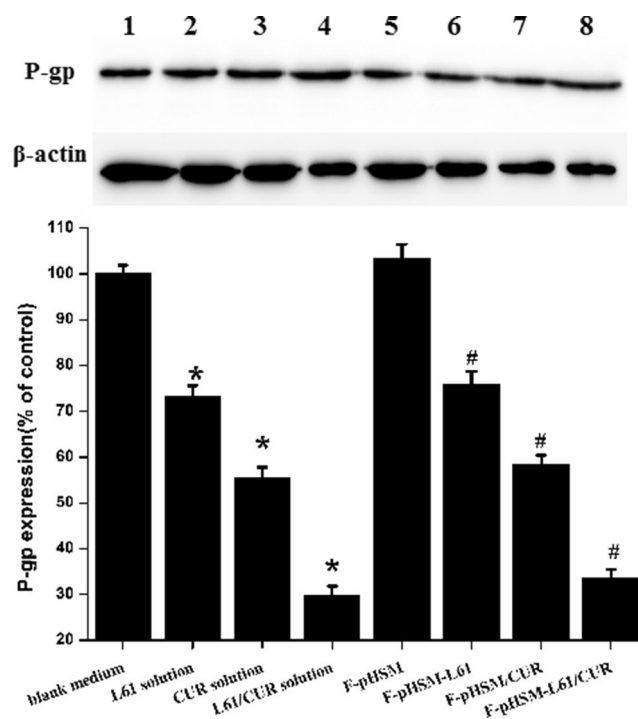


Figure 15. (1) Control; (2) Pluronic L61 unimers; (3) Curcumin; (4) mixed Pluronic L61/CUR solution; (5) F-pHSM; (6) F-pHSM-L61/CUR; (7) F-pHSM-L61; (8) F-pHSM/CUR. * $P < 0.05$: significantly different from cells treated with the blank medium, # $P < 0.05$: significantly different from the F-pHSM-treated cells. The blots were cropped and the full-length blots were included in the Supplementary Information.

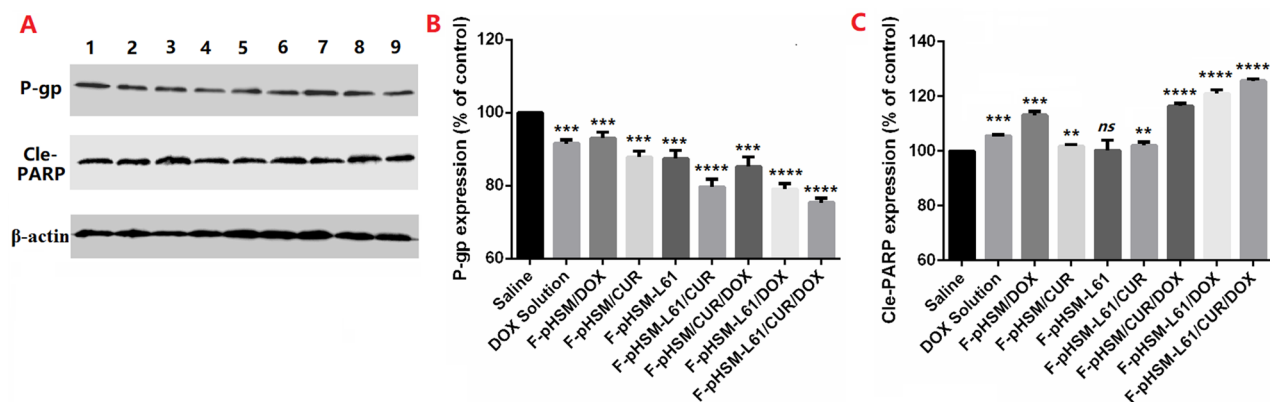


Figure 18. Expression of P-gp and Cle-PARP in tumor tissue from mice after treatment with different formulations (A). Quantitative analysis of the expression of P-gp (B) and Cle-PARP (C) in tumor tissue from mice after treatment with different formulations: 1. Saline; 2. DOX solution; 3. F-pHSM/DOX; 4. F-pHSM/CUR; 5. F-pHSM-L61; 6. F-pHSM-L61/CUR; 7. F-pHSM-L61/DOX; 8. F-pHSM-L61/CUR/DOX; 9. F-pHSM-L61/CUR/DOX. Statistical significance was defined as * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ and **** $P < 0.0001$. One data-point for F-pHSM-L61/CUR was omitted, as it was considered an outlier (more than 3 standard deviations).

between L61 and CUR. Furthermore, apoptosis related protein Cle-PARP was measured by western blotting to investigate whether the enhanced anti-tumor effect of F-pHSM-L61/CUR/DOX in vivo was related to the pro-apoptosis activity. As shown in Fig. 18C, compared with that of control groups (saline, F-pHSM-L61/CUR, F-pHSM-L61 and F-pHSM/CUR), the effect of groups administrated with free drugs, F-pHSM/DOX, F-pHSM/CUR/DOX, F-pHSM-L61/DOX and F-pHSM-L61/CUR/DOX were more evident.”

As a result of the above, the original blots provided in the Supplementary Information file for Figure 15 and 18 are incorrect. The correct Supplementary Information File is provided below.

Additional information

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1038/s41598-021-97676-8>.



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