

## Prediction of Leg Fluid Turnover During an Upright Position

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### Abstract

**Introduction:** It is well known that hydrostatic pressure pulls body fluid down into the lower extremities during standing and causes leg edema. Early studies show that the fluid accumulation increased and reached a plateau for about 40 minutes in upright position. However, it has been reported that the plateau was not reached. And they show that leg fluid increased linearly after more than 45 minutes in sitting position. This study aimed at investigating the time course of fluid accumulation for 90 minutes in upright position

**Methods:** In order to clarify changes in leg volume, leg circumferences were measured at ankle, calf and thigh levels and leg fluid was estimated using a method of bioelectrical impedance. Subjects lay down in the supine position for 90 minutes, and then sat with their legs still for 90 minutes or they stood still for 90 minute.

**Results:** When they lay down, leg volume gradually decreased in the first 60 minutes, and the rate of decrease declined from 70-90 minutes. The reduction almost fit a first order exponential curve, suggesting that it is possible to decide foreseeable point in which decumulation of leg fluid stops in the supine position. Leg volume gradually increased during the upright position. The increase in fluid was quite variable and did not fit well with an exponential function and/or a linear function, suggesting that it is difficult to predict an end in the time course of fluid accumulation. Further study will be needed to clarify whether or not leg fluid accumulates linearly during prolonged upright position.

**Keywords:** Edema, Bioelectrical impedance, Leg