

Light-induced cyanide-insensitive respiration in wild type *Neurospora crassa*

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Abstract

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Light-induced cyanide-insensitive

respiration in wild type Neurospora crassa

pressure lamps HQA 125 W Osram) which also decreased the growth rate.

Neurospora was grown at 25-30°C in 2 1-Erlenmeyer flasks with 300 ml Vogel's minimal medium containing 2% sucrose (Vogel 1956 Microbial. Genet. Bull 13: 42) on a reciprocal shaker with 140 strokes per min. Media were inoculated with 10^8 conidia/ 300 ml. Irradiation started 2 h after inoculation. A slow increase of temperature in the cultures (maximally 5-12°C) could not be prevented with the intercalated heat absorbing filters (K1, Schott), but growing parallel wrapped cultures or cultures at 37°C in darkness could not induce cyanide-insensitive respiration.

Respiratory rates via the cyanide-insensitive respiration pathway were determined in the presence of 2 mM KCN with an oxygen electrode, via the cyanide-sensitive way in the presence of 1.5 mM salicyl hydroxamic acid (SHAM). These values do not add up to 100% since electron transport is not fully operative in both pathways before addition of the respective inhibitor. Cyanide insensitivity did not appear immediately with the onset of irradiation but showed a lag phase of 2-4 h. The cyanide-insensitive respiration decreased after 6-8 h of irradiation or after transferring the cultures into darkness. Irradiation of older cultures did not induce cyanide insensitivity.

Cyanide-insensitive respiration of a mycelium irradiated for 8 h with 450 Wm^2 was 42% of the uninhibited respiration (i.e. no inhibitor added); cyanide-sensitive respiration was 73% of the total. The dark control was 96% cyanide-sensitive.

In isolated mitochondria from irradiated mycelium the cyanide-insensitive and SHAM-sensitive respiration with succinate was 30% of the uninhibited respiration, and with exogenous NADH it was 38%.

Since NADH dehydrogenase, succinate dehydrogenase and ubiquinone are involved in both pathways, we do not believe that cyanide-insensitive respiration is induced by their photoinactivation (see Ramadan-Talib and Prebble 1978 Biochem J. 176: 767) under our conditions. (Supported by the Deutsche Forschungsgemeinschaft.) - - - Institut für Chemische Pflanzenphysiologie, Corrensstr. 41, 74 Tübingen, West Germany.

Continuous irradiation of young (2-6 h) liquid cultures of Neurospora crassa wild type 74-OR23-IA (FGSC #987) can induce cyanide-insensitive respiration (for review of such respiration see Solomons 1977 Ann. Rev. Plant Physiol. 28: 279). Rather high intensities of white light were needed to induce ($>450 \text{ Wm}^2$ measured in front of the culture vessel, about 45 Wm^2 behind it; light sources: Atralux 230V, 300 W Osram or mercury high pressure lamps HQA 125 W Osram) which also decreased the growth rate.