Supplementary material for MoCo-Diff: Adaptive Conditional Prior on Diffusion Network for MRI Motion Correction

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Table S1. Quantitative comparison of different methods on the HCP dataset under three motion trajectories, spanning severe to mild motion severities, in terms of PSNR (dB), SSIM, and LPIPS.

Corrupted phase lines		40%			30%			20%		
Motion Trajectory	Methods	PSNR↑	SSIM↑	LPIPS↓	PSNR↑	SSIM↑	LPIPS↓	PSNR↑	SSIM↑	LPIPS↓
Gaussain	Corrupted	21.81	0.5877	0.2934	22.37	0.6258	0.2456	23.34	0.6741	0.1817
	D^2MC-Net	25.23	0.8018	0.1267	26.11	0.8189	0.1651	27.67	0.8584	0.1275
	Restormer	24.99	0.8206	0.1686	26.02	0.8468	0.1431	27.37	0.8733	0.1206
	IR-SDE	22.76	0.7331	0.1462	23.74	0.7448	0.1296	24.29	0.7607	0.1005
	SwinIR	27.61	0.8125	0.1211	28.49	0.8321	0.1173	29.67	0.8548	0.1087
	MoCo-Diff	**29.02**	**0.8741**	**0.0947**	**29.74**	**0.8909**	**0.0831**	**30.64**	**0.9089**	**0.0741**
Piecewise Transient	Corrupted	21.71	0.6073	.2649	22.26	0.6262	.2317	23.48	0.6855	0.1694
	D^2MC-Net	24.82	0.8013	0.1243	26.22	0.8132	0.1596	27.24	0.8601	0.1168
	Restormer	24.29	0.8106	0.1601	25.32	0.8393	0.1328	26.93	0.8709	0.1115
	IR-SDE	22.34	0.7255	0.1471	23.37	0.7187	0.1209	25.01	0.7563	0.1054
	SwinIR	27.01	0.8081	0.1219	28.09	0.8301	0.1094	29.59	0.8559	0.0995
	MoCo-Diff	**28.81**	**0.8621**	**0.0988**	**29.81**	**0.8791**	**0.0861**	**31.21**	**0.8957**	**0.0736**
Piecewise Constant	Corrupted	22.04	0.6992	0.1533	23.38	0.7523	0.1109	23.81	0.7622	0.0908
	D^2MC-Net	25.08	0.7865	0.1355	26.87	0.8212	0.1137	27.38	0.8526	0.1054
	Restormer	24.22	0.8099	0.1549	26.33	0.8604	0.1254	26.59	0.8697	0.1159
	IR-SDE	23.37	0.7283	0.1483	24.37	0.7652	0.1167	24.45	0.7939	0.1068
	SwinIR	26.66	0.8085	0.1329	28.64	0.8491	0.1098	30.01	0.8601	0.1024
	MoCo-Diff	**27.86**	**0.8474**	**0.1071**	**29.79**	**0.8692**	**0.0811**	**30.89**	**0.8861**	**0.0723**

$$\mathcal{L}_{\phi^*} = \underset{\phi}{\operatorname{argmin}} \sum \lambda \underbrace{\left|\tilde{I}_d - I_d\right|^2}_{\text{Identity mapping}} + \underbrace{\left(\frac{\left|\tilde{I}_d - I_{gt}\right|}{\tilde{\alpha}_i}\right)^{\tilde{\beta}_i} - \log\frac{\tilde{\beta}_i}{\tilde{\alpha}_i} + \log\Gamma\left(\frac{1}{\tilde{\beta}_i}\right)}_{\text{Negative log-likelihood}} \tag{1}$$

$$I_u = \mathcal{F}(\tilde{\beta}_i, \tilde{\alpha}_i) = \frac{\tilde{\alpha}_i^2 \Gamma\left(\frac{3}{\tilde{\beta}_i}\right)}{\Gamma\left(\frac{1}{\tilde{\beta}_i}\right)} \tag{2}$$

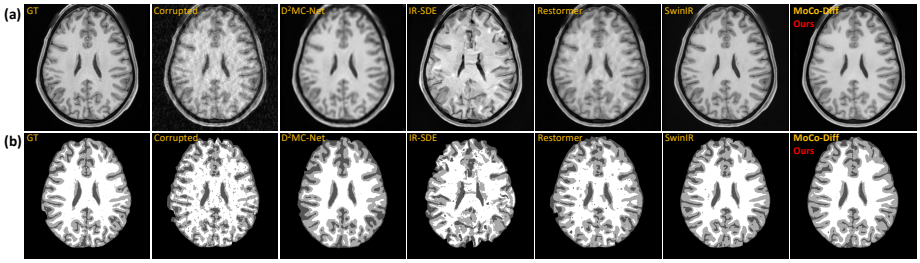

Fig. S1. Qualitative comparison of segmentation results on corrected MR images using different methods. (a) Original images. (b) The corresponding segmentations.

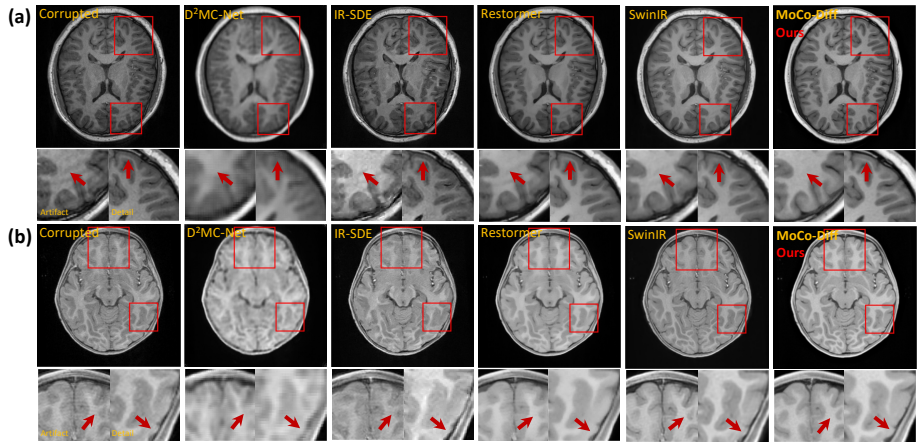

Fig. S2. The rest of the qualitative results of different methods under real motion artifacts on two external validation sets. (a) In-house. (b) BCP.