L. Plaghki and G. Maréchal

Recovery from the tension deficit produced by a release at a slow velocity.

Frog sartorius muscles tetanized isometrically were released at a constant velocity (2.56 cm/s) from lengths l_L (1.17 l_o) to l_S (1.08 l_o). The tension P_S^* redeveloped after the release was lower than the isometric tension P_S at l_S and higher than the isometric tension P_L at l_L. The tension deficit D_o is defined as the difference $P_S - P_S^*$. One second after the end of the shortening the stimulation was interrupted during 0.3 to 2 s. The tension decreased to a minimum P_A^*, and redeveloped to a maximum P_B^*. It was found that the normalized tension deficit $D/D_o = (P_S - P_B^*)/(P_S - P_S^*)$ was equal to $1 + 0.5 \log_{10} (P_A^*/P_S)$. This function did not change when the interruption of the stimulation was made immediately after the release, in spite of the fact that the half-relaxation occurred then about 0.24 s earlier.

The tension deficit has been explained by Maréchal and Plaghki (1979) by stress inhibition of the cross-bridges formed by that part of the filaments which enters the overlap region during the shortening. The experiments reported here lend support to their explanation, as they show that the tension deficit disappears during the relaxation, that is, when the forces which stabilize the distorted shape of the stress-inhibited actin molecules are removed.

G. Maréchal and L. Plaghki (1979) J. gen. Physiol.73, 453-467.

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