

# Abstract

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## Abstract

**Background:** *Bacillus subtilis* is a model organism for studying the cell cycle and cell division. The cell cycle is a highly regulated process that ensures the accurate replication and distribution of genetic material. In *B. subtilis*, the cell cycle is controlled by a series of regulatory proteins, including Spo0A, Spo0B, and Spo0C. Spo0A is a central regulator of the cell cycle, and its activity is controlled by a complex network of phosphorylation events. Spo0B and Spo0C are kinases that phosphorylate Spo0A, and their activity is also regulated by other proteins. The cell cycle is essential for the growth and survival of *B. subtilis*, and understanding its regulation is important for developing new antibiotics and biotechnological applications.

**Results:** We have identified a new protein, Spo0D, that is involved in the regulation of the cell cycle. Spo0D is a phosphatase that dephosphorylates Spo0A, and its activity is essential for the proper functioning of the cell cycle. We have shown that Spo0D is expressed in a cell cycle-dependent manner, and its activity is regulated by the same regulatory network as Spo0A. Spo0D is a novel member of the phosphatase family, and its discovery provides new insights into the regulation of the cell cycle in *B. subtilis*.

**Conclusions:** Spo0D is a novel phosphatase that is essential for the regulation of the cell cycle in *B. subtilis*. Its discovery provides new insights into the complex regulatory network that controls the cell cycle. Further studies are needed to determine the exact mechanism of Spo0D action and its interactions with other proteins in the cell cycle regulatory network.

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**Competing Interests:** The authors have nothing to disclose.

## Introduction

The cell cycle is a highly regulated process that ensures the accurate replication and distribution of genetic material. In *B. subtilis*, the cell cycle is controlled by a series of regulatory proteins, including Spo0A, Spo0B, and Spo0C. Spo0A is a central regulator of the cell cycle, and its activity is controlled by a complex network of phosphorylation events. Spo0B and Spo0C are kinases that phosphorylate Spo0A, and their activity is also regulated by other proteins. The cell cycle is essential for the growth and survival of *B. subtilis*, and understanding its regulation is important for developing new antibiotics and biotechnological applications.

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4,5,6,7,8, 9, 10. A





**Figure 3. / formation of sense-antisense fusions.**





in vitro

9.

Materials and Methods

in vitro

DNA (IEB) ... HXK1, E29 ... KRE29 ... SPT7; ... Xho ... 1 μ ... 37°C ... BE, ... A5100 ... IA ... 4 ... 0.5 ... ED ... 0.1% D ... 1 μ ... C ... (IEB), ... 50°C ... 1 ... HXK1/KRE29 ... 53°C ... SPT7 ... (A) ... 50 ... IA ... 5 ... (A) ... (IEB) ... 1 ... A ... (A ...). ... : 0.5, ... IA, 500, ... IA ( ...), ... 125, ... 0.5 μ ... 10 ...

6.5 μ ... 65°C ... 5 ... 2 ... 2 μ ... 5 ... 1 μ ... 0.1 ... D ... 0.5 μ (100 ...), ... 10 ... 42°C ... 50 ... 70°C ... 15 ... ( ...), ... 250 ... 42°C ... D IA ... D IA ... 500 ... IA ... 0.5 ... Xho -Pvu ... A ... D (C ... ) ... 65°C ... 6 μ ... 1 ... A ... : 0.5, ... IA, 500, ... IA ( ...), ... 125, ... 8.25 μ ... 5 ... 70° ... 5 ... 1.25 μ ... 10 ... 2.5 μ ... 5 ... 0.5 μ (5 ... ) A ... 1 ... 37°C.

Supporting Information

Table S1 ... A ... C ... E ...

