J. Membrane Biol. 26, 407 (1976)

Comments on: Correlation Analysis of Membrane Noise

Received 15 December 1975

We agree with DeFelice and Sokol that in the analysis of experimentally determined autocorrelation functions of noise signals the filter characteristics of the amplifier have to be taken into account in general. Their Eqs. (3) and (4) correctly describe how the autocorrelation function corresponding to an on-off process is modified by the settings of the upper and lower cut-off frequencies of a RC-filter. The apparent inconsistency of their Eq. (4) and Fig. 3 of our paper results from the fact that in the experiments with gramicidin the autocorrelation function $C(\tau)$ is poorly reproducible at long times ($\tau > 2\tau_c$) where negative values of $C(\tau)$ should occur according to Eq. (4). (The variations in the tail of $C(\tau)$ presumably originate from slow changes in the membrane conductance due to incomplete equilibration of gramicidin between membrane, torus, and aqueous solution.) In contrast to the considerable variations in the shape of $C(\tau)$ at long times, the early phase of $C(\tau)$ is resproducible. In the analysis of our experimental data a computer fit of the time constant τ_c as well as of the zero point of $C(\tau)$ was made using the early decay ($\tau \lesssim 2\tau_c$) of $C(\tau)$. If Eq. (4) of DeFelice and Sokol is used for this fit instead of the single exponential function of our analysis, the calculated values of τ_c differ by less than 3% and the values of $C(0)$ by less than 2% in the experimental range of τ_c between 0.16 and 0.6 sec at the lower cut-off frequency of 0.03 Hz which we have used. This shows that the influence of filter characteristics is negligible under the conditions of our experiments.

H.-A. Kolb
P. Läuger
E. Bamberg
Department of Biology
University of Konstanz
7750 Konstanz, Germany