## What Can We Learn From The Temporal Changes In Knee Skin Temperature Following Total Knee Arthroplasty? - A Systematic Review And Meta-Analysis

Orthopaedics / Knee & Lower Leg / Joint Replacement - Primary

**Lilach Gavish**[1], Leonid Kandel[2], Gurion Rivkin[2], S.David Gertz[1], Oshrit Hoffer[3]

1. The Hebrew University of Jerusalem, Jerusalem, Israel
2. Hadassah-Hebrew University Medical Center, Jerusalem, Israel
3. Afeka Tel-Aviv Academic College of Engineering, Tel-Aviv, Israel

Keywords: Thermal Imaging, Skin Temperature, Arthroplasty, Total Knee Arthroplasty, Meta-Analysis

### Background
Surgical procedures elicit local acute inflammation associated with increased skin temperature (ST).  Previous studies of patients undergoing total-knee arthroplasty (TKA), have shown a transient increase in knee ST that subsided as the recovery progressed -- except in cases of systemic or intra-prosthesis infections.

### Objectives
Using a Meta-Analysis approach, the present study was designed to characterize the quantitative and temporal changes in knee ST following TKA in patients with uncomplicated recovery.

### Study Design & Methods
This systematic-review and Meta-Analysis was performed according to the PRISMA guidelines and was prospectively registered in PROSPERO (CRD42021269864).  PUBMED and EMBASE were systematically searched.  Screening and data extraction were performed by 2 reviewers.  The primary outcome was the difference in skin temperature ($\Delta$ST) between the operated and non-operated knees (˚C) in TKA patients with uncomplicated recovery ($\Delta$ST>0.5˚C is considered pathological in symmetrical limbs).  A Meta-Analysis was performed for each time point (before TKA and post-TKA at 1-day, 1-2-and-6-weeks, and 3-6-and-12-months). Comparisons were performed using 1-way ANOVA with Tukey as the *post-hoc* test.

### Results
332 patients from 8 separate studies were included. In uncomplicated knee recovery, $\Delta$ST was highest during the first 2-weeks post-surgery reaching a pooled mean of over 2.5˚C. The $\Delta$ST continued to be significantly higher than pre-surgery at 4-6 weeks post-TKA (*$p \leq 0.001$ vs pre-surgery).  At 3-months post-TKA, $\Delta$ST was 1.3˚C and then gradually decreased to 1.0˚C and 0.4˚C at 6 and 12-months post-surgery respectively ($p \leq 0.01$ vs day-1,Week-1, and Week-2).

### Conclusions
The quantitative profile of ST temporal changes described here in patients with reportedly uncomplicated recovery is characteristic of the knee joint recovery process post-surgery. There is a prominent increase in ST in the first 2 weeks that gradually resolves by 6 months, reaching near pre-surgical values at 1-year post-surgery when clinical recovery was considered satisfactory.  This study is the necessary first step in evaluating the usefulness of this objective, non-invasive method for monitoring the knee condition post-TKA.