

Blood Glucose Control and Vision Outcome in Diabetes

There is now compelling evidence that tight control of blood glucose levels in diabetes decreases the risk of diabetic retinopathy (retinal damage) and other microvascular (small blood vessel) disease.

The Diabetes Control and Complications Trial Research Group, initiated in 1982, has reported data on 1441 patients (age range: 13 to 39) with insulin-dependent diabetes (IDDM) from 29 centres followed from 3 to 9 years. A “primary prevention cohort” had no diabetic retinopathy at baseline and a “secondary-prevention cohort had mild retinopathy. Patients were randomly assigned to “intensive” (multiple daily insulin injections or infusion by pump with continual adjustment of dosage) or “standard” (once or twice daily insulin with conventional monitoring of blood glucose levels) therapy groups. Six monthly retinal photographs were graded for retinopathy. Other outcomes measured nephropathy, neuropathy, neuropsychologic disorders, macrovascular disease and quality-of-life.

Data at all time intervals showed significantly improved blood sugar and glycated haemoglobin levels with “intensive” therapy. Most importantly, the risk of progression of retinopathy was definitely less in the intensive therapy group by 36 months and, after 5 years, the risk was 50% less. Intensive therapy substantially reduced the risk of nephropathy (kidney damage), neuropathy (nerve damage) and, probably, macrovascular (major blood vessel) disease.

Adverse effects were relatively minor except for an increased rate of hypoglycaemia (very low blood sugar). As with other studies, a transient worsening of retinopathy was noted during the first year of intensive therapy but tended to regress toward baseline by 18 months. The incidence of vision threatening complications of diabetes, including macular oedema (retinal swelling) and neovascularization (new, abnormal blood vessel formation), was dramatically decreased by intensive insulin therapy

	standard therapy	intensive therapy
sustained microaneurysms	90%	70%
9 year incidence of neovascularization	24%	8%
9 year incidence of macular oedema	44%	27%
Secondary cohort requiring laser	14.2%	5.5% and required fewer sessions
Stable retinopathy at 5 years with respect to baseline retinopathy	33%	51% of primary cohort
	32%	45% of secondary cohort

Conclusions:

early intensive therapy is more effective in controlling diabetic retinopathy
advanced retinopathy also profits from intensive control but may take 3 years to show
sight-threatening retinopathy, including maculopathy and neovascularization of disc & elsewhere, is reduced by intensive therapy
the rate of progression of retinopathy increases with time with standard therapy but decreases with intensive therapy

References

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