Chiu, S. W. & Moore, D. (1999). Carbon metabolism in the Oyster mushroom, *Pleurotus pulmonarius*. In: *Abstracts, Seventh International Fungal Biology Conference*, (ed. J. H. Sietsma), p. 46. University of Groningen, The Netherlands, 22 -25 August, 1999.

CARBON METABOLISM IN THE OYSTER MUSHROOM, *PLEUROTUS PULMONARIUS*

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The Oyster mushroom (*Pleurotus* sp.) is the second most popular fresh mushroom in the world. Recently, it was reported that strains tolerant to the sugar analogue 2-deoxy-D-glucose (2-DG) were more productive in cultivation. This study examines the carbon metabolism and the effect of 2-DG on this metabolism of two 2-DG resistant strains of *Pleurotus pulmonarius*. Media containing either glucose or maltose as the C source. Lower protein productivity and lower activity of glutamate-oxalacetate transaminase (GOT) were observed in maltose media, although fruit bodies appeared more rapidly on maltose media. Addition of 2-DG to either glucose or maltose media did not affect the mycelial growth rate of vegetative cultures of the resistant mutants, nor intracellular protein productivity, or specific activities of glucose-6-phosphate dehydrogenase (G6DPH: marker enzyme for the pentose phosphate (PPP) pathway), fructose 1,6-bisphosphate aldolase (aldolase) and glucose 6-phosphate isomerase (PHI; both of which are marker enzymes for the Embden-Meyerhof-Parnass (EMP) pathway), or the two transaminases GOT and glutamate-pyruvate transaminase (GPT). However, 2-DG did inhibit renewed fruiting *in vitro* and delayed fruiting and decreased yield in cultures grown on waste-paper compost. In the fruit body tissues, 2-DG present in compost decreased protein productivity in stipe. When *P. pulmonarius* initiated fruiting, GOT specific activity declined, aldolase activity increased, and PHI specific activity was reduced in the whole culture. The specific activity of PHI was maintained at such low levels in both stipe and pileus tissues that we conclude that the EMP pathway makes only a minor contribution to hexose metabolism in the fruit body. G6PDH and GOT activities were high in fruit body tissues (highest in stipe tissues). Thus, although both PPP and EMP pathways contribute to vegetative growth, the PPP pathway is the main route for metabolism of glucose to pyruvate in fruit bodies. The tolerance mechanism to 2-DG does not involve direct intervention in carbon flux, but the different reactions to 2-DG imply that “fruit-body-specific” metabolism is differentially sensitive to inhibition by this analogue. 2-DG may act as a paramorphogen through some regulatory mechanism. 2-DG is phosphorylated but not further metabolised and can influence metabolism through the uncontrolled rise in 2-DG 6-phosphate concentration, depletion of ATP, rise in ADP, and drain on metabolic phosphate. It is feasible, therefore, that high yielding strains have an altered “fruit-body-specific” metabolism which can be manifested in mycelium *in vitro* as a natural tolerance to 2-DG.