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JOURNAL ARTICLE

Quantification of the nonenzymatic fast and slow TRAP in a postaddition assay in human seminal plasma and the antioxidant contributions of various seminal compounds

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Total radical-trapping antioxidant potential (TRAP) measurements of human seminal plasma (N = 25) were performed by using a post-addition assay based on trapping 2,2' Azino-bis(3-ethylbenzthiazoline-6-sulfonic acid) (ABTS) radicals. This method enables the antioxidant capacity of human seminal plasma and its constituents to be quantified. The standard procedure consisted of determination of the Trolox equivalent antioxidant capacity (TEAC) after incubating the test sample in the ABTS radical solution for 10 seconds (fast TRAP) and 300 s (total TRAP). Interestingly, seminal plasma showed a fast TRAP and a high slow TRAP (Total TRAP - Fast TRAP). The final total TRAP of seminal plasma is about 10 times higher than that of blood plasma. Various components of seminal plasma contribute to its fast TRAP; 37% can be attributed to vitamin C, uric acid, and tyrosine; proteins and polyphenolic compounds contribute a further 57%. In contrast, the slow TRAP was attributed to vitamin C (1%), uric acid (2%), and tyrosine (15%) and to proteins and polyphenolic compounds (33%). It was not possible to account for the remaining 49%. Neither known putative antioxidants, such as spermine, pyruvate, and taurine, nor other seminal compounds, such as carnitine, sialic acid, fructose, spermidine, glycerophosphorylcholine, and hyaluronic acid, contributed to any significant radical-trapping activity at a standard concentration of 1 mM. Of the amino acids, only tyrosine possessed a slow TRAP, and it is present at a high concentration in seminal plasma. Glutathione and hypotaurine show high fast and slow TRAPs, respectively. However, because of their low concentration in seminal plasma, their contribution to the TRAP is negligible. In conclusion, seminal plasma possesses a high antioxidant buffer capacity that protects spermatozoa from oxidative stress. Moreover, these findings suggest that the fast and slow TRAPs may have an important role as infertility markers and treatment targets in future antioxidant therapies.

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