UKPDS 58 Modeling glucose exposure as a risk factor for photocoagulation in type 2 diabetes.

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In type 2 diabetes, the risk of retinopathy, and of retinal photocoagulation, rises with time after diagnosis of diabetes. In this paper, mathematical modeling shows that this ageing effect is attributable to the rise in glycemia with time since diagnosis of diabetes. Mathematical models were fitted to data from 3,648 patients from the UK Prospective Diabetes Study (UKPDS). A proportional hazards model, in which time and glycemia measured by HbA(1c) are independent risk factors for photocoagulation, was compared to a model in which time does not contribute except through a measure of cumulative glucose exposure. Since likelihood ratio tests cannot be applied to non-nested models, graphical methods were used to compare the two models. The glucose exposure model was able to fit variation in survival with time at least as well as the proportional hazards model. The proportional hazards model, however, seriously underestimates the differences in two groups of different mean HbA(1c). We conclude that duration of diabetes and HbA(1c) level better predict risk for photocoagulation when treated as two components of cumulative glucose exposure, than when treated as independent risk factors.