

Dietary intake of acrylamide and risk of breast, endometrial and ovarian cancer: a systematic review and dose-response meta-analysis

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Background

Acrylamide is a probable human carcinogen. Aside from occupational exposures and smoking, diet is main source of exposure. It is formed in starchy foods during cooking processes at high temperatures, particularly potatoes, grain products, and coffee. High acrylamide intake had been associated with alteration of sex steroid hormone levels and increased risks of hormone-dependent gynecologic and breast cancers.

Methods

We performed a systematic review of the papers investigating the association between acrylamide intake and risk of breast, endometrial and ovarian cancer. We also examined a possible dose-response relation by carrying out a dose-response random effects meta-analysis of these studies. We used a restricted cubic spline model with 3 knots at fixed percentiles (10, 50, 90%) and we pooled study specific estimates using restricted maximum likelihood methods

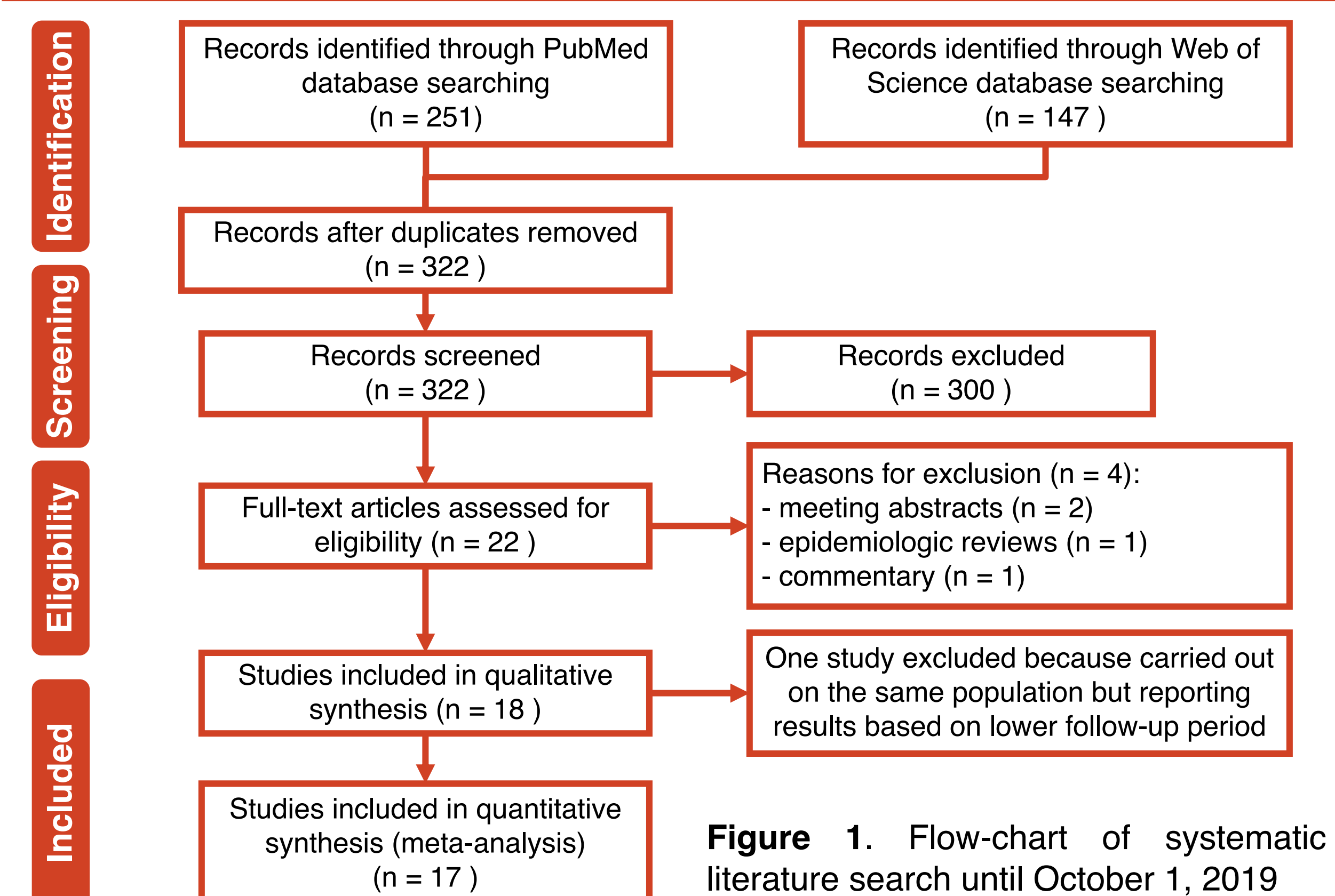


Figure 1. Flow-chart of systematic literature search until October 1, 2019

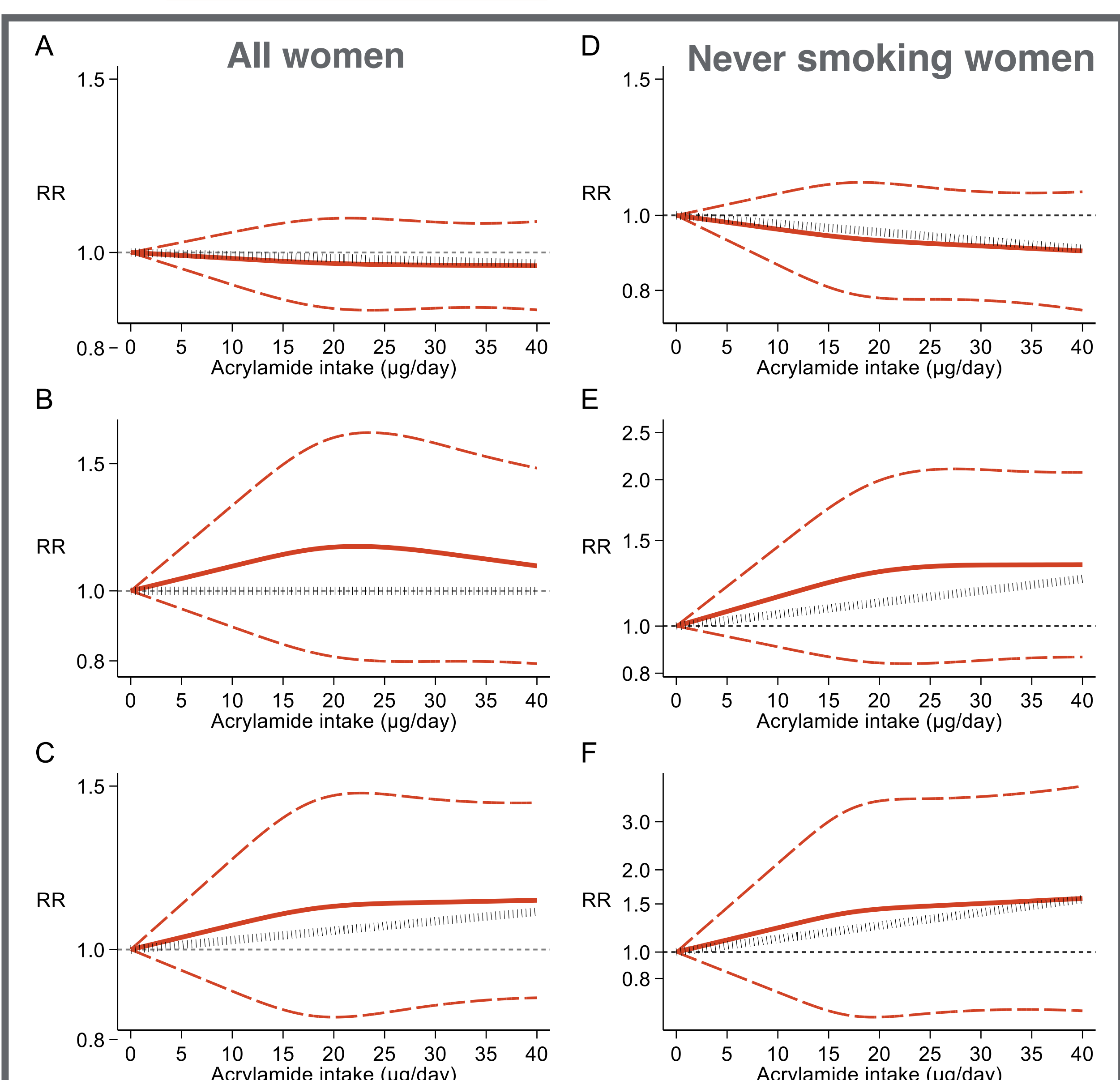


Figure 2. Dose-response meta-analysis between acrylamide intake and risk of breast (A), endometrial (B) and ovarian cancer (C) in all women and in never smoking women (D, E and F). Spline curve (solid line) with 95% confidence limits (long-dashed lines), null association (short-dashed line), and linear trend (vertical bar line). RR, risk ratio.

Results

We retrieved 18 studies: 11 women only (**Figure 1**). Conversely for breast cancer, we found no evidence to support an increased risk following acrylamide exposure (**Figure 2**), with a slight decrease risk especially in never smoking and post-menopausal women, while we found an imprecise but positive association among pre-menopausal women exposed to at least 20 μg/day of acrylamide (**Figure 3**). No evidence of publication bias was found since funnel plots showed a substantial symmetrical distribution for all results in post-menopausal

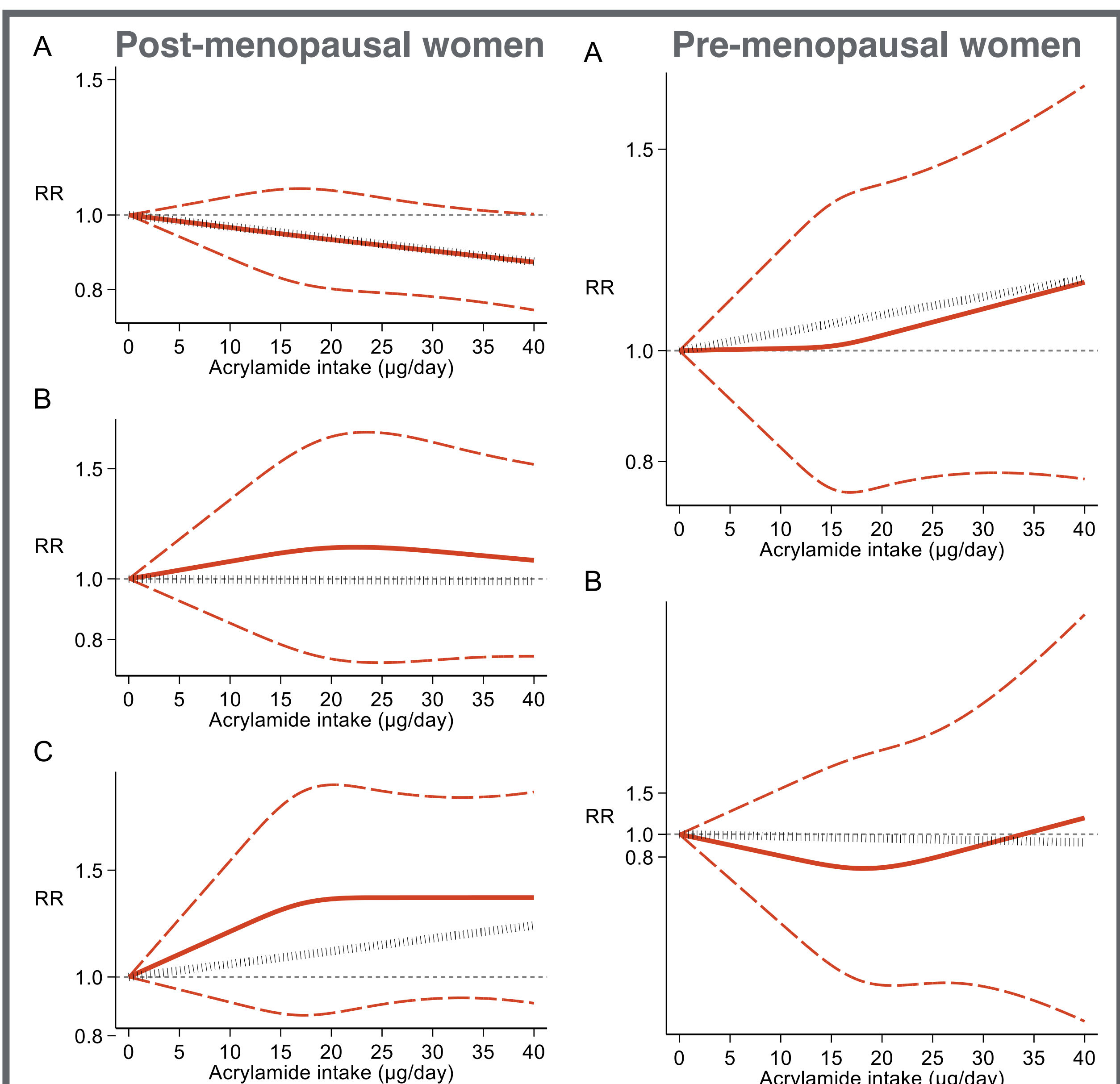


Figure 3. Dose-response meta-analysis between acrylamide intake and risk of breast (A), endometrial (B) and ovarian cancer (C) in post- and pre-menopausal women. Spline curve (solid line) with 95% confidence limits (long-dashed lines), null association (short-dashed line), and linear trend (vertical bar line). RR, risk ratio.

Conclusions

Based on the relatively small number of studies published to date, acrylamide intake was associated with an increased risk of breast cancer only among pre-menopausal women and at intakes greater than 20 μg/day, while no evidence of increased risk was found in post-menopausal or never smoking women.



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