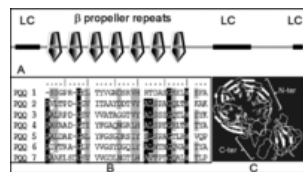


DR1769, a Protein with N-Terminal Beta Propeller Repeats and a Low-Complexity Hydrophilic Tail, Plays a Role in Desiccation Tolerance of *Deinococcus radiodurans*

Yogendra S. Rajpurohit and Hari S. Misra

+ Author Affiliations

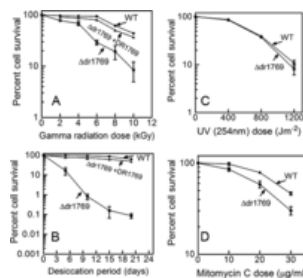


View larger version:

[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)
FIG 1

Functional domain analysis of DR1769. (A) Primary sequence of DR1769, searched for the presence of functional motifs showing 7 beta propeller repeats making PQQ-interacting motifs (PQQ) in the N-terminal domain and low complexity (LC) region, largely confined to the C-terminal domain;

(B) beta propeller repeats (PQQ1 through PQQ7) showing the typical signature of the WD motif, starting with consensus G and ending with W; (C) modeled structure of DR1769 showing typical arrangement of 7 beta propeller repeats of the N-terminal domain (N-Ter) and disorganized C-terminal domain (C-Ter).

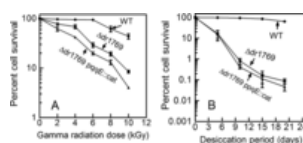


View larger version:

[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)
FIG 2

DNA damage response of the $\Delta dr1769$ mutant. *D. radiodurans* cells (■), $\Delta dr1769$ mutant cells (●), and $\Delta dr1769$ cells expressing wild-type DR1769 (▲) were treated with different doses of gamma radiation (A), desiccation (B), UV (254 nm) (C), and mitomycin C (D). Different dilutions of these cells were plated on LB agar plates supplemented with the required antibiotics, numbers of CFU per milliliter were computed, and the percent cell survival was calculated by considering the percentage of CFU of untreated samples as 100%.

survival was calculated by considering the percentage of CFU of untreated samples as 100%.



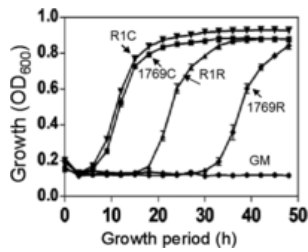
View larger version:

[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)
FIG 3

Genetic interaction of *pqqE* and *dr1769* loci in DNA damage response of *D. radiodurans*. *D. radiodurans* (■), $\Delta dr1769$ mutant (●), and $\Delta dr1769pqqE::cat$ (▲) cells were treated with different doses of gamma radiation (A) and desiccation (B), the number of CFU per milliliter was computed, and percent cell survival was calculated by considering the percentage of CFU of untreated samples as 100%.

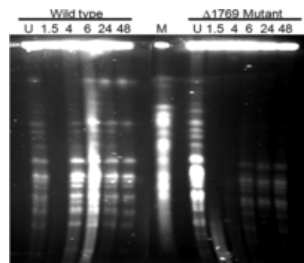
per milliliter was computed, and percent cell survival was calculated by considering the percentage of CFU of untreated samples as 100%.

FIG 4



View larger version:
[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)

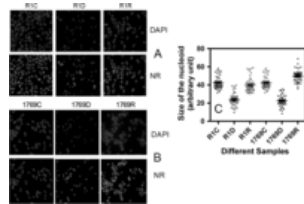
Effect of *dr1769* deletion on normal growth and recovery from desiccation. *D. radiodurans* R1 (▼, ▲) and $\Delta dr1769$ mutant (■, ◆) cells were grown in rich medium under normal conditions (▼, ■) and stressed at 5% humidity for 20 h and then allowed to recover (▲, ◆). Optical density at 600 nm was measured continuously on a microtiter-based density reader. Growth medium (●, GM) was taken as the blank control.



View larger version:
[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)

FIG 5

DSB repair kinetics during postirradiation recovery in *D. radiodurans*. *D. radiodurans* R1 (wild type) and $\Delta dr1769$ mutant ($\Delta dr1769$ mutant) cells were treated with 6.5 kGy gamma radiation and allowed to grow at different time periods (1.5, 4, 6, 24, and 48 h), and PFGE was carried out along with unirradiated (U) respective controls.

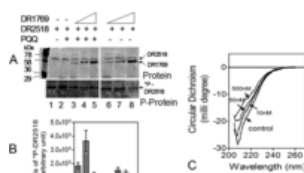


View larger version:
[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)

FIG 6

Effect of *dr1769* deletion on nucleoid compactness under desiccation. *D. radiodurans* R1 (A) and $\Delta dr1769$ mutant (B) untreated cells (R1C, 1769C) were incubated at 5% humidity for 24 h (R1D, 1769D) and allowed to recover in rich medium under normal growth conditions (R1R, 1769R). These cells were stained for nucleoid

(DAPI) and with Nile red (NR), and images were taken with a fluorescence microscope. (C) The false blue areas of DAPI-stained images were measured using Image J software and plotted in GraphPad Prism software. Data shown here are representative of a reproducible experiment repeated three times independently. For a color version of this figure, you may refer to Fig. S2 in the supplemental material.



View larger version:
[In this page](#) [In a new window](#)
[Download as PowerPoint Slide](#)

FIG 7

DR1769 effect on DR2518 autophosphorylation and DR1769 interaction with pyrroloquinoline quinone (PQQ). Purified recombinant DR2518 was mixed with increasing molar ratios of 1:1 (lanes 3 and 6), 1:5 (lanes 4 and 7), and 1:10 (lanes 5 and 8) of purified recombinant DR1769 in the presence (lanes 2 to 5) and absence

(lanes 1, 6, 7, 8) of 10 nM PQQ and 1 μ Ci [32 P]ATP for 1 h. (A) Proteins were separated on an SDS-PAGE gel, the gel was stained with Coomassie blue (Protein) and dried, and autoradiogram (P-protein) was developed. (B) The intensity of phosphoprotein bands of each lane (1 to 8) were computed and plotted. (C) Interaction of PQQ with recombinant purified DR1769 was checked by circular dichroism spectroscopy in the absence (control) and presence of increasing concentrations (10 nM, 50 nM, and 500 nM) of PQQ.

Copyright © 2013, American Society for Microbiology. All Rights Reserved.

We recommend

Involvement of a protein kinase activity inducer in DNA double strand break repair and radioresistance of *Deinococcus radiodurans*.

Yogendra S Rajpurohit et al., *J Bacteriol*, 2008

Radioresistance of *Deinococcus radiodurans*: functions necessary to survive ionizing radiation are also necessary to survive prolonged desiccation.

V Mattimore et al., *J Bacteriol*, 1996

Effect of a *recD* mutation on DNA damage resistance and transformation in *Deinococcus radiodurans*.

Matthew D Servinsky et al., *J Bacteriol*, 2007

FrnE, a cadmium-inducible protein in *Deinococcus radiodurans*, is characterized as a disulfide isomerase chaperone in vitro and for its role in oxidative stress tolerance in vivo.

Nivedita P Khairnar et al., *J Bacteriol*, 2013

Functional characterization of the role of the chromosome I partitioning system in genome segregation in *Deinococcus radiodurans*.

Vijay Kumar Charaka et al., *J Bacteriol*, 2012

Dose Effects of Ion Beam Exposure on *Deinococcus Radiodurans*: Survival and Dose Response

Song Dao-jun et al., *Plasma Science and Technology*, 2001

Effect of N+ Beam Exposure on Superoxide Dismutase and Catalase Activities and Induction of Mn-SOD in *Deinococcus Radiodurans*

Song Dao-jun et al., *Plasma Science and Technology*, 2000

Missense mutations in the WD40 domain of AHI1 cause non-syndromic retinitis pigmentosa

Sylvia E C van Beersum et al., *J Med Genet*, 2017

BRCA1 Variant Confers Intermediate Cancer Risk

Amanda B Spurdle et al., *Medscape*, 2012

PPAR Gamma and Metabolism: Insights From the Study of Human Genetic Variants

Mark Gurnell, *Medscape*, 2003

Powered by