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TB-500: from horseracing to human doping

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Abstract

An emerging product called TB-500, claimed to increase muscle growth and tissue repair in horses and other mammals, is available on the Internet and officially distributed. Anecdotal evidences suggest that it is legitimate to suspect its use as doping agent not only in horse and greyhound racing, but even in humans. Indeed, TB-500 packages have recently been confiscated by the Belgian Customs during a routine control. The case has received worldwide attention from the media since it was connected to a former professional athlete which was still employed by his team, who declared that the product was for personal use. In another case, a former team doctor was arrested in possession of the substance.
The active content of TB-500 was first identified as the N-terminal acetylated 17-23 fragment of human thymosin beta 4 (sequence: Ac-LKKTETQ) by means of high-performance liquid chromatography/high resolution mass spectrometry through a bottom-up approach. This peptide corresponds to the actin-binding domain of the human thymosin beta 4, which is known for promoting on tissue repair and angiogenesis. To unequivocally confirm the structure of the peptide, Ac-LKKTETQ was synthesized by solid-phase peptide synthesis. Finally, strategies for monitoring its misuse are proposed.

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