INVESTIGATION OF THE ANTIBACTERIAL ACTIVITY OF A SHORT CATIONIC PEPTIDE AGAINST MULTIDRUG-RESISTANT KLEBSIELLA PNEUMONIAE AND SALMONELLA TYPHIMURIUM STRAINS AND ITS CYTOTOXICITY ON EUKARYOTIC CELLS.

June 27, 2014

Moghaddam MM, Barjini KA, Ramandi MF, Amani J.

World J Microbiol Biotechnol. 2014 May;30(5):1533-40.

Applied Biotechnology Research Center, Baqiyatallah University of Medical Sciences, P.O. Box 19395-5487, Tehran, Iran, mm.genetics@gmail.com.

Abstract

With the growing microbial resistance to conventional antimicrobial agents, the development of novel and alternative therapeutic strategies are vital. During recent years novel peptide antibiotics with broad spectrum activity against many Gram-positive and Gram-negative bacteria have been developed. In this study, antibacterial activity of CM11 peptide (WKLFKKILKVL-NH2), a short cecropin-melittin hybrid peptide, is evaluated againstantibiotic-resistant strains of Klebsiella pneumoniae and Salmonella typhimurium as two important pathogenic bacteria. To appraise the antibacterialactivity, minimal inhibitory concentration (MIC), minimal bactericidal concentration (MBC) and bactericidal killing assay were utilized with different concentrations (2-128 mg/L) of peptide. To evaluate cytotoxic effect of peptide, viability of RAJI, Hela, SP2/0, CHO, LNCAP cell lines and primary murine macrophage cells were also investigated with MTT assay in different concentrations (3-24 and 0.5-16 mg/L, respectively). MICs of K.pneumoniae and S. typhimurium isolates were in range of 8-16 and 4-16 mg/L, respectively. In bactericidal killing assay no colonies were observed at 2X MIC for K. pneumoniae and S. typhimurium isolates after 80-90 min, respectively. Despite the fact that CM11 reveals no significant cytotoxicity on RAJI, Hela, SP2/0, and CHO cell lines beneath 6 mg/L at first 24 and 48 h, the viability of LNCAP cells are about 50 % at 3 mg/L, which indicates strong cytotoxicity of the peptide. In addition, macrophage toxicity by MTT assay showed that LD50 of CM11 peptide is 12 uM (16 mg/L) after 48 h while in this concentration after 24 h macrophage viability was about 70 %.

Go To PubMed

Additional Information

This research was based on our previous study that for the first time we evaluated antibacterial activity of CM11 and CM15 peptides against antibiotic resistance isolates of five pathogenic bacteria including *Staphylococcus aureus, Pseudomonas aeruginosa, Vibrio cholerae, Acinetobacter baumannii, and Escherichia coli* which is published in the journal of *probiotics and antimicrobial proteins* (June 2012). Our studies demonstrated the effective antibacterial activity of these peptides against five pathogenic bacteria

KEY SCIENTIFIC ARTICLES


Ubiquitination of the glycosomal matrix protein receptor PEX5 in Trypanosoma brucei by PEX4 displays novel features.
June 27, 2014

Mitochondria are required for ATM activation by extranuclear oxidative stress in cultured human hepatoblastoma cell line Hep G2 cells.
June 27, 2014


Redox control of indoleamine 2,3-dioxygenase expression and activity in human monocyte-derived dendritic cells is independent of changes in oxygen tension.
June 27, 2014


Synthesis of 2.3 mg/ml of protein with an all Escherichia coli cell-free transcription-translation system.
June 27, 2014


The glutaminase activity of l-asparaginase is not required for anticancer activity against ASNS-negative cells.
June 27, 2014

Potential roles of adenosine deaminase-2 in diabetic retinopathy.
June 27, 2014


Redox sulfur chemistry of the copper chaperone Atox1 is regulated by the enzyme glutaredoxin 1, the reduction potential of the glutathione couple GSSG/2GSH and the availability of Cu(I).
June 27, 2014


Investigation of the antibacterial activity of a short cationic peptide against multidrug-resistant Klebsiella pneumoniae and Salmonella typhimurium strains and its cytotoxicity on eukaryotic cells.
June 27, 2014

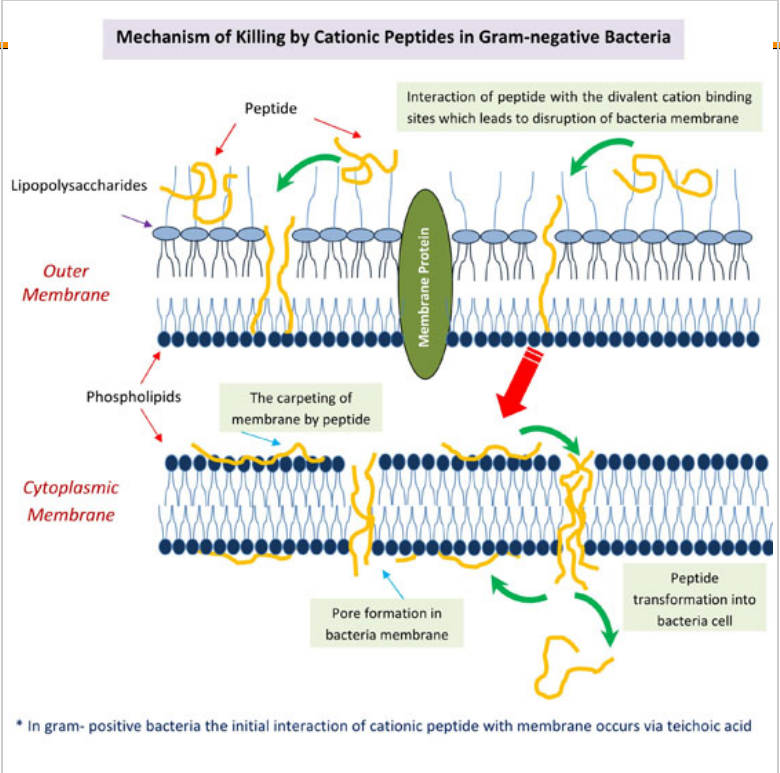

Unveiling the degradative route of the V247M α-sarcoglycan mutant responsible for LGMD-2D.
June 27, 2014


Immunohistochemical localization of oxytocin receptors in human brain.
June 27, 2014

Impeding macrophage entry into hypoxic tumor areas by Sema3A/Nrp1 signaling blockade inhibits angiogenesisand restores antitumor immunity.
June 27, 2014

Functional role of endothelial adhesion molecules

with the same ranges of inhibitory values (MIC 8 mg/L and MBC 32 mg/L) in early 24 h but after 48 h the MIC and MBC remained constant for CM11 peptide, while for CM15 peptide these parameters were not stable. Results highlighted bacteriostatic potential of CM11 peptide even after 48 h with a remarkablestability in environment of the experiments. So based on these results, we investigated antibacterial activity of CM11 peptide against multi-drug resistant *Klebsiella pneumonia* and *Salmonella typhimurium* strains.



in the early stages of brain metastasis.
June 27, 2014

The angiogenic effects of ischemic conditioning in experimental critical limb ischemia.
June 27, 2014

Implantation serine proteinase 2 is a monomeric enzyme with mixed serine proteolytic activity and can silence signalling via proteinase activated receptors.
June 27, 2014

The bidirectional p53-Wrap53{Beta} promoter is controlled by common cis- and trans-regulatory elements.
June 27, 2014

Translational control during endoplasmic reticulum stress beyond phosphorylation of the translation initiation factor eIF2{Alpha}.
June 27, 2014

Sulforaphane mitigates genotoxicity induced by radiation and anticancer drugs in human lymphocytes.
June 27, 2014

The plasma protein fibrinogen stabilizes clusters of red blood cells in microcapillary flows.
June 27, 2014

Spontaneous slow replication fork progression elicits mitosis alterations in homologous recombination-deficient mammalian cells
June 23, 2014

Targeting DNGR-1 (CLEC9A) with antibody/MUC1 peptide conjugates as a vaccine for carcinomas.
June 23, 2014

Quantitative proteome analysis of alveolar type-II cells reveals a connection of integrin receptor subunits beta 2/6and WNT signaling.
June 23, 2014

G protein-dependent basal and evoked endothelial cell vWF secretion.
June 23, 2014

Microdosimetric measurements in the thermal neutron irradiation facility of LENA reactor.
June 23, 2014

Minocycline prevents retinal inflammation and vascular permeability following ischemia-reperfusion injury.
June 23, 2014

Gene expression pattern of Treg and TCR Vγ subfamily T cells before and after specific immunotherapy in allergic rhinitis.
June 23, 2014

Signaling mediated by the NF-κB sub-units NF-κB1, NF-κB2 and c-Rel differentially regulate Helicobacter felis-induced gastric carcinogenesis in C57BL/6 mice.
June 23, 2014

Gene expression and reproductive abilities of male Drosophila melanogaster subjected to ELF-EMF exposure.
June 23, 2014

Filtration is a time-efficient option to Histopaque, providing good-quality islets in mouse islet isolation.
June 17, 2014

Cell intrinsic and extrinsic factors synergize in mice with haploin sufficiency for Tp53, and two human del(5q)genes, Egr1 and Apc.

June 17, 2014

Role of IκB kinase-{Beta} in the growth-promoting effects of angiotensin II in vitro and in vivo.
June 17, 2014

Inhibition of serine/threonine protein phosphatase PP1 protects cardiomyocytes from tunicamycin-induced apoptosis and I/R through the upregulation of p-eIF2{Alpha}.
June 17, 2014

SUBSCRIBE FOR FREE TO GMD FOR UPDATES

Enter your email address below then click subscribe to receive the latest science updates from GMD!

Subscribe