isotonicity, urea, and sodium. The interrelationship between these two substances during osmotic stress is of obvious interest. Several techniques were employed in an attempt to produce a hypouremic state in the dogfish, Squalus acanthias. A modification of the continuous peritoneal dialysis technique (coelomic douche) using urea-free solutions were unsuccessful in removing substantial amounts of urea, indicating a low permeability of the coelomic membrane for this substance. A modified single-coil extracorporal hemodialysis unit similar to the Kolff human twin-coil unit was technically successful, but the ducts of Cuvier did not tolerate long-term blood infusions. The use of exchange transfusion proved quite successful and simple. Pooled blood from several fish of the same species was anticoagulated and dialyzed against sea water until the urea concentration was less than 100 mg%. 200-400 ml exchange transfusions were used requiring 2-6 hours for completion. Judging from plasma urea concentrations, an average of approximately 20-25% of total body urea was removed. Plasma urea concentrations were reduced to as low as 160 mM/L. This loss of urea was accompanied by rises in plasma sodium to values as high as 380 mEg/L. These changes were not accompanied by changes in body weight. Animals surviving as long as 48 hours did not have increase in plasma urea concentration from the post-dialysis values. The data are consistent with the following conclusions: (1) the source of elevated urea in this animal is chiefly related to low urea loss from the body rather than augmented urea production, (2) acute osmotic stresses appear to be met by changes in sodium metabolism rather than urea metabolism.

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UREA TRANSPORT IN ELASMOBRANCH ERYTHROCYTES

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Previous workers have shown that erythrocytes of the dogfish, Squalus acanthius, are permeable to urea. If this permeability was due to simple diffusion these erythrocytes, like mammalian erythrocytes, should rapidly hemolyze in isosmotic solutions containing urea as the only solute. In this study it was found that there is no hemolysis of dogfish erythrocytes in salt free solutions of 1 M urea or 1 M hydroxyurea. Hemolysis is rapid, however, in 1 M methylurea or 1 M thiourea. When dogfish erythrocytes were exposed to various concentrations of urea it was found that slow hemolysis was evident in 0.7 M urea and hemolysis was rapid in 0.3 M urea. The addition of 0.3 M urea to 1 M methylurea or to 1 M thiourea prevented hemolysis of dogfish erythrocytes by these solutions. Flux measurements showed that equilibration was approximately 95% complete within 5 minutes. These findings with dogfish erythrocytes of: a) no hemolysis in isosmotic urea solutions, b) apparent substrate competition, and c) rapid equilibration are similar to the behavior of primate erythrocytes in glucose solutions and suggest a carrier mediated transport of urea by facilitated diffusion.