Location of the Gene (ndk) for Nucleoside Diphosphate Kinase on the Physical Map of the Escherichia coli Chromosome

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Nucleoside diphosphate kinase is essential to maintain the cellular concentrations of all nucleoside triphosphates and deoxynucleoside triphosphates at functional levels (3). The gene (ndk) for this enzyme from Myxococcus xanthus has been cloned, and its DNA sequence has been determined (8, 9). A genetic experiment indicated that the ndk gene is essential for cell growth of M. xanthus (8, 9). Recently the ndk genes from various eukaryotes (Dictyostelium discoideum [7], rat [5], mouse [12], human [12], and Drosophila [2]) have been found to also be cloned and sequenced. These nucleoside diphosphate kinases differ from each other kinases from different sources show substantial sequence similarities (2). From the results of these sequences, oligonucleotide primers were synthesized. On the basis of the fact that the ndk gene is located near hisS in Salmonella typhimurium (11), phase DNAs from 8E3 (phage 427), 2D5 (phage 428), 7F8 (phage 429), 5E10 (phage 430), 6F10 (phage 431), and 8E12 (phage 432) of the Kohara genomic lambda library were used in the polymerase chain reaction (13). Phages 428 and 429 gave rise to a DNA band, the sequence of which matched the consensus sequence of the nucleoside diphosphate kinase. By using this DNA fragment, the ndk gene was cloned and sequenced (4). The identity of the predicted gene product as Escherichia coli nucleoside diphosphate kinase was confirmed by comparison of the N-terminal sequence with that determined by direct sequencing of the purified protein (10). Nucleoside diphosphate kinase of E. coli was found to consist of 143 amino acid residues, having 56% identity with that from M. xanthus. The exact position of the gene on the Kohara map (6) was determined to be at 2646 to 2646.5 kb with the transcriptional direction from right to left (Fig. 1). Thus, the ndk gene is located at 54.2 min on the E. coli genetic map near two other genes for GTP-binding proteins, lepA and era, mapped at 55.4 min (1).

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REFERENCES