Sperm surface modification during epididymal transition has been suggested to be due to certain highly charged glycoproteins acquired from androgen-dependent epididymal secretion. Since carboxylic groups of sialoglycoproteins are likely to contribute to the sperm surface negative charges, alteration in sperm sialic acid contents has been studied, using a reliable biochemical technique. In addition, the characteristics of sialoglycoproteins in epididymal fluids and on sperm surface were also investigated.

Bound sialic acids on rat epididymal sperm were assayed by mild oxidation with NaIO₄ liberating C₉ as formaldehyde which was further quantitated using 3-methyl-1,2-benzothiazolinone HCl (MBTH). The contents of the bound sialic acids of sperm from the caput and cauda epididymis were 50.9 ± 8.0 and 25.2 ± 3.8 nmole NANA/10⁸ sperm respectively (mean ± S.D., n = 20).

Sialoglycoproteins of rat epididymal fluid and sperm were specifically radiolabelled by NaIO₄/KB³H₄ method. At least 10 sialoglycoproteins of the fluids can consistently be demonstrated by SDS-PAGE. The most intensively labelled protein band 2 (M_r 21,000) may be either α-lactalbumin or pre-albumin protein B and C and the next was protein band 9 (M_r 68,000) which was as large as albumin. Band 6 (M_r 40,000) and 7 (M_r 48,000) present mainly in the caput epididymal fluid may be androgen-binding protein. The sialoglycoproteins of the fluids did not significantly decrease during epididymal transition. Some of them were partially resistant to trypsin or neuraminidase treatment indicating multiple forms of them in the fluids.
There were at least 11 sialoglycoproteins bound to the epididymal sperm, mainly located on sperm tails. During epididymal transition, most of sperm-bound sialoglycoproteins decreased in labelling, those were $5,933 \pm 1,658$ and $3,563 \pm 998$ cpm/10^6 cells (mean ± SD., n=3) for the caput and cauda epididymal sperm. The order of sensitivities of these sialoglycoproteins to treatment with Triton X-100/DTT, neuraminidase and trypsin were 85%, 70% and 40% respectively for caput sperm and 75%, 20% and 30% respectively for cauda sperm.

Testosterone withdrawal by castration did not affect sperm-bound sialoglycoproteins. In contrast, radiolabelling of most sialoglycoproteins, except band 9, in the fluids from 3-day-castrated rats was reduced by half. Further decrease was detectable in the fluid from caput epididymides whilst not from cauda epididymides when castration was prolonged to 7 days. Testosterone propionate (1 mg/kg body weight/day) administration can reverse the changes.

Employing ³H-labelled polycationized ferritin (*PCF) to directly quantitate sperm surface anionic sites, cauda epididymal sperm were found to possess more anionic sites or negative charges than caput epididymal sperm, i.e. *PCF bound to sperm were $2.43 \pm 0.04$ and $2.06 \pm 0.06$ pmole/10^6 cells or $(1.5 \pm 0.02) \times 10^6$ and $(1.28 \pm 0.03) \times 10^6$ binding sites/sperm for the cauda and caput epididymal sperm respectively (mean ± SD., n=3). The order of sensitivities of the sperm anionic sites to enzymes and detergent treatments were: Triton X-100 > trypsin > neuraminidase. The anionic sites of the caput epididymal sperm were more sensitive to each treatment than those of the cauda epididymal sperm. Majority of the sperm anionic sites was resistant to neuraminidase indicating that they were contributed by other negative groups rather than carboxylic groups of sialic acids.
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