Contribution ID: **15** Type: **Poster**

Membrane interacting peptides as positron emission tomography (PET) based infection imaging probes

Tuesday, 29 October 2019 23:44 (15 minutes)

Membrane interacting peptides as positron emission tomography (PET) based infection imaging probes

Jyotsna Bhatt Mitra, Archana Mukherjee, Mukesh Kumar, Ashutosh Dash

Abstract

Objective:

Ubiquicidin (UBI) or ribosomal protein S30 (RS30) is a result of post-translational processing of a 133-amino-acid fusion protein Fau, consisting of an N-terminal 74-amino-acid polypeptide FUBI and the C-terminal 59 amino acid RS30 polypeptide also known as Ubiquicidin. Fragments derived from the RS30/ubiquicidin are known to detect bacteria *in-situ*. UBI (29-41) has been labeled with ^{99m}Tc as well as ^{68}Ga and ^{18}F in order to develop single photon emission computed tomography (SPECT) agent and positron emission tomography (PET) based infection imaging agents respectively. A smaller fragment UBI (31-38) is also reported to show uptake in infectious foci. We set out to compare the potential of radiolabeled UBI (29-41) and UBI (31-38) fragments as PET based infection imaging probes with the aim of improving the sensitivity of detection.

Methodology:

To facilitate ^{68}Ga labeling, 1,4,7-triazacyclononane-1-glutaric acid-4,7-diacetic acid (NODAGA) conjugated peptide fragments UBI (29-41) and UBI (31-38) were utilized in the current study. Interaction of peptide conjugates was studied with bacterial as well as mammalian membranes models using isothermal titration calorimetry (ITC) and circular dichroism (CD). These peptide conjugates were labeled with ^{68}Ga in order to develop PET based infection imaging agent and tested for radiochemical purity (RCP), serum stability and in-vitro association with bacteria. Bio-distribution of the ^{68}Ga labeled peptides was carried out in mice bearing infection to understand the pharmacokinetics of these agents.

Results and discussion:

Both peptides selectively interacted with bacterial membrane model (anionic) and not with mammalian (neutral) membrane models. UBI (29-41) interacted more strongly with bacterial membrane model as compared to the octapeptide UBI (31-38). Stronger interaction of UBI (29-41) with bacterial membrane model could be explained by greater propensity to form helix in a "membrane like environment". Both peptide conjugates could be labelled with ^{68}Ga, with high RCP. ^{68}Ga labeled peptide conjugates were found to be comparable in terms of in-vitro association with bacteria and bio-distribution in mice bearing infection.

Conclusion: Our results indicate that NODAGA-UBI (29-41) was superior to NODAGA-UBI (31-38) with respect to binding to bacterial membranes.

Primary authors: Mrs BHATT MITRA, JYOTSNA (BHABHA ATOMIC RESEARCH CENTRE); Dr MUKHERJEE, ARCHANA (Bhabha Atomic Research Centre); Dr MUKESH, KUMAR (BHABHA ATOMIC RESEARCH CENTRE); Dr ASHUTOSH, DASH (Bhabha Atomic Research Centre)

Presenter: Mrs BHATT MITRA, JYOTSNA (BHABHA ATOMIC RESEARCH CENTRE)