Note

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A practical method for determining chondroitin sulfate content in shark cartilage materials and products

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Abstract

Chondroitin sulfate (CS) is widely used in dietary supplements. However, no accurate and practical assay for CS determination in shark cartilage materials and dietary supplements is currently available. For this reason, it has been identified as a problem that the labeled value of CS content on some products is significantly higher than the actual value. To solve this problem, we constructed an improved assay method for CS. Assay samples were enzymatically degraded, and CS content was calculated using the sum of unsaturated disaccharide peak areas from HPLC chromatograms. We concurrently used the degradations of the purified shark cartilage CS as a standard reference for cost and availability. Method accuracy and repeatability for shark cartilage material was satisfactory after optimizing degradation conditions, and correcting for the absorption coefficients of unsaturated disaccharides. Furthermore, assay of CS in dietary supplements gave values that were between 73% and 92% of the labeled values. Although further study is required to ameliorate interference by the reaction matrix, this method shows no excess value and is practical for CS product labeling.

Keywords : chondroitin sulfate, dietary supplements, disaccharides, HPLC

I Introduction

Meta-analyses show that oral administration of CS is effective in patients with osteoarthritis[1, 2], and CS has increasingly received recognition as a pharmaceutical treatment for this disease; resulting in an expansion of the market for dietary CS supplements. Since it was reported that effective dose of CS on osteoarthritis was more than 800 mg/day[3], consumers thus evaluate a dietary supplement product by seeing the declared value of CS content in the label. However, it has been reported that the value declared on some of supplement products is significantly larger than the actual amount of CS in the products, and this difference in the amount is causing less reliability among consumers and has been identified as a problem[4, 5]. Therefore, a specific and practical method to determine the labeling value of CS content in dietary supplement products is required.

Quantitative analysis of CS in dietary supplements has been difficult for the following reasons: (1) Crude extracts containing the CS-protein complex and other related glycosaminoglycans are used as materials for dietary supplements according to the Food Sanitation Act[6]; (2) The

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