IDENTIFICATION OF A GLYCOSAMINOGLYCAN IN SARCOPLASMIC RETICULUM FROM RABBIT SKELETAL MUSCLE: REGULATION OF Ca^{2+} - ATPase ACTIVITY.

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The sarcoplasmic reticulum (SR) is composed of two fractions: the heavy fraction (HSR), which contains proteins involved in Ca^{2+}-release, and the light fraction (LSR), which is enriched in Ca^{2+}-ATPase (SERCA), an enzyme responsible for Ca^{2+} uptake from the cytosol to the SR lumen. SERCA activity is inhibited by sulfated polysaccharides and this inhibition is antagonized by monovalent cations. In this work we identified a new glycosaminoglycan in SR vesicles derived from rabbit skeletal muscle, which we named SR-GAG. The SR-GAG content is higher in HSR than in LSR. In a Mono-Q FPLC, SR-GAG elutes at 0.4 M NaCl, similar to the hialuronic acid elution. However, this GAG presents a molecular mass of ~ 12 KDa (~ 100 times smaller than that of hyaluronic acid). SR-GAG is enriched in uronic acid and does not show metachromasia, indicating that it is not sulfated. In spite of the absence of sulfatation, very low concentrations of SR-GAG inhibits both the SERCA Ca^{2+} transport and ATPase activity. The IC_{50} for Ca^{2+} uptake is significant lower than that for ATPase activity. The inhibitory effect of SR-GAG on SERCA is reverted by KCl. This is the first description of a non-sulfated GAG associated with the SR of rabbit skeletal muscle, which regulates SERCA activity.

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