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Chromosomal mapping of genes encoding subunits of complex I from Neurospora crassa

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Abstract

The genes encoding the 21 kDa protein and the 19.3 kDa, 21.3 kDa and 24 kDa iron-sulfur subunits of complex I were located, by RFLP analysis, in Linkage Groups IV, VI, VI and V, respectively, of the *Neurospora crassa* genome

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Complex I or respiratory chain NADH dehydrogenase is located in the inner mitochondrial membrane, where it catalyzes electron transfer from NADH to ubiquinone through a series of protein-bound prosthetic groups, coupled to proton translocation across the membrane. In mammals and *N. crassa*, seven subunits of this mitochondrial enzyme are encoded and synthesized in the organelle, whereas about 30 others are imported from the cytoplasm. The nuclear-coded genes are usually called *nuo* (for NADH:ubiquinone oxidoreductase) followed by the molecular mass of the respective polypeptide. We have determined the chromosomal location of four new nuclear genes encoding subunits of complex I by the analysis of segregation of RFLPs among the strains of the multicent-2 cross kit (Metzenberg *et al.* 1984 Fungal Genet. Newsl. **31**:35-39). Using cDNAs encoding proteins of 19.3 kDa, 21 kDa, 21.3 kDa and 24 kDa as probes (the homologues of bovine PSST, AQDQ, TYKY and 24 kDa proteins, respectively; Azevedo *et al.* 1994 Biochim. Biophys. Acta **1188**:159-161; Duarte *et al.* 1996 Biochim. Biophys. Acta **1275**:151-153; unpublished results), we have isolated the respective genomic clones from a λ J1 library obtained from the FGSC. Genomic DNA fragments containing the genes were then labeled with different non-radioactive techniques employing either PCR or random-primer labeling, and used in the RFLP analysis. The genes encoding the 21 kDa protein and the 19.3 kDa, 21.3 kDa and 24 kDa iron-sulfur proteins were located in Linkage Groups IV, VI, VI and V, respectively, of the *N. crassa* genome (Table 1). With these assignments, ten nuclear-coded single-copy genes encoding subunits of complex I have been located (reviewed in Videira 1998 Biochim. Biophys. Acta, in press).

Table 1. Segregation of RFLPs, related to complex I genes, among the strains of the multicent-2 cross kit

	AABBCCDDEEEEEFFGGHHIIJJKKLLMMNNOOPPQQRR
	14671457135713145768141414582324142414
nuo19.3	M-MOMMMMOOMMMMOOOOOO-OOOMMOOOOMMMMOOMM
nuo21	MOMMMOOMMOOMOMOMOOOM-OOMOMOMMOM-OMMMMO
nuo21.3c	M-OOMOOMOMOMOMMOOOMOOOOMOMOMOMMOMOMOOM
nuo24	M-O-MOOMOOMMMOOO-MOO-MMOOM-MOMOMMMOMM-