

Enzyme patterns in regenerating rat gastrocnemius muscles

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Rat gastrocnemius muscles are minced and orthotopically autografted. This procedure induces a mass regeneration of the muscles [Carlson, *The Regeneration of Minced Muscles*, Basel, Karger (1972)]. Rats are killed 1, 3, 6, 15, 30, 60, 120 and 240 days after the operation. (n= 6 for each duration of regeneration). Muscle extracts are made in 80 mM KCl, 1 mM TES (pH 7) and 1 mM dithiothreitol. The activities of eleven enzymes are measured: creatine kinase; glycogen phosphorylase; phosphofructokinase; aldolase; pyruvate kinase; lactico-, isocitrico-, malico- and glucose-6-phosphate dehydrogenase; β -galactosidase; and β -glucoseaminidase. Activities are expressed in International Units (25° C) per gram of wet tissue. DNA and total creatine (sum of creatine and phosphocreatine) are also measured (in μ mol/g). The correlation matrix (Q-type) between eight stages of regeneration and control is computed,

based on the standard scores of the 13 components (11 enzymes and 2 substrates). A principal component analysis is then performed. The first and the second factor together account for 93% of the total variance. Factor 1 loadings are negative for control and for the two latest stages of regeneration (120 and 240 days). They are positive for all the other stages of regeneration. Factor 2 loadings are positive for the early stages of regeneration (1, 3, 6 and 15 days) and negative for the other stages and the controls. In the plane defined by these factors, 'seven (out of 8) of the points representative of the regeneration stages, together with that of controls, are located in ranking order an α -circumference: -zero-centered, 0.92 in radius. (The eighth point, 120 days; is located inside the circumference; near the 240. day point). This map also demonstrates that changes in regenerating muscles decrease in rates between day 1 and day 60, there, being little difference between day 30 and 60. It also brings out that there is a large change between day 60 and day 120 in spite of the fact that histological studies show little change during that period (Carlson, 1972). This is the first indication of a late enzymatic maturation in regenerating muscles.