Affinity on Demand: A One-Pot Method for Synthesis and Sample Enrichment Using TentaGel-Functionalized Resins

Autorzy

Michalina Zawadzka

Wojciech Gil

Andrzej Konieczny

Kornelia Krakowska-Jura

Monika Kijewska

Piotr Stefanowicz

Rok wydania

2025

Czasopismo

ACS Omega

Numer woluminu

10

Strony

18135-18144

DOI

10.1021/acsomega.5c02738

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Protein glycation is a nonenzymatic reaction that results in the formation of early glycation products, commonly referred to as Amadori products, which play an important role in diabetes complications. In proteomic research, the analysis of glycated peptides is very challenging due to the low amount of analyte in a biological sample. One of the methods to overcome this is selective enrichment of the sample in the desired analyte. A method for synthesizing functionalized resins with phenylboronic acids has been developed, which allows for the incorporation of different linkers and a variable number of phenylboronic acid moieties, as well as the use of any solid support. Furthermore, the resins are prepared for use in sample enrichment following the completion of the synthesis process and demonstrate a high affinity for glycated peptides. The highest-affinity resin (4PhB-3Lys-TGR) was applied to artificially glycated albumin hydrolyzate and patient serum, and, in addition, it was used in conjunction with a biological sample (i.e., milk) for the selective enrichment of glycated peptides. The bioinformatics analysis provided results that confirmed the high coverage of protein sequences identified in the complex samples based on glycated peptides. This paper presents a novel, fast, simple, and cost-effective one-pot method for the synthesis of functionalized resins, along with a selective method for the enrichment of samples with glycated peptides. We believe that the presented approach is general and, with necessary modifications, could be applied for affinity-based isolation not only of Amadori products but also of carbonyl compounds, thiols, compounds with chelating properties, and others.

Słowa kluczowe

Beverages, Dairy products, Functionalization, Organic polymers, Peptides and proteins

Adres publiczny

http://dx.doi.org/10.1021/acsomega.5c02738

Strona internetowa wydawcy

https://www.acs.org/content/acs/en.html