Long-Term Effects of Anabolic-Androgenic-Steroid Abuse
Morphological Findings Associated With Fatal Outcome

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SUMMARY

The use of performance-enhancing drugs is an important and increasing phenomenon no longer limited only to elite athletes. Nowadays, people employ a broad variety of drugs in order to improve their athletic performance. Recent studies suggest that 3 to 12% of male adolescents and about 1 to 2% female adolescents use anabolic-androgenic-steroids (AAS) at some time during their
lives. Serious alterations of different organ systems have been attributed to long-term use of these drugs. Adverse effects of AAS include myocardial hypertrophy and fibrosis, vascular disease and hepatic pathology such as hepatoma, peliosis hepatis, and cholestasis. Steroid-related abnormalities in lipid profiles with elevated low-density lipoprotein (LDL) cholesterol and depressed high-density lipoprotein (HDL) cholesterol, as well as hematological disorders, may increase the risk of cardiac infarction and stroke. Recently, a number of case reports of acute cardiac death associated with steroid abuse has appeared in the literature. The overwhelming majority of fatalities reported in the literature is associated with acute myocardial infarction (MI) with or without thrombotic occlusion of the coronary arteries. Steroid-associated cardiovascular lesions could be demonstrated in animal studies but there seem to exist no steroid-specific pathological findings in humans. Consequently, other possible reasons, apart from AAS use, responsible for structural organ changes have to be clarified by extensive morphological examination and toxicological analysis, including the circumstances of death as well as the individual’s previous medical history.

**Key Words:** Anabolic steroids; performance-enhancing drugs; adverse effects; fatalities; autopsy findings; histopathology.

1. **Introduction**

Anabolic-androgenic-steroid (AAS) abuse seems to be widespread among professional athletes and amateur sportsmen (1–3), but the real incidence is difficult to estimate. The investigations of the National Household Survey on Drug Abuse in 1990 indicated that more than 1 million Americans are current or former AAS users (4,5). As reported by Dawson (6), the use of performance-enhancing drugs is no longer limited to the elite athlete: in 1993, the Canadian Center for Drug-free Sport estimated that 83,000 children between the ages of 11 and 18 had used anabolic steroids in the previous 12 months and there is evidence that anabolic steroids are now the third most commonly offered drug to children in the United Kingdom. In Germany, the estimated number of juvenile users is about 100,000 (7). Recent studies have shown that 3 to 12% of male adolescents and about 1 to 2% female adolescents admit to taking an ASS at some time during their life (8).

There are several reports in the literature regarding the adverse effects of anabolic steroids on various organ systems including cardiovascular and hepatic pathologies, as well as abnormalities in lipid profiles, which may increase the risk of cardiovascular disease. Alterations of the endocrine function have been