

## Cardiovascular morbidity and mortality in the Losartan Intervention For Endpoint reduction in hypertension study (LIFE): a randomised trial against atenolol

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### Summary

**Background** Blood pressure reduction achieved with  $\beta$ -blockers and diuretics is the best recorded intervention to date for prevention of cardiovascular morbidity and death in patients with hypertension. Left ventricular hypertrophy (LVH) is a strong independent indicator of risk of cardiovascular morbidity and death. We aimed to establish whether selective blocking of angiotensin II improves LVH beyond reducing blood pressure and, consequently, reduces cardiovascular morbidity and death.

**Methods** We did a double-masked, randomised, parallel-group trial in 9193 participants aged 55–80 years with essential hypertension (sitting blood pressure 160–200/95–115 mm Hg) and LVH ascertained by electrocardiography (ECG). We assigned participants once daily losartan-based or atenolol-based antihypertensive treatment for at least 4 years

**Interpretation** Losartan prevents more cardiovascular morbidity and death than atenolol for a similar reduction in blood pressure and is better tolerated. Losartan seems to confer benefits beyond reduction in blood pressure.

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See *Commentary* page 990

### Introduction

The benefits of drug intervention in hypertension to reduce blood pressure are well established, especially in high-risk individuals.<sup>1</sup> However, treated patients with hypertension still have significantly higher rates of hypertension-related cardiovascular complications than matched people without hypertension. This anomaly might result from failure to achieve normal blood pressure, residual target organ damage such as left ventricular hypertrophy (LVH), or both.

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would be more effective than  $\beta$ -blockade with atenolol in reducing cardiovascular morbidity and death in patients with essential hypertension and signs of LVH. LIFE is an investigator-initiated, double-masked, double-dummy, randomised comparison of the long-term effects of losartan with atenolol in patients with hypertension and LVH. The primary endpoint was cardiovascular morbidity and death, a composite endpoint of cardiovascular death, myocardial infarction, and stroke. **Other outcome measures were total**

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**mortality, angina pectoris or heart failure requiring admission to hospital, coronary or peripheral revascularisation procedures, resuscitated cardiac arrest, and new-onset diabetes mellitus.**

screening, baseline, serial, yearly, and endpoint electrocardiograms were centrally assessed for signs of LVH and Minnesota coded at one reading centre. Because combined ECG assessment of QRS voltage and duration