

FEMSLE 06173

# Lysis of *Escherichia coli* cells induced by bacteriophage T4

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(Received 3 June 1994; revision received 14 July 1994; accepted 18 July 1994)

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**Abstract:** Structural changes in the envelope of *Escherichia coli* cells accompanying their lysis from without by bacteriophage T4 have been studied. The hypothesis concerning the role of collapse of membrane potential and formation of periplasmic vesicles in the process of lysis from without has been advanced.

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**Key words:** Phage infection; Multiplicity of infection; Membrane potential; Membrane invagination; Periplasmic vesicles; *Escherichia coli*

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## Introduction

Bacteriophage T4 is known to be capable of lysing cells of *Escherichia coli* by two different processes [1–3]. Firstly, lysis of cells, as a necessary stage of the living cycle of phage, is observed before the newly formed phage particles leave the cytoplasm at later stages of infection (lysis from within). Secondly, the phage interacting with the outer surface of the bacterial cell can induce lysis upon a great multiplicity of infection (so-called lysis from without).

Up to now the mechanism of both processes has been studied rather superficially [3]. It is commonly accepted that bacteriophage lysis from within is the result of the accumulation of phage-encoded lysozyme during late protein synthesis.

Despite some available evidence on direct participation of phage protein (e lysozyme) in lysis from within [4,5], it was subsequently found that some mutants, which are deficient in the product of gene e, are also able to initiate lysis [2,6]. The process of lysis was shown to be capable of being induced by the product of gene 5, i.e. by a protein belonging to the central part of the T4 baseplate [6].

The process of lysis from without complicates our thinking about T4 lysis. It is known that mutations in gene 5 abolish the ability to cause lysis from without [6]. It was suggested that gp5 is responsible for the lytic activity which is intrinsic to the virion and probably acts to cause localized degradation of the murein layer during the infection process [3]. However, the mechanism of lysis from without and the structural changes in the cell membranes taking place during lysis have practically not been studied.

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