

BIOCHEMISTRY BYLINE

PSEUDOHYPERKALEMIA & FIST CLENCHING

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Most physicians, nurses and laboratory workers are aware that hemolysis occurring in a collection tube will cause pseudohyperkalemia, and for this reason, most laboratories do a good job informing clinical staff about hemolyzed specimens.

There is however, another cause of pseudohyperkalemia that is quite common, but exceedingly difficult to identify, namely PSEUDO-HYPERKALEMIA caused by FIST CLENCHING. During phlebotomy by venipuncture, fist clenching has commonly been used by the phlebotomists to make veins more prominent. The practice can cause potassium to increase locally so that the serum potassium is increased by as much as 1.6 mmol/L. Use of a tourniquet does not have a similar effect.

The cause of this increased potassium during fist clenching is a local effect caused by release of potassium from muscle during muscle contraction in the forearm. Potassium in the interstitial fluid has been demonstrated to increase to levels 4x greater than that of inflowing arterial blood. Fist clenching or an isometric handgrip for as little as 1 minute can cause an increase

of 1.6 mmol/L in the collected blood. Although this information was published first in 1961⁽¹⁾, it appears not to be general knowledge, since it was again published in 1990⁽²⁾.

Fist clenching should be avoided altogether. Rely on the tourniquet to induce venous stasis. This will not only prevent pseudohyperkalemia but will also prevent the false impression of normokalemia in those patients that are in fact hypokalemia.

There are also two other causes of pseudohyperkalemia, but these fortunately are rare^(3,4). Both involve patients that have either a leukocytosis or a thrombocytosis. During clotting of the collected specimen to produce serum, either the leukocytes or thrombocytes release potassium causing an elevated serum potassium. This type of pseudohyperkalemia will disappear if a plasma potassium is measured instead of a serum potassium since the increased potassium is due only to release of potassium during clotting. Needless to say, in patients with normal platelets or leukocytes, this is not a factor.

- REFERENCES:
1. Skinner, SL. Lancet 1969; 1: 478-80.
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 3. Bronson WR, DeVita VT, Carbone PP, and Cotlove E. NEJM 1966; 274: 369-375.
 4. Hartman RC, Auditore JV, and Jackson DP. J Clin Invest 1958; 37: 669-707.