

## Article

# Comparative Analysis of Amaryllidaceae Alkaloids from Three *Lycoris* Species

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**Abstract:** The major active constituents from Amaryllidaceae family were reported to be Amaryllidaceae alkaloids (AAs), which exhibited a wide spectrum of biological activities, such as anti-tumor, anti-viral, and acetyl-cholinesterase-inhibitory activities. In order to better understand their potential as a source of bioactive AAs and the phytochemical variations among three different species of *Lycoris* herbs, the HPLC fingerprint profiles of *Lycoris aurea* (*L. aurea*), *L. radiata*, and *L. guangxiensis* were firstly determined and compared using LC-UV and LC-MS/MS. As a result, 39 peaks were resolved and identified as AAs, of which nine peaks were found in common for all these three species, while the other 30 peaks could be revealed as characteristic AAs for *L. aurea*, *L. radiata* and *L. guangxiensis*, respectively. Thus, these AAs can be used as chemical markers for the identification and quality control of these plant species. To further reveal correlations between chemical components and their pharmaceutical activities of these species at the molecular level, the bioactivities of the total AAs from the three plant species were also tested against HepG2 cells with the inhibitory rate at 78.02%, 84.91% and 66.81% for *L. aurea*, *L. radiata* and *L. guangxiensis*, respectively. This study firstly revealed that the three species under investigation were different not only in the types of AAs, but also in their contents, and both contributed to their pharmacological distinctions. To the best of our knowledge, the current research provides the most detailed phytochemical profiles of AAs in these species, and offers valuable information for future valuation and exploitation of these medicinal plants.

**Keywords:** Amaryllidaceae alkaloids; chemical fingerprints; chemical marker; anti-HepG2 activity

## 1. Introduction

Belonging to the Amaryllidaceae family, plants of genera *Lycoris* were known not only for their ornamental value, but also for their medicinal value being used as a medicinal herb for thousands of years in China [1,2]. It has been well documented that the Amaryllidaceae alkaloids (AAs) were responsible for their pharmaceutical activities, and exhibited a wide spectrum of biological activities, such as anti-tumor, anti-malarial, and acetylcholinesterase inhibitory activities [3–8]. In turn, there has been growing interest in the search for new AAs with better bioactivities from Amaryllidaceae plants [9]. In the past few years, more and more alkaloids were isolated from the Amaryllidaceae family, and most of which belong to galanthamine type, lycorine type, homolycorine type, tazettine type and crinine type in terms of chemical structures [10]. Among them, galanthamine and lycoramine were reported to exhibit good activity against Alzheimer's disease [7]. While more AAs, such as lycorine, dihydrolycorine, haemanthamine, pretazettine, pseudolycorine, and narciclasine,