

Metabolism of Non-Steroidal Phytoestrogens: Ipriflavone and 5-Methyl-isoflavones

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Isoflavones are naturally occurring non-steroidal phytoestrogens. Some isoflavones e.g. 7-isopropoxyisoflavone (ipriflavone) and 5-methyl-7-methoxy-isoflavone (methoxyisoflavone) have been marketed as “powerful anabolic” substances. These claims based on research described in patents filed in Hungary in the early 1970s (US Patent No. 4,163,746). Only one work [1] showed that combining 5-methyl-7-methoxy-isoflavone with a proper diet and regular training programme yields muscle building and simultaneous fat shedding. Since ipriflavone and 5-methyl-isoflavones are widely advertised in the Internet, and reportedly might be used as non-steroidal anabolizing or concomitant agents indicating possible abuse of prohibited drugs, it seems necessary to develop analytical method for their detection in biological matrices by means of GC–MS and HPLC–MS. Therefore the metabolites of three “highly recommended” isoflavones: ipriflavone, 5-methyl-7-methoxy-isoflavone and 5-methyl-7-hydroxy-isoflavone were investigated. Tentative identification of the metabolites was based on the retention indices, EI-MS, ESI-MS, and MS-MS mass spectra.

Above compounds produce a variety of metabolites. After oral administration of ipriflavone dose of 250 mg seven metabolites were found in human urine: 7-hydroxy-isoflavon-4-one, four monohydroxylated metabolites, dihydroxylated and dihydro hydroxylated metabolites. Excretion study showed that 7,4'-dihydroxyisoflavone (Daidzein) is the main and long time metabolite. Than we expected to detect well-known metabolites of Daidzein, namely Equol and O-desmethylangolensin, but seemingly further metabolism of Daidzein have not occurred in case of ipriflavone administration.

Ten metabolites of 5-methyl-7-hydroxy-isoflavone were found in human urine after oral administration of single dose of 150 mg: four monohydroxylated metabolites, three dihydroxylated metabolites, metabolite with reduction of -C=O bond, methoxylated metabolite and methoxylated monohydroxylated metabolite. The parent drug was also present. Excretion study showed that 5-methyl-7, 4'-dihydroxyisoflavone are long time metabolite.

Eleven metabolites of 5-methyl-7-methoxy-isoflavone were found in human urine after oral administration of single dose of 200 mg: 5-methyl-7-hydroxy-isoflavone and its above-mentioned 10 metabolites.

The method can be applied for toxicological purposes, and for the analysis of sport nutritional supplements. The detection of isoflavones in course of doping control might indirectly indicate possible abuse of banned anabolizing agents and growth hormone.

REFERENCES:

1 Incedon, T., Van Ganneren, D., and Antonio, J. The effects of 5-methyl-7-methoxyisoflavone on body composition and performance in college-aged men. *Medicine and Science in Sports & Exercise*, (2001) 33, A2421

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