Associations of serum liver enzyme levels and their changes over time with all-cause and cause-specific mortality in the general population: a large-scale national health screening cohort study

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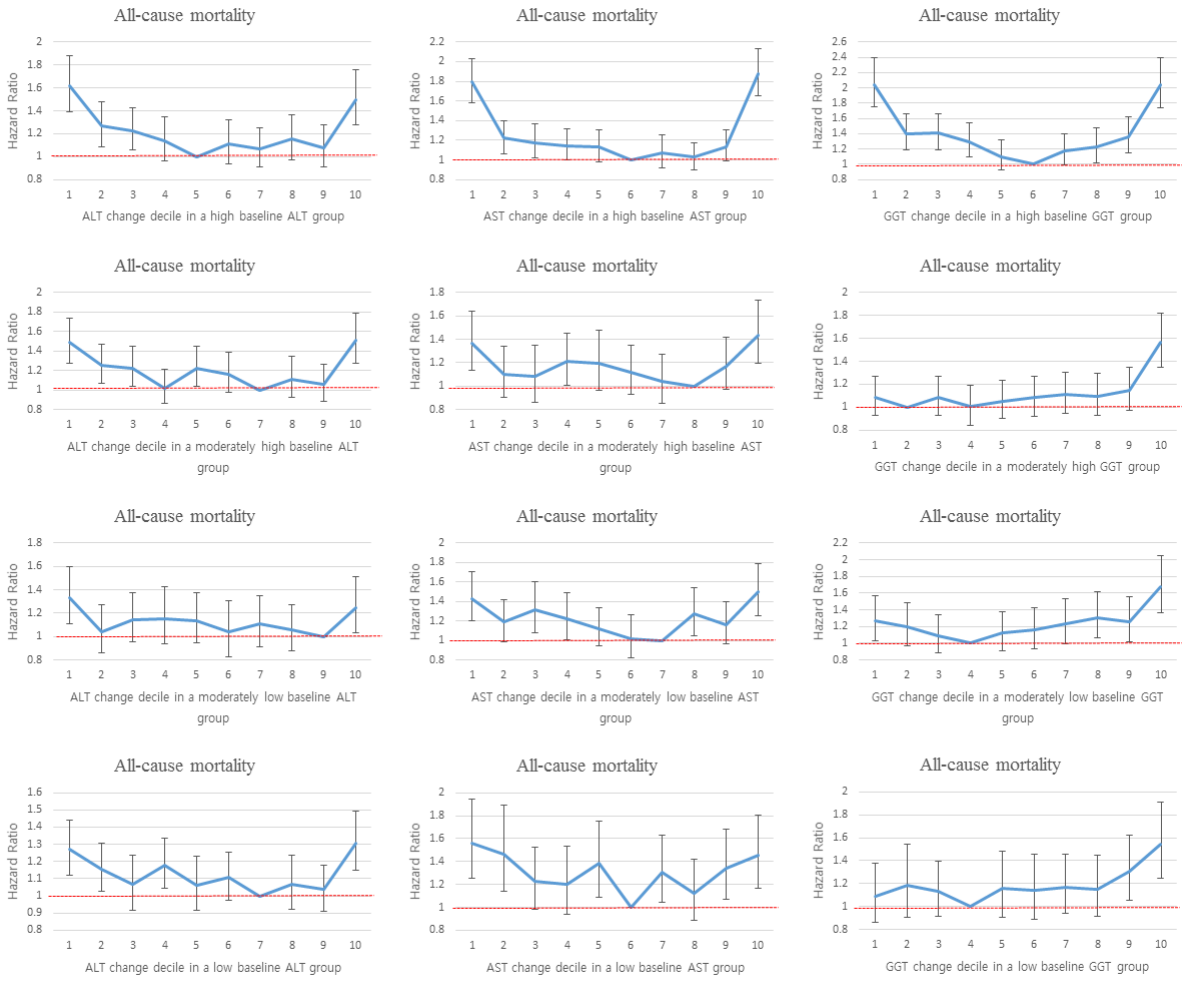
Table of Contents:

Supplementary Methods

In a sensitivity analysis, because distributions of liver enzyme levels were different by sex (U/L, ALT: median, 25, interquartile range [IQR], 16 among men; median, 18, IQR, 10 among women; AST: median, 25, IQR, 11 among men; median, 22, IQR, 9 among women; GGT: median, 33, IQR, 34 among men; median, 16, IQR, 12 among women), we repeated all analyses using sex-specific cut-off points for deciles of the baseline liver enzyme levels (U/L, ALT: ≤14, 15–16, 17–19, 20–21, 22–24, 25–27, 28–31, 32–37, 38–48, or ≥49 among men; ≤10, 11–12, 13–14, 15–16, 17, 18–19, 20–22, 23–26, 27–33, or ≥34 among women; AST: ≤17, 18–19, 20–21, 22–23, 24–25, 26–27, 28–29, 30–33, 34–40, or ≥41 among men; ≤15, 16–17, 18–19, 20, 21–22, 23, 24–25, 26–28, 29–33, or ≥34 among women; GGT: ≤15, 16–19, 20–23, 24–27, 28–32, 33–39, 40–48, 49–63, 64–95, or ≥96 among men; ≤9, 10–11, 12, 13–14, 15–16, 17–18, 19–21, 22–26, 27–35, or ≥36 among women) and changes in liver enzyme levels (U/L, ALT: ≤-19, -18 to -11, -10 to -7, -6 to -4, -3 to -1, 0–1, 2–4, 5–7, 8–14, or ≥15 among men; ≤-12, -11 to -7, -6 to -4, -3 to -2, -1 to 0, 1–2, 3–4, 5–7, 8–12, or ≥13 among women; AST: ≤-13, -12 to -8, -7 to -5, -4 to -3, -2 to -1, 0–1, 2–3, 4–6, 7–10, or ≥11 among men; ≤-10, -9 to -6, -5 to -3, -2, -1 to 0, 1–2, 3, 4–6, 7–10, or ≥11 among women; GGT: ≤-27, -26 to -13, -12 to -7, -6 to -3, -2 to 0, 1–3, 4–7, 8–13, 14–27, or ≥28 among men; ≤-10, -9 to -5, -4 to -3, -2 to -1, 0–1, 2, 3–4, 5–7, 8–13, or ≥14 among women), instead of the above mentioned sex-non-specific cut-off points, to confirm the robustness of the results.

Figure Legends

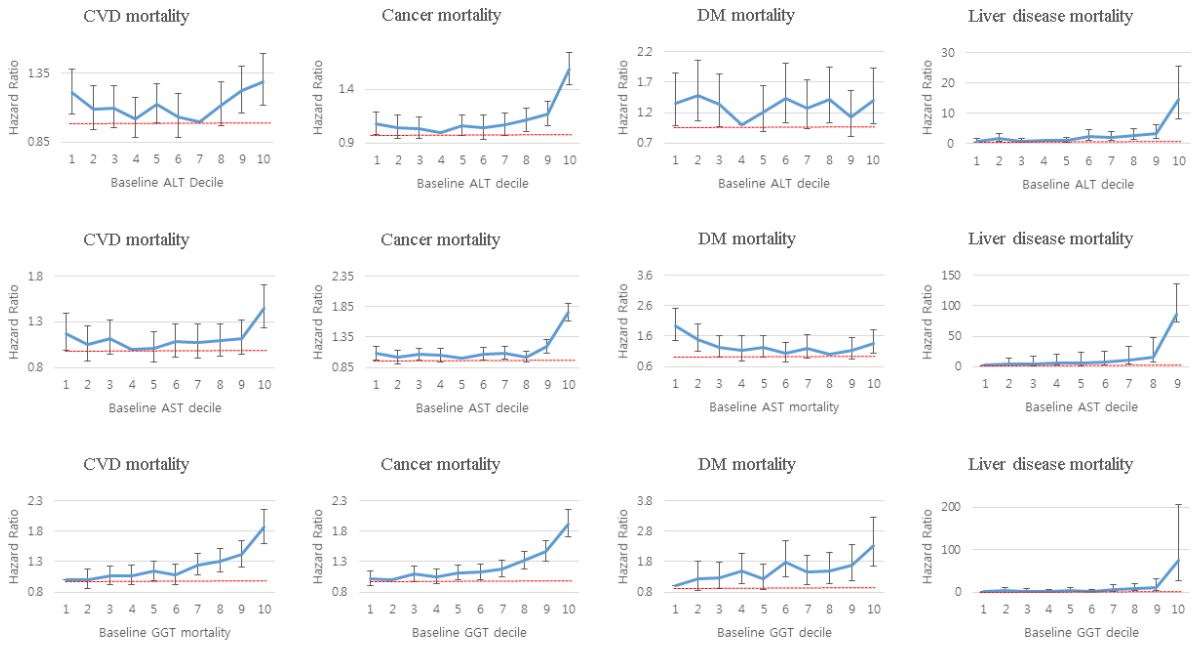
Supplementary Figure 1. Associations[a] between deciles of changes in liver enzyme levels over a 4-year period and all-cause mortality, stratified by the quartiles of each baseline liver enzyme levels.



Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma glutamyltransferase

[a]Hazard ratios were estimated using Cox proportional hazard models adjusted for age, sex, household income decile, smoking status, alcohol consumption, physical activity, body mass index, systolic and diastolic blood pressure, fasting glucose levels, and past history of heart disease, stroke, and cancer.

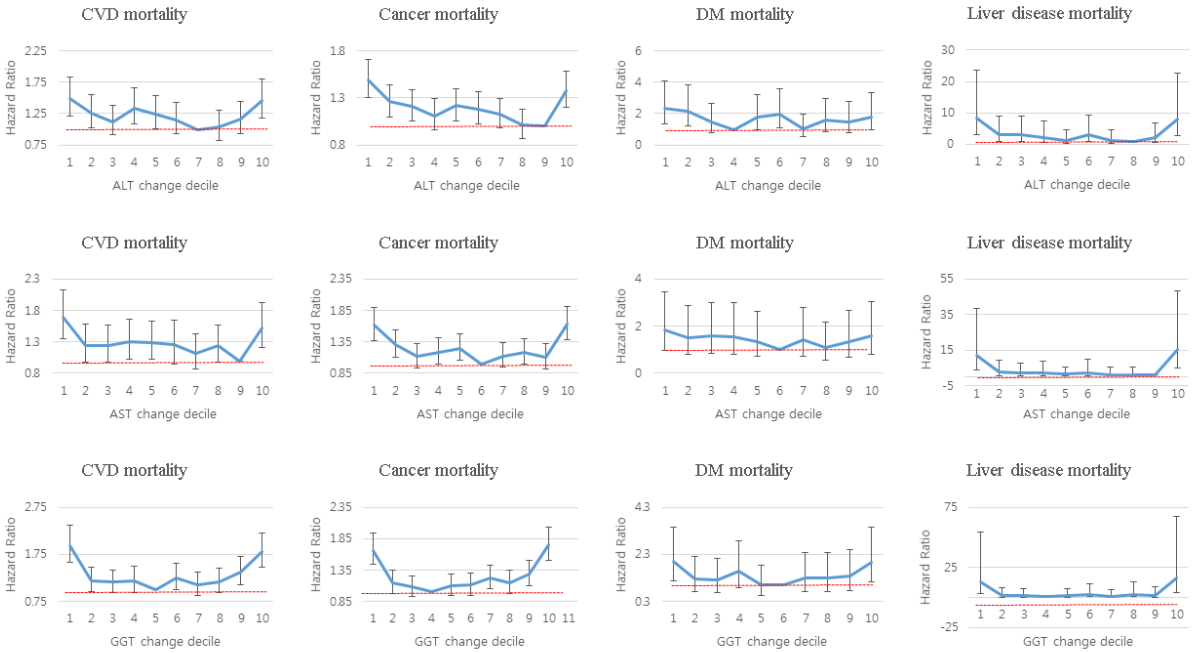
Supplementary Figure 2. Associations[a] between deciles of the baseline liver enzyme levels and cause-specific mortality.



Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma glutamyltransferase

[a]Hazard ratios were estimated using cause-specific proportional hazard models adjusted for age, sex, household income decile, smoking status, alcohol consumption, physical activity, body mass index, systolic and diastolic blood pressure, fasting glucose levels, and past history of heart disease, stroke, and cancer.

Supplementary Figure 3. Associations[a] between deciles of changes in liver enzyme levels over a 4-year period and cause-specific mortality.



Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma glutamyltransferase

[a]Hazard ratios were estimated using cause-specific proportional hazard models adjusted for age, sex, household income decile, smoking status, alcohol consumption, physical activity, body mass index, systolic and diastolic blood pressure, fasting glucose levels, and past history of heart disease, stroke, and cancer.