**Study of Selenium metabolism (Title: please delete inside parentheses)**

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(Body)Persulfidation has been observed in various proteins and is involved in the regulation of its functions. The present study shows a new methodology to detect protein persulfidation in acidic conditions: the sulfane sulfur acidic capture method (SSACM). SSACM can stably detect persulfide by inhibiting its hydrolysis. Apply SSACM to human plasma identified the persulfidation of transferrin (Tf) as a new persulfidated protein. Notably, all the Cys of Tf are known to form disulfide bonds that cannot react with maleimide. However, our present results suggest some disulfide bonds of Tf can react with maleimide through persulfidation. PEG-maleimide assay indicated at least six disulfide bonds are persulfidated in Tf. Removal of persulfidation of Tf did not affect Fe holding. However, Fe supply capability evaluated by induction of ferritin in HepG2 cells was significantly decreased. Furthermore, in the plasma, selenoprotein P (SeP) is responsible for the reduction of intramolecular oxidative persulfidation of Tf to enhance its reactivity to maleimide and is involved in the Fe transport. The impact and significance of the present study can be accountable as that it first reports Tf has wobbling disulfide bridges by persulfide, which contributes to intracellular iron release and supply, and SeP is a novel regulator of persulfide of Tf in plasma and is related to not only selenium but also Fe transport.

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