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ORIGINAL ARTICLE

Glycobiochemical characterization of salivary carcinoembryonic antigen

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Summary

Purpose: *Carcinoembryonic antigen (CEA) is a highly glycosylated molecule, expressed in both normal and pathological conditions. This study was aimed at isolation and glycobiochemical characterization of human salivary CEA, and comparison of its structural properties with those of cancer-derived CEA.*

Materials and methods: *CEA was isolated by immunoaffinity chromatography on an anti-CEA IgG-Sepharose 4B column. The isolated antigen was characterized by SDS-PAGE, gel filtration on Sepharose 4B and lectin-affinity chromatography using a panel of 6 plant lectins.*

Results: *The isolated salivary CEA had a molecular mass of 180 kD and retained its structural and antigenic properties. Lectin-affinity chromatography indicated pronounced microheterogeneity of both salivary and cancer-derived CEA. Comparison of the lectin-binding patterns demonstrated lower relative amounts of distinct Phaseolus vulgaris agglutinin-reactive and Pisum sativum agglutinin-reactive glycoforms in salivary CEA than in cancer-derived CEA.*

Conclusion: *The observed microheterogeneity of salivary CEA could have both functional and clinical relevance in relation to normal as well as to pathological oral physiology.*

Key words: cancer, carcinoembryonic antigen, glycosylation, lectin, saliva

Introduction

CEA was first described in 1965 by Gold and Freedman as an oncofetal antigen present in colonic tumors and fetal gut [1]. Currently, it is classified to the immunoglobulin superfamily of proteins [2-4]. So far, a number of CEA-related genes (28 genes/pseudogenes) as well as splice variants of individual genes, i.e. encoded proteins, have been identified [5]. There are 2 subgroups of the CEA family: CEA-related cell adhesion molecules (CEA-CAM), and pregnancy-specific glycoproteins (PSG) [5-7]. The CEA subgroup members are cell surface associated glycoproteins that mediate cell adhesion via homophilic as well as heterophilic binding to other proteins of the subgroup. It is supposed that they are involved in different cellular activities including proliferation and differentiation, angiogenesis, apoptosis, metastasis and modulation of innate and adaptive immune responses, acting as receptors for different pathogens [8-12]. These proteins exhibit a complex expression pattern in normal and neoplastic tissues [13-17]. Thus, CEA, being a well-known colorectal tumor marker, is predominantly expressed by the normal colon enterocytes and colon cancer cells, but it has also been detected in different normal adult tissues [18-22].

CEA has a molecular mass of approximately 180 kDa and consists of a protein core of 72 kDa and abundant glycans [3,4,23,24]. It is N-glycosylated with 28 potential glycosylation sites. Accumulated experimental evidence has indicated differences in its protein and carbohydrate structure in relation to expression in normal and pathological conditions, resulting in the existence of different molecular forms [24,25]. These are detected as distinct splicing variants or differently glycosylated forms in both normal and tumor cells [26].

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