A SIMPLE CRITERION FOR PREDICTING WHETHER OR NOT A MYOGLOBIN HAS THE USUAL DISTAL HISTIDINE RESIDUE

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Myoglobins from various species can be divided into two groups by an absorbance ratio of the Soret peak of the acidic met-form to that of the oxy-form, namely the $\gamma_{met} / \gamma_{oxy}$ ratio.

Values higher than 1.0 (ranging from 1.16 to 1.41) were thus obtained for the myoglobins containing the usual distal histidine, whereas those of less than 1.0 (ranging from 0.79 to 0.84) were the ratio for the myoglobins lacking this residue, such as those from three kinds of gastropodic sea molluscs and two kinds of sharks.

On the basis of these Soret absorption spectra, we have also examined the unique structures of a protozoan myoglobin from *Paramecium caudatum*, an annelid giant hemoglobin from *Tylorrhynchus heterochaetus*, and an insect hemoglobin from *Tokunagayusurika akamusi*.

Shikama, K. and Matsuoka, A. (1989) *J. Mol. Biol.* **209**, 489-491.

ELEPHANT MYOGLOBIN WITH THE DISTAL GLUTAMINE : AN UNUSUAL STABILITY PROPERTY OF OXYMYOGLOBIN

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In the usual mammalian myoglobins, the distal (E7) histidine is known to play a key role in the stability properties of the bound dioxygen. Elephant myoglobin, however, lacks this residue and has a glutamine at E7 position.

In order to know the effect of the distal residue on the stability, we have isolated native oxymyoglobin (MbO_2) directly from the cardiac and skeletal muscle tissues of the African elephant (*Loxodonta africana*), and examined the autoxidation rate from MbO_2 to metMb over the wide range of pH 4.5 - 12.3 in 0.1 M buffer at 25°C. The pH profile obtained was similar to that of *Aplysia* MbO_2 bearing the distal valine, but elephant MbO_2 was found to be less susceptible to autoxidation and its extent was almost comparable with sperm whale MbO_2.

ROLE OF THE DISTAL RESIDUE ON THE REACTION OF METMYOGLOBIN WITH HYDROGEN PEROXIDE : A COMPARATIVE STUDY

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Metmyoglobin reacts with hydrogen peroxide to form ferryl-myoglobin, which can revert back spontaneously to the met-form. This reaction seems to be of physiological importance, since through this cyclic reaction of myoglobin between metMb(III) and ferryl-Mb(IV), H_2O_2, one of the most potent oxidant *in vivo*, can be decomposed continuously in red muscle tissues in the absence of catalase and peroxidase (Tajima, G. and Shikama, K. (1992) *Int. J. Biochem. in press* .).

We have isolated native metmyoglobins from various species, and examined the mode of reaction with hydrogen peroxide in relation to the kinds of the distal (E7) residue. The spectroscopic results have shown that metmyoglobins lacking the usual distal histidine, such as those from African elephant, shark (*Galeus nipponensis*), and three species of gastropoda, *Aplysia kurodai*, *Aplysia juliana* and *Dolabella auricularia*, are little or never converted to ferryl-form.

EFFECT OF PHOTOIRRDIATED TIN-PROTOPORPHYRIN ON ARYLSULFATASE ACTIVITY OF RAT BRAIN LYSOSOMES.

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A synthetic heme analogue (tin-protoporphyrin; SnPP) is known to cause serious responses of human babies and suckling rats to photoirradiation. It also suggested that photo-excited porphyrins cause great damage to lysosomal membranes. In this study we report the effects of SnPP plus photoirradiation on a lysosomal enzyme (arylsulfatase; ASase). The crude mitochondria fraction was obtained from the brain of suckling rats. The mitochondria-free lysosomes were then isolated from the crude mitochondria fraction by Percoll density gradient centrifugation. ASase activity was markedly reduced by photo-excited SnPP. No reduction of ASase activity was detected under the dark. Photoirradiation never reduces the ASase activity without SnPP. The reduction was prevented by administration of L-ascorbic acid and was reinforced by D_2O. Photo-excited SnPP may bring singlet oxygen and inaugurate oxygen-free radical reactions. The kinetic study demonstrates that apparent Km value of ASase for 4-nitrocatecholsulfate was calculated to be 0.39mM in both presence and absence of the photo-excited SnPP. Photo-excited SnPP reduced the velocity of ASase activity.