Glutathione in human plasma: decline in association with aging, age-related macular degeneration, and diabetes.

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Blood samples were analyzed for GSH and GSH redox state in 40 age-related macular degeneration (ARMD) patients (> 60 y), 33 non-ARMD diabetic patients (> 60 years), 27 similarly aged non-ARMD and nondiabetic individuals (> 60 years), and 19 younger individuals (< 60 years) without ARMD or diabetes. Results showed a significantly lower plasma GSH in older individuals (ARMD, diabetes, and controls) than in younger individuals ($p < .01$). Total GSH (GSHt) obtained following treatment with dithiothreitol was significantly lower only in diabetic cases ($p < .05$) but also approached significance for ARMD cases ($p = .089$). Estimation of redox potential indicated that the plasma GSH pool is considerably more oxidized in all of the older groups. Analyses of whole blood GSH showed that GSH was significantly lower in diabetic cases compared to the other groups, but did not reveal any difference associated with age or ARMD. In contrast, GSSG in whole blood was significantly higher in the older groups compared to the younger controls. The results suggest that in studies of age-related pathologies, oxidation of GSH may be a more important parameter than a decline in pool size, while in specific pathologies such as diabetes, both oxidation and a decline in pool size may be important.