Xi and Lu, Cell Dev Biol 2012, 1:3
DOI: 10.4172/2168-9296.1000e106

Cell & Developmental Biology

Editorial Open Access

The Relationship between Tumor Sialic Acids and Neoplasm Metastasis and as a Drug Target

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Backgrounds

Cancer is one of the high-mortality diseases, which causes the annual deaths listing among the top 5 mortality in almost all countries. Unlike cardiovascular diseases, the treatment beneficiary for cancers especially for epithelial carcinoma has been improving slightly over the past several decades [1-3]. Neoplasm metastasis is one of the fatalist characters responsible for these unsatisfactory of therapies and more than 60% cancer deaths and can be hopefully only controlled by drugs. Paradoxically to our efforts and expectations, except some antibodies, no obvious improvements and therapeutic benefits by conventional antimetastatic drugs (usually antivascular agents or MMPs inhibitors) have been achieved until now. Therapeutic benefits in late-staged or aged cancer patients are especially poor and useless [1-3]. Clinical anticancer drug therapies currently in use have been mainly focusing on primary tumor growth rather than specifically targeting pathologic courses of metastases relevantly. Finding important drugs targeting specifically to neoplasm metastases is essential and indispensable [4-7]. It nevertheless needs changing our focus from targeting vascularity and MMPs into more metastatic-relating molecules.

Tumor Sialic Acids Aberrant

Sialic acids (Sias, neuraminic acid) are a special series of 9-carbon backbone acidic carbohydrates and typically found at outermost part of sugar chains attached to cell membrane macromolecules. They play many important roles in a series of physiological and pathologic processes, including microbe binding that leads to infections, regulation of the immune response, the progression and spread of human malignancies and in certain aspects of human evolution [8-10]. The earliest work tackling the phenomenon of a positive relationship between sias and tumors can be traced back to Kimura et al. from 1958 [11-12]. Their discovery is tumor cells might excrete and contain more sialyl glycoproteins or glycolipids. These characteristic later have been found to link with highly metastatic tumor types [13]. It has been shown that there are higher sias contents in highly metastatic tumor cell lines than those in lower metastatic tumor cell lines. Since then, numerous similar reports and reviews have been published rapidly [14-17].

Tumor Sialic Acids Aberrant as Drug Targets

Since we all know there is a positive relation between tumor sialic acid and neoplasm metastasis. Future drug therapy can be promised to target tumor sialic acids. Different pathways of antimetastatic drugs targeting neoplasm sialic acids have been tabulated (Table 1).

Future Direction

As modern antimetastatic drug development needs new ideas and targets, the drugs targeting tumor sias seems to be a good choice. There are many ineffective antimetastatic drugs approved by authority and some of them have been withdrawn from market. In this critical time, we ought to consider changing our focus a little bit from current stalemate of angiogenic therapy into some other new perspectives and insight. Aberrantly sialylation in tumors seems to be good targets waiting for us. Why don't we wait and see the results?

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Compounds types	Proposed targets
Sia analogues or conjugates	Pathologic sias
DNA chelating agents	DNA template
Sialyltransferase inhibitors	Sia adding or releasing from antigens
Vaccine	Patients immune system
Antibodies	Pathologic antigens
Antimetastatic agents	Unknown mechanism
Sia-anticancer drugs	Tumor affinity molecules

Table 1: Different pathways of antimetastatic drugs targeting neoplasm sialic acids [18].

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Received June 21, 2012; **Accepted** June 23, 2012; **Published** June 26, 2012

Citation: Xi YC, Lu DY (2012) The Relationship between Tumor Sialic Acids and Neoplasm Metastasis and as a Drug Target. Cell Dev Biol 1:e106. doi:10.4172/2168-9296.1000e106

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