

Does propranolol have a role in cancer treatment? A systematic review

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Background & Aims

Beta-blockers, initially developed for cardiovascular conditions, have shown potential in cancer treatment. Propranolol may help regress tumours such as breast cancers by inhibiting stress-induced signalling pathways. We aimed to: **(i) interrogate published systematic reviews and meta-analyses to ensure the inclusion of as many studies as possible** and **(ii) review up-to-date randomised controlled trials to determine whether there is more conclusive evidence that these drugs influence cancer outcomes including incidence, recurrence and survival together with biomarkers of tumour regression or death.**

Results

While there is some pre-clinical evidence indicating that propranolol may improve cancer outcomes such as slowing tumour growth, reducing metastases, and improving overall response to cancer therapies (1, 2), **the timing of administration and the cancer treatment it is paired with, appear to factor in its effectiveness.**

The perioperative period - a time of heightened stress and inflammation which is known to influence cancer progression (3) - may be a critical window to exert its beneficial effects, such as **reducing the risk of recurrence (4-6)**. However, these findings are not universally observed, and the inconsistency across studies could be due to variations in study design, patient characteristics, and the timing of beta-blocker administration.

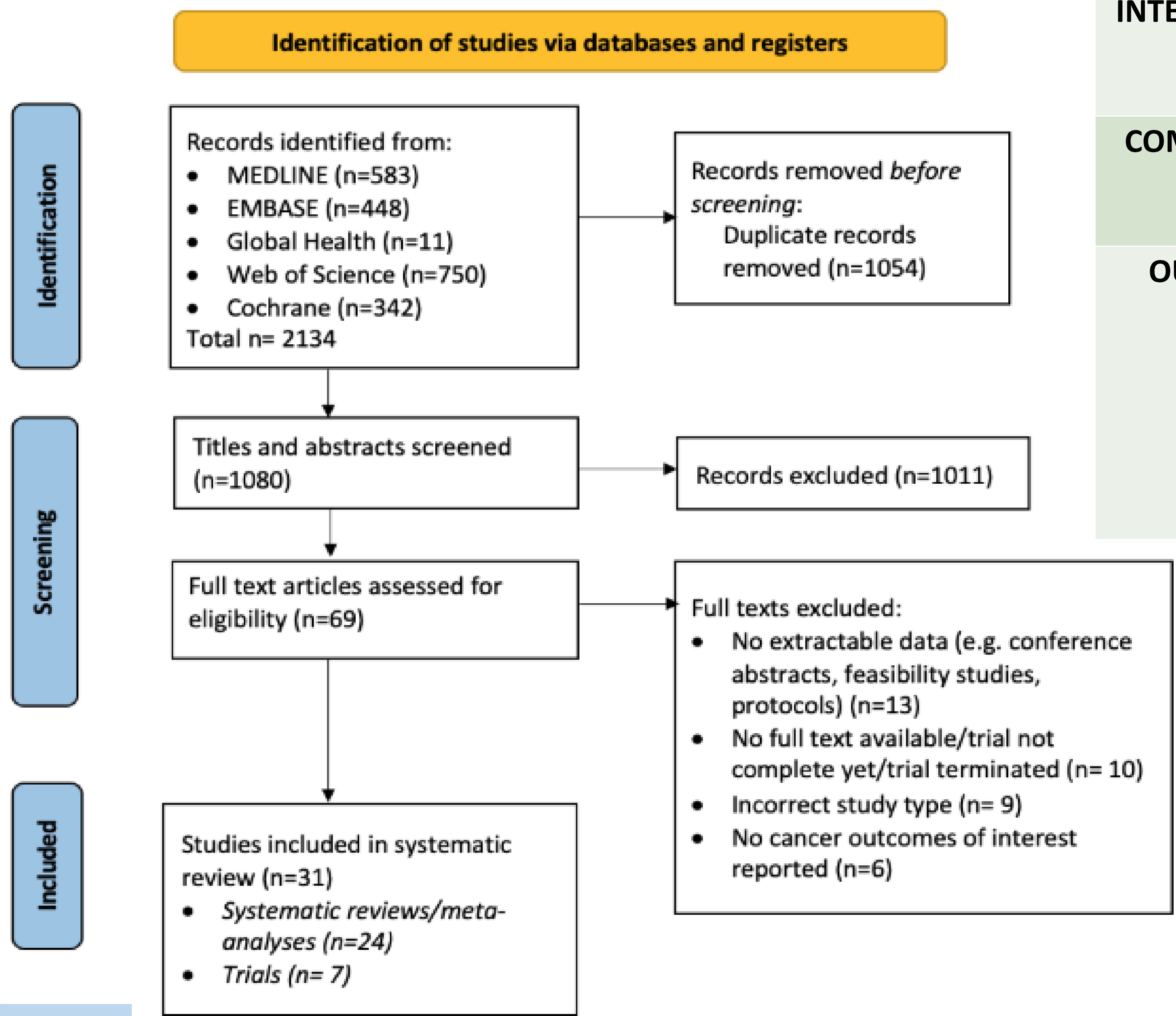
Conclusion

Propranolol’s overall effectiveness in cancer remains inconclusive. Future clinical trials focusing on specific cancer types, patient populations, and treatment regimens are needed to better define its role as an adjunctive therapy.

Methods

MEDLINE, Embase, Global Health, Web of Science and the Cochrane

Library were searched from database inception to 1 July 2024 to identify peer-reviewed studies in English (eligibility criteria in Table 1). A narrative synthesis was conducted.



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Table 1: Eligibility criteria for included studies

PICO criteria	Inclusion criteria	Exclusion criteria
POPULATION	Patients of all ages diagnosed with cancer (established using standard criteria, including imaging and lab tests if indicated).	Patients with benign tumours, such as haemangiomas, were not eligible.
INTERVENTION	The use of propranolol, including as an adjunct to current cancer treatment.	If beta-blockers were used in the intervention arm with no results for propranolol specifically.
COMPARISON	Placebo, treatment as usual, alternative medications including comparison to other beta-blockers or anti-hypertensives.	If no comparison group available/observational studies.
OUTCOME	1. The effect of beta-blockers on mortality, survival, recurrence or incidence/risk in cancer patients including genes or biomarkers of tumour regression/apoptosis. 2. In meta-analyses or systematic reviews, reported hazard ratio (HR), relative risk (RR) and 95% confidence intervals (CI).	If papers were not available in English and did not include human participants.

The review was registered with PROSPERO in July 2024 (CRD42024568054).

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