Haemoglobin A\textsubscript{1c} concentrations were associated with increased cardiovascular disease and all cause mortality


Clinical impact ratings GP/FP/Primary care ★★★★★★ IM/Ambulatory care ★★★★★☆ Cardiology ★★★★★★

What is the relation between haemoglobin (Hb) A\textsubscript{1c} concentrations and coronary heart disease (CHD) events, cardiovascular disease (CVD) events, and all cause mortality?

**METHODS**

**Design:** cohort study (European Prospective Investigation into Cancer in Norfolk [EPIC-Norfolk]) with a mean follow up of 6 years.

**Setting:** Norfolk, UK.

**Patients:** 10 232 patients 45–79 years of age (54% women, 2.4% with diabetes) who were recruited from general practice registers and had baseline data on a health and lifestyle questionnaire and HbA\textsubscript{1c} concentrations.

**Risk factors:** HbA\textsubscript{1c} concentrations, known diabetes, age, body mass index, waist-to-hip ratio, systolic blood pressure, cholesterol concentrations, triglyceride concentrations, cigarette smoking, and history of heart attack or stroke.

**Outcomes:** CHD events (hospital admission or death from CHD), CVD events (hospital admission or death from CVD, stroke, or other vascular causes), and all cause mortality.

**MAIN RESULTS**

Persons with known or undiagnosed diabetes had a greater risk of all cause mortality and CVD or CHD events than those without diabetes. A gradient of increasing rates of all cause mortality, CHD, and CVD was found for the entire distribution of HbA\textsubscript{1c} concentrations in men and women (p<0.001 for linear trend).

Regression analyses adjusted for age and other risk factors (except for HbA\textsubscript{1c} concentration) showed that compared with persons without diabetes, men with diabetes had a higher risk of CHD events, CVD events, and all cause mortality, and women with diabetes had an increased risk of CHD events and CVD events (table). In a regression analysis that did not adjust for diabetes, HbA\textsubscript{1c} concentrations predicted an increased risk of CHD, CVD, and all cause mortality in both men and women. A 1% increase in HbA\textsubscript{1c} concentration was associated with a 20–30% increase in event rates.

**CONCLUSIONS**

A 1% increase in haemoglobin A\textsubscript{1c} concentrations was associated with a 20–30% increase in cardiovascular events and all cause mortality in men and women 45–79 years of age. This relation was independent of diabetes status.

Abstract and commentary also appear in ACP Journal Club

---

### Adjusted relative risks (RRs) for coronary heart disease events, cardiovascular disease events, and all cause mortality by haemoglobin A\textsubscript{1c} concentrations and history of diabetes*

<table>
<thead>
<tr>
<th>Outcomes at mean 6 y</th>
<th>Adjusted RR (95% CI) per 1% increase in HbA\textsubscript{1c} concentration</th>
<th>Adjusted RR (CI) for diabetes history (yes vs no)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>1.25 (1.16 to 1.34)</td>
<td>1.20 (1.07 to 1.34)</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>1.21 (1.13 to 1.29)</td>
<td>1.21 (1.11 to 1.31)</td>
</tr>
<tr>
<td>All cause mortality</td>
<td>1.24 (1.14 to 1.34)</td>
<td>1.28 (1.06 to 1.32)</td>
</tr>
</tbody>
</table>

*Adjusted for age and cardiovascular risk factors (systolic blood pressure, serum cholesterol concentration, body mass index, waist-to-hip ratio, cigarette smoking, and history of myocardial infarction or stroke). Not significant.