

Online Ressource 1 – Impact of the duration of the simulation on the category of firing behaviors

Categorization of the MCNs based on their firing behaviors is a critical prerequisite for validating the simulations used in this study. The recommended duration for the experimental recordings to categorize the firing behavior with confidence was 10 min (Poulain et al. 1988). Here we demonstrate that a simulation of 200 sec is sufficient to categorize the firing behavior of individual MCN. The following table presents the evolution of the mean of firing rate (mofr) and the variance-to-mean ratio (V/mofr) as a function of the duration of the simulation.

Duration (ms)	MCN firing behaviors							
	Phasic		Irregular		Continuous		Silent	
	mofr	V/mofr	mofr	V/mofr	mofr	V/mofr	mofr	V/mofr
30000	2.67	16.22	0.00	0.00	6.47	0.66	0.00	0.00
60000	2.68	16.24	0.05	0.00	6.47	1.10	0.00	0.00
120000	3.26	16.34	0.03	0.00	6.45	0.90	0.00	0.00
180000	3.12	16.36	0.95	12.02	6.44	0.94	0.01	0.00
240000	3.25	16.29	0.71	12.36	6.43	0.90	0.00	0.00
300000	3.40	15.95	0.57	12.48	6.44	0.89	0.00	0.00
360000	3.29	16.13	0.48	12.55	6.43	0.86	0.00	0.00
420000	3.37	16.18	0.81	12.38	6.43	0.82	0.00	0.00
480000	3.33	16.66	1.04	12.36	6.44	0.83	0.00	0.00
540000	3.37	16.42	0.94	12.45	6.44	0.81	0.00	0.00
600000	3.33	16.40	0.85	12.51	6.44	0.81	0.00	0.00

The simulation indicates that a minimal duration of 120 sec is necessary to correctly categorize the firing behavior (grey background). Note that the mofr of the irregular firing pattern changes radically between 120 and 180 sec and stays relatively constant after 180 sec. This change does not impact the category of the firing pattern, but will influence AVP secretion (see text for details). To obtain more reliable values for mofr and V/mofr, the cut-off duration of the simulations was set to 200 sec. This minimal duration required to correctly categorize the firing behavior using simulations is probably shorter because the simulated traces are more stable (less noise) than the experimental traces.

Reference:

Poulain, D. A., Brown, D., & Wakerley, J. (1988). Statistical analysis of patterns of electrical activity in vasopressin and oxytocin-secreting neurones. In: *Pulsatility in neuroendocrine systems* (ed. Leng G), 119-154. CRC Press, Boca Raton, FL, U.S.A.