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 Title : THERMIC EFFECT OF POSTOPERATIVE PARENTERAL NUTRITION
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Introduction. An abnormally elevated body temperature has traditionally been regarded as a sign of infection. However, Wilmore¹ has demonstrated an increase in core (rectal) temperature following major burns. The ways in which injury alters heat production and heat loss and the teleological benefits of such changes are unclear. Administration of total parenteral nutrition (TPN) has been demonstrated to increase resting energy expenditure in patients following major injury.² This study analyzes the effect of TPN on energy expenditure and body temperature in patients undergoing cystectomy.

Methods. Ten patients who were to undergo radical cystectomy were admitted to the study. None of the subjects had evidence of a previous history of diabetes, chronic liver disease or metastatic cancer. All patients required TPN on medical grounds. The details of the experiment, including risks, were explained to each patient, and written consent was obtained. The protocol of this study has been approved by the Columbia University Institutional Review Board.

Each patient was randomly assigned to receive either (a) 5% dextrose solution, or (b) TPN (energy intake 1.5 times resting energy expenditure; 12 gms/day nitrogen was given with glucose as nonprotein calories). Following surgery the patients were admitted to the Surgical Metabolism Unit. TPN was instituted the following day. Resting energy expenditure was calculated from measurements of O₂ consumption and CO₂ production made with a canopy system previously described.³ All body temperatures were rectal and hence reflect core temperature. Patients with evidence of postoperative infection were excluded from the study.

Results. Resting energy expenditure (REE) in patients receiving TPN was 20% above that observed in the group receiving 5% dextrose. Body temperature (mean and peak) are shown in Figure 1. Clearly the patients receiving TPN have increased mean and peak temperature on the 4th, 5th and 6th postoperative days.

Discussion. This study demonstrates that TPN will increase body temperature in injured patients. Burn patients become febrile 2 - 4 days following injury, before bacterial infection results.¹ The mechanism and physiologic role of the increase in body temperature is unknown. Post-traumatic nitrogen loss and plasma protein metabolism have been shown to be influenced by environmental temperature.⁴ Thus, body temperature, heat production and heat loss may represent important but not entirely appreciated components of the metabolic response to injury. This study demonstrates an increase in body temperature

of 1.5° F in association with a 20% difference in REE secondary to administration of TPN. An equivalent increase in energy expenditure in normal subjects secondary to exercise would not increase body temperature 1.5° F. Since this apparently does occur in injured patients, it suggests that the thermoregulatory system has been altered in an attempt to conserve heat.

Clinically a temperature of greater than 100° F measured rectally is said to require an investigation of possible infection. This study demonstrates that, following major elective operations, patients receiving TPN tend to have a higher body temperature. Thus, the clinical implications of fever may need re-assessment in injured patients receiving hypertonic glucose and amino acids.

References

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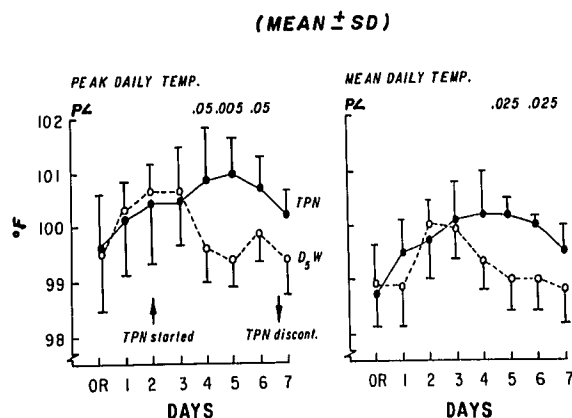


Figure 1