

E2-04 Human sperm motility stimulant S-ACT-1 of Sri Lankan marine red alga *Gelidiella acerosa*: a dipalmitate of glyceryl-6-sulfo- α -D-quinovose

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A human sperm motility stimulant (S-ACT-1) has been isolated from 1:1 CH₂Cl₂/MeOH extract of Sri Lankan marine red alga *Gelidiella acerosa*. S-ACT-1 increases both % motility and velocity of human sperm *in vitro* in a dose-dependant manner. Sperm motility stimulants are rare in nature. Although such stimulants are critically needed in the treatment of certain male infertility and in *in vitro* fertilization (IVF), very few are available to date. Therefore, evaluation of S-ACT-1 as a potential human sperm stimulant is warranted. For this purpose, establishment of its exact chemical structure is extremely important. Thus, HPLC purified, S-ACT-1 was subjected to the following spectroscopy: IR, ¹H & ¹³C NMR, DEPT, COSY, HOHAHA, HMQC and HMBC. Mass fragmentations were studied using FDMS, EIMS and FAB+ & FAB-

The ¹H NMR had, 6H triplet at δ 0.88 for 2 terminal methyl groups, a broad signal at δ 1.3 corresponding to 48 H indicating long alkyl chains and a mass of signals between δ 2.5 and 5.0 for sugar protons. ¹³C NMR had a signal at δ 99.9 for anomeric carbon and 2 signals at δ 174.85 & 175.04 for ester carbonyl groups. IR spectrum had prominent bands at 1178 & 1035 cm⁻¹ for S=O stretchings. Through extensive analysis of HOHAHA spin-spin couplings at 20, 60 & 100 msec. mixing, assignment of other spectral data and by critical analysis of mass fragmentation, the structure of S-ACT-1 was established as 2',3'-di-O-(pentadecanoyl)-glyceryl-6-sulfo- α -D-quinovo pyranoside (I).

$[\alpha]_D^{28} = +2.7$ (c.5, C₅H₅N). IR V_{\max}^{KBr} cm^{-1} : 3350, 3230, 2900, 2850, 1620, 1460. FDMS (m/z): 684 (M+H)⁺; FAB⁺ (m/z): 684 (M+H)⁺; EIMS (m/z): 683 (M)⁺, 665, 647, 357, 339, 308, 280, 265.

¹³C NMR(δ)(DEPT): 14.33 (CH₃), 23.63(CH₂), 25.94(CH₂), 30.15(CH₂), 30.38 (CH₂), 30.59(CH₂), 30.71(CH₂), 32.92(CH₂), 34.92(CH₂), 35.13(CH₂), 54.23(CH₂), 64.20(CH₂), 67.06(CH₂), 69.89(CH₂), 71.67(CH₂), 73.44(CH), 74.85(CH), 74.97(CH), 99.98(CH), 174.84(C=O), 175.04(C=O); ¹H NMR(J=Hz): 0.88(6H,t,6.8,7.11), 1.3(48H, br.s), 1.6(4H, m, ol), 2.31(2H,m), 2.33(2H,m), 2.91(1H,dd,9.05,14.33), 3.1(1H,t,9.65), 3.33(1H,dd,2.20, 14.03), 3.40(1H, dt, 3.75, 9.65), 3.57(1H,dd,6.4,10.85), 3.63(1/t/9.45), 4.06(1H,dt,2.1,9.0), 4.1(1H,dd,5.3,10.85), 4.18(1H,dd,6.9,12.05), 4.5(1H,dd,2.9,12.0), 4.75(1H,t,3.8), 5.3(1H,t,3.8).

ol = overlap

Establishment of the chemical structure opens further research on S-ACT-1 type compounds as potential sperm stimulants and allows structure activity relationship studies. S-ACT-1 may be a lead compound for a potential sperm stimulant in the treatment of male factor infertility caused by asthenozoospermia and in medically assisted conception.

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