MICROBIOLOGY SOCIETY

This is to confirm that

Miguel A. Matilla

Attended the **ANNUAL CONFERENCE** ONLINE **2021** 26–30 April **2021**

President 

Date 04.05.21

Monday, 26 April 2021
10:00 - 10:15

Save

Offered paper: Molecular mechanisms of chemosensory signalling and chemoreceptor adaptation in beneficial and phytopathogenic bacteria

Miguel Matilla, EEZ-CSIC, Spain

ABSTRACT

Chemotactic signalling is initiated by the recognition of chemoeffectors by the chemoreceptor ligand binding domain (LBD). The mechanism of transmembrane signalling is predicted to involve a piston-like shift of the final helix of the LBD, triggering the chemotactic signalling cascade. However, this piston-shift model is still under discussion. We investigate here the sensing and signal transduction mechanisms of the broad range PcaY_PP chemoreceptor from the rhizobacterium Pseudomonas putida. Crystal structures of PcaY_PP-LBD in the absence and in complex with four chemoeffectors revealed that an extensive hydrogen bonding network is responsible for PcaY_PP ligand promiscuity. The comparison of the apo and holo structures did not reveal any piston-like shift, but evidenced a lateral displacement in the membrane-proximal helix sections. Chemoreceptor ligand affinity is modulated by the coordinated action of CheR and CheB, enzymes that methylate and demethylate, respectively, glutamate residues at the chemoreceptor signalling domain. Studies in Escherichia coli showed that specific chemoreceptors possess C-terminal pentapeptides that represent additional binding sites for CheR/CheB. However, the physiological role of these pentapeptides remains unknown. More than half of Pectobacterium atrosepticum (Pa) chemoreceptors have C-terminal pentapeptides and this phytopathogen is an excellent model to investigate their physiological relevance. We report that CheR_Pa binds pentapeptides with different affinities, whereas CheB_Pa was unable to recognize pentapeptides. The 3D structure of CheB_Pa revealed a structural disorder in the pentapeptide binding region that may explain its failure to bind these peptides. Our data provide new insights into the diversity of molecular mechanisms that modulate chemosensory pathway function.

Date: 03/24/2021 [04:57:01 PM CET]
From: Joanne Berry <J.Berry@microbiologysociety.org>
To: Becci Hurst <B.Hurst@microbiologysociety.org>
Subject: Microbiology Society Annual Conference Online 2021 - Microbial physiology, metabolism and molecular biology

Dear Speaker,

We are delighted that you have agreed to present at the Microbiology Society Annual Conference Online 2021, which is taking place digitally between 26 – 30 April 2021.

Your presentation will form part of a session entitled: **Microbial physiology, metabolism and molecular biology**.

This will run on **Monday 26 April 10am to 1pm**.

Unless otherwise instructed, your talk should be **12 minutes** with **3 minutes** for questions.

In order to ensure that your online attendance at the conference goes as smoothly as possible for you, we'd be very grateful if you could please follow the instructions below:

Live presentations
Sessions at Annual Conference Online will be run using Zoom and you will be presenting your talk live followed by a Q&A (please do let me know as soon as possible if you cannot present live for any reason). The online programme is currently being updated and I would encourage you to check the webpage here to see your exact presentation time from next week onwards.

Rehearsal
Rehearsals will be held from 12-16 April to support your live presentations at the event and to answer any questions you may have. You will receive a Doodle poll this week to indicate your availability and myself or one of my colleagues will confirm rehearsal times and dates with you before 2 April.

I look forward to seeing you very soon. In the meantime if you have any questions, please do not hesitate to contact me.

Best wishes,
Jo

Joanne Berry | Conference and Events Manager
Microbiology Society | www.microbiologysociety.org
14-16 Meredith Street, London, EC1R 0AB, UK

AMEND CONTINUE

MICROBIOLOGY SOCIETY ANNUAL CONFERENCE ONLINE 2021

Submission ID

24

Title

Molecular mechanisms of chemosensory signalling and chemoreceptor adaptation in beneficial and phytopathogenic bacteria

Abstract

Chemotactic signalling is initiated by the recognition of chemoeffectors by the chemoreceptor ligand binding domain (LBD). The mechanism of transmembrane signalling is predicted to involve a piston-like shift of the final helix of the LBD, triggering the chemotactic signalling cascade. However, this piston-shift model is still under discussion. We investigate here the sensing and signal transduction mechanisms of the broad range PcaY_PP chemoreceptor from the rhizobacterium *Pseudomonas putida*. Crystal structures of PcaY_PP-LBD in the absence and in complex with four chemoeffectors revealed that an extensive hydrogen bonding network is responsible for PcaY_PP ligand promiscuity. The comparison of the apo and holo structures did not reveal any piston-like shift, but evidenced a lateral displacement in the membrane-proximal helix sections. Chemoreceptor ligand affinity is modulated by the coordinated action of CheR and CheB, enzymes that *methylate and demethylate, respectively,* glutamate residues at the chemoreceptor signalling domain. Studies in *Escherichia coli* showed that specific chemoreceptors possess C-terminal pentapeptides that represent additional binding sites for CheR/CheB. However, the physiological role of these pentapeptides remains unknown. More than half of *Pectobacterium atrosepticum* (Pa) chemoreceptors have C-terminal pentapeptides and this phytopathogen is an excellent model to investigate their physiological relevance. We report that CheR_Pa binds pentapeptides with different affinities, whereas CheB_Pa was unable to recognize pentapeptides. The 3D structure of

Author approval

I confirm that this submission has been approved by all authors

Authors and affiliations

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Session categories

Microbial physiology, metabolism and molecular biology forum

Presentation

Oral

Title (50 words): **Molecular mechanisms of chemosensory signalling and chemoreceptor adaptation in beneficial and phytopathogenic bacteria**

Authors: Miguel A. Matilla, Felix Velando, Jose A. Gavira, Tino Krell

"Microbial physiology, metabolism and molecular microbiology forum"

Abstract (250 words):

Chemotactic signalling is initiated by the recognition of chemoeffectors by the chemoreceptor ligand binding domain (LBD). The mechanism of transmembrane signalling is predicted to involve a piston-like shift of the final helix of the LBD, triggering the chemotactic signalling cascade. However, this piston-shift model is still under discussion. We investigate here the sensing and signal transduction mechanisms of the broad range PcaY_PP chemoreceptor from the rhizobacterium *Pseudomonas putida*. Crystal structures of PcaY_PP-LBD in the absence and in complex with four chemoeffectors revealed that an extensive hydrogen bonding network is responsible for PcaY_PP ligand promiscuity. The comparison of the apo and holo structures did not reveal any piston-like shift, but evidenced a lateral displacement in the membrane-proximal helix sections. Chemoreceptor ligand affinity is modulated by the coordinated action of CheR and CheB, enzymes that methylate and demethylate, respectively, glutamate residues at the chemoreceptor signalling domain. Studies in *Escherichia coli* showed that specific chemoreceptors possess C-terminal pentapeptides that represent additional binding sites for CheR/CheB. However, the physiological role of these pentapeptides remains unknown. More than half of *Pectobacterium atrosepticum* (Pa) chemoreceptors have C-terminal pentapeptides and this phytopathogen is an excellent model to investigate their physiological relevance. We report that CheR_Pa binds pentapeptides with different affinities, whereas CheB_Pa was unable to recognize pentapeptides. The 3D structure of CheB_Pa revealed a structural disorder in the pentapeptide binding region that may explain its failure to bind these peptides. Our data provide new insights into the diversity of molecular mechanisms that modulate chemosensory pathway function.