Table S1. Statistical parameters characterizing pH_e heterogeneities modeled by phantoms.

	I	J	K	L
weighted average (mean), $\overline{pH_e}$	7.13	7.19	7.30	7.42
weighted median, $\widetilde{pH}_e$	7.25	7.30	7.34	7.41
mode, pH_{e1}	7.39	7.38	7.33	7.38
mode, pH_{e2}	6.56	6.56	6.56	6.56
peak height ratios (pH_{e2} / pH_{e1})	0.64	0.41	0.19	0.08
peak area ratios (pH_{e2} / pH_{e1})				
- integrated	0.57	0.38	0.18	0.06
- deconvolved	0.53	0.37	0.18	0.07
skewness, G1	-0.22	-0.44	-0.61	-0.42
kurtosis, G2	-0.63	-0.22	0.79	1.52
entropy, H	5.07	5.00	4.82	4.53

Data are based on ^{31}P NMR spectra of 3-APP phantoms containing two test samples at different pH: 6.5 (pH_{e2}) and 7.2 (pH_{e1}). The divergence between pH_{e1} (the principal mode), $\overline{pH_e}$ and $\widetilde{pH}_e$ was largest for the bimodal distribution with the most pronounced secondary mode (pH_{e2}), and decreased with decreasing relative intensity of the pH_{e2} mode from I to L (decreasing 3-APP concentration of the low-pH solution). As expected, $\overline{pH_e} << \widetilde{pH}_e << pH_{e1}$ for the largest acidic (pH_{e2}) contribution to the pH profile (I), whereas $\overline{pH_e}$ and $\widetilde{pH}_e$ converged toward pH_{e1} with decreasing pH_{e2} contribution (L). The pH distribution had a negative skew throughout because of its asymmetry (see also Fig. 4 I - L): the pH_{e2} mode was consistently less pronounced than the pH_{e1} mode. G1 became increasingly negative with increasing asymmetry from I to K. However, this trend was reversed when going from K to L because the intensity of the pH_{e2} mode dropped to very low values so that the overall pH distribution was dominated by the symmetric pH_{e1} mode. Consequently, for a secondary mode, $pH_{e,n}$, below a particular threshold value, G1 of the overall distribution changes with increasing $pH_{e,n}$ intensity such as to indicate increasing asymmetry. However, as the $pH_{e,n}$ intensity rises above this threshold, G1 returns to values indicating decreasing asymmetry. Obviously, for $pH_{e,n}$ intensities increasing even further, this mode will eventually become the primary mode. Therefore, care has to be taken when interpreting parameters such as skewness in the context of multimodal distributions. Relative areas under the pH_{e1} and pH_{e2} modes were consistent between integrated and deconvolved values, with deconvolved ratios being slightly higher, probably due to contributions from the base of the pH_{e1} mode to the pH_{e2} mode.