

## Introduction

- The effect of iodinated contrast material (CM) temperature on injection pressures and viscosity has been well established.
- However, the effect of extrinsic warming of CM on allergic reactions and extravasations remains unclear.
- The purpose of this study is to compare the rates of allergic reactions and extravasations between warmed CM and room temperature CM.

## Methods

- We conducted a comprehensive systematic search using PubMed, Embase, and Web of Science databases for all studies that assess the impact of warmed CM on adverse reactions.
- The primary outcomes of our study were allergic reaction and extravasation rates. The secondary outcome was the rate of physiologic reactions. Additionally, we conducted subgroup analyses based on the viscosity of the CM.

## Results

- 707 studies were retrieved by our search strategy and a total of five studies, including 307,329 contrast injections (86,676 at room temperature and 220,653 warmed to 37°C), were included in the analysis (Table 1).

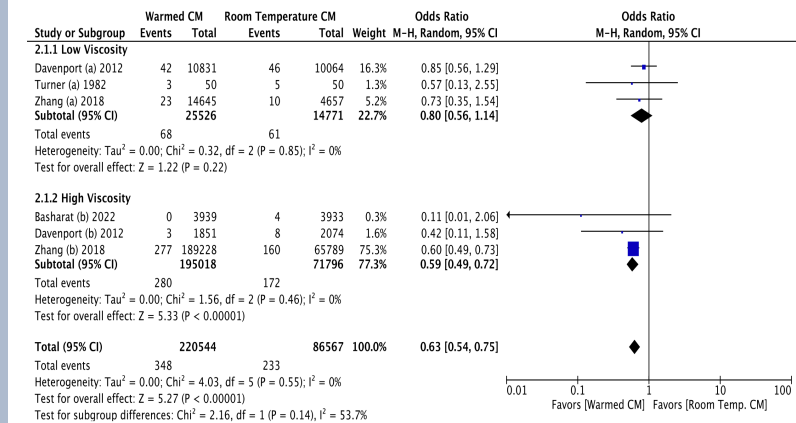
## Results continued

**Table 1: study characteristics**

Author Year	N	Country	CM used	Procedure Type
Basharat, 2022	7,872	USA	Iohexol 350	Computed tomography
Davenport, 2012	24,820	USA	Iopamidol 300, 370	Computed tomography
Martens, 2022	218	Netherlands	Iopromide	Computed tomography
Turner, 1982	100	USA	Iothalamate meglumine	Excretory urography
Zhang, 2018	274,319	China	Iopromide 300, 370; Iopamidol 370; Iohexol 350	Computed tomography

- For high viscosity CM, pre-warming was associated with significantly lower allergic reaction rates (OR:0.59, 95% CI:0.49-0.72, P<0.00001).
- There was no significant difference in rates of extravasation for high viscosity CM (OR:0.53, 95% CI:0.20-1.43, P=0.21).
- For low viscosity CM, there was no significant reduction of either extravasation rates or allergic reaction rates when warming CM.

## Results continued



**Figure 1: Allergic reaction rates between warmed CM and room temperature CM based on the CM viscosity**

## Conclusions

- Our meta-analysis suggests that warming CM to 37°C is a safe and effective approach to reduce the risk of allergic reactions during injection of high-viscosity CM.
- However, pre-warming is not necessary for low viscosity CM as it does not significantly reduce allergic reactions, extravasations, or physiologic reactions.
- Further large-scale randomized controlled trials are necessary to validate our findings.