INPLASY PROTOCOL

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Support: **N/A.**

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Conflicts of interest:
None declared.

Meta-Analysis of the Effectiveness of Heparin in Suppressing Physiological Myocardial FDG Uptake in PET/CT

Chan, SH[1]; Huang, CK[2]; Hou, PN[3]; Wu, J[4].

Review question / Objective: **The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake. Inclusion criteria were RCTs with a minimum of 37 human subjects undergoing PET/CT scans with heparin administration. Exclusion criteria included case reports, animal studies, pediatric studies, duplicate reports, and studies lacking sufficient data to compute odds ratios (ORs).**

Eligibility criteria: **The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake. Inclusion criteria were RCTs with a minimum of 37 human subjects undergoing PET/CT scans with heparin administration. Exclusion criteria included case reports, animal studies, pediatric studies, duplicate reports, and studies lacking sufficient datato compute odds ratios (ORs).**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 05 March 2023 and was last updated on 05 March 2023 (registration number INPLASY202330015).

INTRODUCTION

Review question / Objective: **The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake. Inclusion criteria were RCTs with a minimum of 37 human subjects undergoing PET/CT scans with heparin administration. Exclusion criteria included case reports,**

animal studies, pediatric studies, duplicate reports, and studies lacking sufficient data to compute odds ratios (ORs).

Rationale: Different patient preparation methods can affect the sensitivity and specificity of FDG PET in diagnosing cardiac sarcoidosis and prolonged fasting had a greater impact than heparin infusion.
The meta-analysis did not provide conclusions on the effect of heparin infusion alone on diagnostic accuracy.
The study also observed heterogeneity in the effect of intravenous heparin infusion alone across various 5 studies.
The aim of the present meta-analysis is to gather and quantify results from relevant randomized controlled trials (RCTs) and compare the efficacy of administering UFH in suppressing myocardial FDG uptake in PET/CT scans.

Condition being studied: A pharmacological approach has been utilized to manipulate myocardial metabolism by administering heparin, a blood anticoagulant, which activates serum lipoprotein lipase and raises free fatty acid (FFA) levels.
The most recommended protocol involves a single 50 IU/kg dose of heparin administered approximately 15 minutes before FDG administration.
After UFH injection, plasma FFA levels quickly increase, reducing glucose consumption in the normal myocardium.
This approach has been suggested as a supplementary method to prolonged fasting or HFLCD to suppress glucose metabolism in the myocardium.
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Several authors reported that combining HFLCD, prolonged fasting, and UFH is more effective in suppressing cardiac glucose metabolism than HFLCD or prolonged fasting alone.
Larson et al. found that combining these three methods resulted in adequate suppression of myocardial FDG uptake in 95% of patients. 8 However, studies by Christopoulos et al. and Huang et al. using only HFLCD and prolonged fasting without UFH still showed that 91% to 93% of patients achieved good suppression.
The use of UFH remains inconclusive due to the efficacy of myocardial suppression and the risk of heparin-induced.

METHODS

Search strategy: PRISMA guidelines was use to interrogate the PubMed, Embase, Cochrane library, Web of Knowledge, and http://www.clinicaltrail.gov databases from the earliest records to Feb 2023. The final analysis included five randomized controlled trials (RCTs). Meta-analysis was conducted to compare the effectiveness of heparin administration versus non-heparin administration, and subgroup analysis based on fixed and variable fasting durations was conducted. Effect sizes were pooled using a random effects model, and the pooled odds ratios (ORs) were calculated.

Participant or population: The total number of patients enrolled in the studies was 949, with 589 receivingUFH and 360 not receiving it.

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Comparator: Inclusion criteria were RCTs with a minimum of 37 human subjectsundergoing PET/CT scans with heparin administration. Exclusion criteria included case reports, animal studies,

pediatric studies, duplicate reports, and studies lacking sufficient data to compute odds ratios (ORs).

Study designs to be included: The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake.

Eligibility criteria: The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake. Inclusion criteria were RCTs with a minimum of 37 human subjects undergoing PET/CT scans with heparin administration. Exclusion criteria included case reports, animal studies, pediatric studies, duplicate reports, and studies lacking sufficient datato compute odds ratios (ORs).

Information sources: A comprehensive literature search was conducted using PubMed as the primary source and supplemented by Embase, Cochrane Library, Web of Knowledge, and ClinicalTrials.gov as secondary sources from the earliest record to March 2023.
The search included controlled terms and keywords including "heparin", "suppression of myocardial glucose", and "FDG". Additionally, manual searches were conducted on the reference lists of review articles and meta-analyses, and conference papers were included. No language restrictions were applied. Two reviewers (S.H.C. and C.K.H.) independently screened the search results based on predefined inclusion and exclusion criteria, and any disagreements were resolved by a third reviewer (J.W.).

Main outcome(s): The aim of the present meta-analysis is to gather and quantify results from relevant randomized controlled trials (RCTs) and compare the efficacy of administering UFH in suppressing myocardial FDG uptake in PET/CT scans.

Additional outcome(s): After proper clinical assessment of the risk-benefit relationship, the use of UFH could improve the diagnostic accuracy of cardiac-related diseases in patients.

Data management: The methodology quality of the evaluated studies was assessed using the Cochrane Risk-of-Bias Tool (RoB 2, version 2, London, UK) for randomized trials.

Quality assessment / Risk of bias analysis: The tool consists of six main items: randomization process, intervention adherence, missing outcome data, outcome measurement, selective reporting, and overall risk of bias.

Strategy of data synthesis: The current meta-analysis, as defined by the PICO framework, had the following characteristics: population: human participants; intervention: administration of UFH; comparison: placebo; outcome: effectiveness of UFH for suppressing physiological myocardial FDG uptake.

Subgroup analysis: A subgroup analysis was further performed based on patient's preparation protocols with fixed and varying fasting durations.

Sensitivity analysis: N/A.

Language restriction: N/A.

Country(ies) involved: Taiwan (Department of Medical Imaging and Radiology, Shu-Zen Junior College of Medicine and Management, Kaohsiung).

Keywords: Positron emission tomography/computed tomography Unfractionated heparin.

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