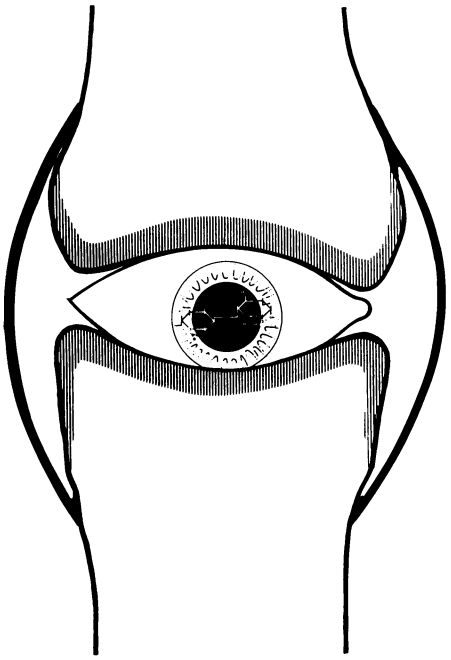
KERATAN SULPHATE

Chemistry, Biology, Chemical Pathology



Edited by

HELMUT GREILING
&
JOHN E. SCOTT

Keratan sulphate is unique, standing at a crossroads, sharing the potential of both typical glycoproteins and typical proteoglycans. In one direction lie immunology, cell development and oncogenesis; in the other, important roles in the ultrastructure and function of cornea, joints and intervertebral discs. This book, the first in the field, is the fruit of the first full international symposium on keratan sulphate. The challenge of new viewpoints produced controversy, but also much common ground; this is revealed by the edited discussions, grouped for continuity, which follow the main sections. The bibliography is collected into one section, providing much of the literature on keratan sulphate in one place.

Contents: **PART I - CHEMISTRY:** Structure of keratan sulphate proteoglycans: core proteins, linkage regions, carbohydrate chains *(Stuhlsatz, Keller, Becker, Oeben, Lennarts, Fisher & Greiling);* Structural and conformational analysis of keratan sulphate oligosaccharides and related carbohydrate structures *(Hounsell);* Discussion. **PART II - IMMUNOLOGY:** Keratan sulphate oligosaccharides, members of a family of antigens of the poly-N-acetyl-lactosamine series *(Feizi);* Studies of keratan sulphates of aorta and cartilage utilizing MAb 6D2 *(Baker);* Detection and purification of corneal keratan sulphate proteoglycan from non-corneal tissues *(Funderburgh & Conrad);* Discussion. **PART III - BIOSYNTHESIS:** Biosynthesis of skeletal and corneal keratan sulphate *(Balduini, De Luca & Castellani);* Keratan sulphate proteoglycans: chemistry and biosynthesis of the linkage regions *(Hascall & Kimura);* Discussion. **PART IV - REGULATION OF BIOSYNTHESIS:** Factors affecting the pathway for the biosynthesis of keratan sulphate *(Mason & Sweeney);* Sulphation, chain elongation and chain termination in keratan sulphate biosynthesis *(Keller, Stuhlsatz & Greiling);* Keratan sulphate: a functional substitute for chondroitin sulphate in O_2 -deficient tissues? *(Scott, Stockwell, Balduini & De Luca);* Discussion. **PART V - DEGRADATION:** Substrate specificity of keratan sulphate-degrading enzymes (endo-β-galactosidase, keratanase and keratanase II) from micro-organisms *(Nakazawa, Ito, Yamagata & Suzuki);* Degradation of keratan sulphate proteoglycans *(Kresse);* Discussion. **PART VI - KERATAN SULPHATE IN THE TISSUES:** The chemical morphology of keratan sulphate proteoglycans *(Scott);* Articular cartilage keratan sulphate: maturation, ageing, biomechanical and scale effects *(Stockwell);* Proteoglycans of mammalian corneal stroma *(Damle & Gregory);* Discussion; Developmental aspects of keratan sulphate *(Cintron, Covington, Kublin, Gregory & Damle);* Keratan sulphate proteoglycans in organ and cell culture *(Dahl);* Discussion. **PART VII -CHEMICAL PATHOLOGY:** Studies of the metabolism of keratan-sulphate-bearing proteoglycans of cartilage *(Thonar, Williams, Sweet, Maldonado, Lenz, Schnitzer & Kuettner);* Serum keratan sulphate in rheumatoid arthritis and different clinical subsets of osteoarthritis *(Seibel, Towbin, Braun, Kiefer, Müller & Paulsson);* Factors affecting the determination of keratan sulphate using monoclonal antibodies in immunoassay procedures *(Caterson, Brooks, Sattsangi, Ratcliffe, Hardingham & Muir);* Discussion; Alterations in the synthesis of keratan sulphate proteoglycan in corneal wound healing and in macular corneal dystrophy *(Hassell, SundarRaj, Cintron, Midura & Hascall);* Distribution of keratan sulphate-containing proteoglycans in human aorta and their possible role in the calcification of aorta *(Greiling, Loffler & Stuhlsatz);* Discussion. *Bibliography. Index.*

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P.O. Box 32, Commerce Way, Colchester CO2 8HP, U.K.
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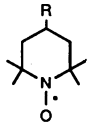
Nitroxide Spin Labels

Spin labeling is a spectroscopic technique which employs stable organic free radicals as structure probes of macromolecular systems.[1,2] The organic free radicals normally employed in spin-labeling experiments are "protected" nitroxide free radicals (i.e., nitroxide radicals bearing no α-hydrogens).[3] These radicals can be obtained in pure form, are stable to storage and are compatible with a variety of synthetic reagents.[4] The plethora of available "protected" nitroxide free radicals, plus their stability and intrinsic magnetic properties, make them the spin labels of choice for biochemical applications. Illustrated below are some of our nitroxide spin labels with citations from recent literature. For bulk quotations on these items as well as custom synthesis requests please contact our Bulk Sales Department at 800-255-3756.

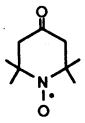
References: (1) Ohnishi, S.; McConnell, H.M. *J. Am. Chem. Soc.* **1965**, *87*, 2293. (2) a) *Spin Labeling. Theory and Applications;* Berliner, L.H., Ed.; Academic: New York, 1976 (**Z13,658-1 $90.75**). b) *Spin Labeling in Pharmacology;* Holtzman, J.L., Ed.; Academic: Orlando, 1984 (**Z12,956-9 $54.50**). (3) Briere, R.; Rassat, A. *Tetrahedron* **1976**, *32*, 2881. (4) For reviews on the synthesis and chemistry of nitroxide free radicals, see Gaffney, B.J. pp 184-238 in ref. 2a and Keana, J.F.W. p 185 in ref. 2b.



Probes used to examine the effect of complexation by cyclodextrins and albumin on single-electron-transfer reactions.[1] Also used in the synthesis of anticancer agents.[2]

(1) Rassat, A. *et al. Neuro. J. Chem.* **1988**, *12*, 158. (2) Sosnovsky, G. *et al. Cancer Lett.* **1985**, *25*, 255.

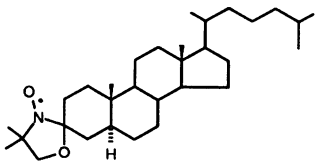
21,400-0 TEMPO, 98% (R = H) 1g $8.00; 5g $23.90; 25g $79.30
17,614-1 4-Hydroxy-TEMPO (R = OH) 1g $12.30; 5g $29.60
16,394-5 4-Amino-TEMPO, 97% ($R = NH_2$) 1g $32.90; 5g $107.80



Enhances relaxation of lipid protons *via* hydrogen bonding.

Bennett, H.F. *et al. Invest. Radiol.* **1987**, *22*, 502.

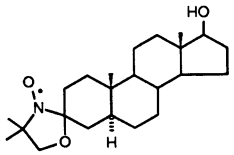
17,948-5 4-Oxo-TEMPO 1g $12.30; 5g $43.90



Employed in the study of rotational diffusion of steroid molecules in phosphatidyl choline membranes.

Kusumin, A.; Pasenkiewicz-Gierula, M. *Biochemistry* **1988**, *27*, 4407.

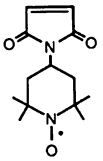
25,353-7 3-DOXYL-5α-cholestane 10mg $24.30; 25mg $50.10



Used to examine lipid-protein interaction in sodium-potassium ATPase membranes.

Esmann, M. *et al. Biochemistry* **1985**, *24*, 1386.

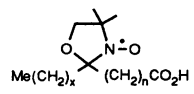
25,354-5 3-DOXYL-17β-hydroxy-5α-androstane 10mg $24.30; 25mg $50.10



Utilized for binding studies of protein sulfhydryl groups.

Kunicki, T.J. *et al. Biochemistry* **1986**, *25*, 4979.

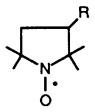
25,335-9 4-Maleimido-TEMPO 10mg $24.45; 25mg $50.25



Used for membrane studies,[1] investigation of the kinetics of enzymatic reduction of lipid-soluble nitroxides by living cells[2] and in the characterization of reversed micelles by ESR.[3]

(1) Vachon, A. *et al. J. Chem. Soc., Faraday Trans. 1* **1987**, *83*, 177; Krainev, A.G. *et al. Biol. Membr.* **1986**, *3*, 816. (2) Chen, K. *et al. Biochim. Biophys. Acta* **1988**, *943*, 477. (3) Haering, G. *et al. J. Phys. Chem.* **1988**, *92*, 3574.

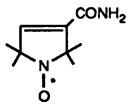
25,363-4 5-DOXYL-stearic acid (x = 12; n = 3) 25mg $43.30; 100mg $138.05
27,699-5 7-DOXYL-stearic acid (x = 10; n = 5) 10mg $24.30; 25mg $50.10 100mg $119.45
33,480-4 10-DOXYL-stearic acid (x = 7; n = 8) 10mg $23.45; 25mg $48.50 100mg $135.00
25,356-1 12-DOXYL-stearic acid (x = 5; n = 10) 25mg $43.30; 100mg $138.05
25,359-6 16-DOXYL-stearic acid (x = 1; n = 14) 10mg $24.15; 25mg $43.30



Employed to examine the ESR spectra of spin-labeled cytochrome P450 and tetrahydroporphyrins.[1] Also used for magnetic-resonance imaging.[2]

(1) Eaton, G.R. *et al. J. Am. Chem. Soc.* **1986**, *108*, 618. (2) Ehman, R.L. *et al. Invest. Radiol.* **1986**, *21*, 125.

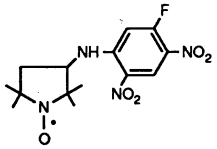
25,749-4 3-Cyano-PROXYL (R = CN) 10mg $17.50; 25mg $28.60
27,018-0 3-(Aminomethyl)-PROXYL ($R = CH_2NH_2$) 10mg $18.35 25mg $29.75
16,391-0 3-Carbamoyl-PROXYL ($R = CONH_2$) 1g $38.20
25,332-4 3-Carboxy-PROXYL (R = COOH) 25mg $7.00 250mg $15.40; 1g $42.55



Utilized to study the rate of respiration by mitochondrial muscle.

Leston, B. *et al. Period. Biol.* **1986**, *88*, 155.

15,568-3 3-Carbamoyl-2,2,5,5-tetramethyl-3-pyrrolin-1-yloxy, 99% 1g $28.65 5g $90.05



For the investigation of reverse bilirubin binding capacity.

Hsia, J.C. U.S. Patent 4 240 797, 1980; *Chem. Abstr.* **1980**, *94*, 170648a.

25,366-9 3-(5-Fluoro-2,4-dinitroanilino)-PROXYL 10mg $24.55; 25mg $50.35

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