Lithium dilution measurement of cardiac output and arterial pulse waveform analysis: an indicator dilution calibrated beat-by-beat system for continuous estimation of cardiac output

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Lithium dilution cardiac output (LiDCO trade mark; LiDCO, London, UK) is a minimally invasive indicator dilution technique for the measurement of cardiac output. It was primarily developed as a simple calibration for the PulseCO trade mark (LiDCO, London, UK) continuous arterial waveform analysis monitor. The technique is quick and simple, requiring only an arterial line and central or peripheral venous access. These lines would probably already have been inserted in critical care patients. A small dose of lithium chloride is injected as an intravenous bolus, and cardiac output is derived from the dilution curve generated by a lithium-sensitive electrode attached to the arterial line. Studies in humans and animals have shown good agreement compared with results obtained with other techniques, and the efficacy of LiDCO trade mark in pediatric patients has also been proven. Compared with thermodilution, lithium dilution showed closer agreement in clinical studies with electromagnetic flow measurement.PulseCO trade mark is a beat-to-beat cardiac output monitor that calculates stroke volume from the arterial pressure waveform using an autocorrelation algorithm. The algorithm is not dependent on waveform morphology, but, rather, it calculates nominal stroke volume from a pressure-volume transform of the entire waveform. The nominal stroke volume is converted to actual stroke volume by calibration of the algorithm with LiDCO trade mark. Initial studies indicate good fidelity, and the results from centers in the United States and the United Kingdom are extremely encouraging. The PulseCO trade mark monitor incorporates software for interpretation of the hemodynamic data generated and provides a real-time analysis of arterial pressure variations (ie, stroke volume variation, pulse pressure variation, and systolic pressure variation) as theoretical guides to intravascular and cardiac filling.