



### A19 Identification of Sildenafil and Other Male Potency Enhancers Found in Internet Products

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After attending the presentation, attendees will understand that erectile dysfunction pharmaceutical medication is being put into Internet products that are being marketed as all natural or herbal remedies. Attendees will be shown data from various analytical techniques such as Thin Layer Chromatography, Gas Chromatography/Mass Spectrometry, High performance Liquid Chromatography/Ultraviolet Detection and Liquid Chromatography/Mass Spectrometry. They will be made aware that this phenomenon is happening in the United States and around the world. Finally, they will be shown dangerous physical effects that can occur by taking these products without a prescription from a physician.

This presentation will impact the forensic science community by showing that the adulteration of Internet products with Viagra<sup>®</sup> and related compounds is actually occurring. This is significant because these medications have dangerous side effects and various contraindications, and should not be taken without a doctor's prescription. Many members of the forensic science community may not be aware this adulteration is happening; therefore, it is extremely important this information is made available to the community.

There has been an increase over the last decade in the sale of products marketed as male potency enhancers that can be purchased through the Internet. Erectile dysfunction drugs that are only available by a doctor's prescription such as sildenafil (Viagra<sup>®</sup>), tadalafil (Cialis<sup>®</sup>), and vardenafil (Levitra<sup>®</sup>), or their chemical analogs, are being added to various Internet products proposed to naturally enhance male potency, without regulation or medical approval. The danger in this manifests itself in the various side effects of these drugs that include stroke, loss of vision/hearing, and death. These drugs act as specific phosphodiesterase type 5 (PDE-5) inhibitors that block the degradation of an enzyme that allows for increased blood flow to the penis, thus maintaining an erection. The enzyme involved is cyclic GMP and has a variety of functions in the body, including being a carrier protein. This, in turn, causes significant vasodilation and can lower blood pressure drastically. Men with cardiovascular problems would normally not be prescribed this medication due to the inherent risks; however, now they have the possibility of obtaining it without a doctor's prescription by buying products on the Internet, in local shops, or in gas stations.

Various unregulated erectile dysfunction products were ordered over the Internet and analyzed by Thin Layer Chromatography, Gas Chromatography/Mass Spectrometry, High performance Liquid Chromatography/Ultraviolet Detection, and Liquid Chromatography/ Mass Spectrometry. Ten of these products were examined. The matrices explored were pills, powders, and even a cream. They were all purchased over the Internet for a very low price and all were marketed as "all natural." Ingredient lists made no mention to the presence of sildenafil, tadalafil, or vardenafil. Results obtained indicate the presence of these compounds in various Internet products. Furthermore, other compounds such as caffeine were also found in these products without being listed on the ingredient list. This indicates that companies, both in the United States and overseas, are falsely marketing these products and selling them over the Internet, making them very accessible. This threatens the safety of individuals that may experience damaging side effects while consuming these products, believing them to be all natural.

**Sildenafil, Internet Products, Adulteration**