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Peptides and Cancer

Rafael Coveñas[1,2]

[1]Laboratory of Neuroanatomy of the Peptidergic Systems, Institute of Neurosciences of Castilla y León (INCYL), Salamanca, Spain
[2]Group GIR-BMD (Bases Moleculares del Desarrollo), University of Salamanca, Salamanca, Spain
coveñas@usal.es

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Peptides exert oncogenic or anticancer effects on many cancer types and, compared with normal cells, cancer cells overexpress peptide receptors. Overexpression of the peptidergic systems (peptides and/or peptide receptors) by tumors has been related with tumor size, relapse risk, aggressiveness, and poor prognosis. This overexpression serves as tumor biomarker for diagnosis/treatment and opens the door to use compounds favoring a more specific destruction of cancer cells than the anticancer strategies currently used in clinical practice. Oncogenic peptides favor the proliferation, invasion, migration and metastasis of tumor cells, exert an anti-apoptotic action in these cells, and promote lymphangiogenesis and angiogenesis, therefore favoring tumor development, whereas peptide receptor antagonists counteract all the previous oncogenic effects [1]. Different tumor types overexpress the same peptide receptor and this suggests that the same antitumor strategy (e.g., peptide receptor antagonists, peptide receptor radionuclide therapy, cytotoxic peptide conjugate-based cancer therapy) could be applied to treat different cancers. Anticancer peptides exert antiproliferative, apoptotic and antimigration actions in cancer cells as well as anti-angiogenic effects; that is anticancer peptides and peptide receptor antagonists exert the same antitumor actions. Peptides receptor antagonists show a high therapeutic capacity because peptides/peptide receptor agonists have poor bioavailability and short half-life, although the latter compounds have a higher solubility and safety. However, many strategies to increase the therapeutic effect of peptides, their delivery and stability have been developed [2]. Peptides and peptide receptor antagonists are therapeutic tools to fight cancer and hence ligands and receptors of the peptidergic systems open the door to develop new, specific and promising anticancer strategies. In fact, the Food and Drug Administration (FDA) has approved gonadotropin-releasing hormone receptor agonists to treat breast and prostate cancers and somatostatin peptide analogs for diagnostic and treatment purposes in tumors expressing somatostatin receptors (e.g., lung, neuroendocrine) [2]. Moreover, the repurposing of the antiemetic drug aprepitant (a neurokinin-1 receptor antagonist) as anticancer agent has been suggested [3]. This confirms the important roles that peptidergic systems play in cancer progression and how the current knowledge on these systems can be applied in clinical practice because peptidergic systems are crucial therapeutic targets for cancer treatment [4].

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