

## **Lithium dilution cardiac output measurement: a clinical assessment of central venous and peripheral venous indicator injection**

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**Objective:** The lithium indicator dilution technique has been shown to measure cardiac output (CO) accurately by using central venous injection of lithium chloride (Li-CCO). This study aimed to compare the measurement of CO by using peripheral venous administration of lithium chloride (Li-PCO) with Li-CCO.

**Design:** Prospective, observational human study.

**Setting:** Surgical intensive care unit.

**Patients:** Thirty-one patients were studied after major surgery. All patients had arterial, central, and peripheral venous catheters. A total of 24 patients had pulmonary artery catheters.

**Measurements:** Serial measurements of Li-CCO and Li-PCO were made during hemodynamically stable conditions. CO was also measured using thermodilution (TDCO) when a pulmonary artery catheter was present. Data were analyzed by linear regression, the generalized estimating equation, and the comparison method described by Bland and Altman.

**Main results:** There were 93 Li-CCOs, 93 Li-PCOs, and 216 TDCOs recorded. The ranges of COs were similar: Li-CCO, 2.36-11.52 L/min (mean, 5.22 L/min; n = 31); Li-PCO, 1.63-9.99 L/min (mean, 5.22 L/min; n = 31), and TDCO, 3.28-10.4 L/min (mean, 5.75 L/min; n = 24). There was good linear correlation between Li-CCO and Li-PCO ( $R^2 = .845$ ). The mean difference for Li-CCO-Li-PCO was very small and insignificant ( $p = .97$ ), and the limits of agreement were acceptable (mean difference  $\pm$  sd, 0.0005  $\pm$  0.64 L/min). The mean difference for Li-CCO-Li-PCO was smaller if the peripheral injection site was proximal rather than distal to the wrist ( $p = .053$ ). Li-PCO and Li-CCO values were lower than simultaneously obtained TDCO measurements (Li-PCO-TDCO,  $-0.538 \pm 0.95$  L/min,  $p = .003$ ; Li-CCO-TDCO,  $-0.526 \pm 0.67$  L/min,  $p = .0001$ ).

**Conclusions:** Li-PCO gives a measurement that agrees well with Li-CCO. Accuracy of Li-PCO is probably improved if a proximal arm vein is used. Li-PCO provides accurate measurements of CO without the risks of pulmonary artery or central venous catheterization.