

Modified Kluver-Barrera staining for the study and diagnosis of fetal encephalopathies

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SUMMARY

In fetal post-mortem examinations of the Central Nervous System, any lesions must be carefully detected and identified in order to determine their etiology. Common abnormalities found in a fetal brain can be ascribed to incomplete or defective neuronal migration, often correlated with genetic syndromes or exogenous etiological factors. Neuronal migration begins between the 7th and 8th week of gestation, whereby neuroblasts migrate along radial extensions of glial cells located in paraventricular buds. In fetuses less than 20 weeks gestational age, since myelization has not begun yet in the telencephalon, histochemical techniques such as luxol fast blue (for myelin) or Kluver-Barrera staining (for myelin and neuroblasts) cannot be employed. In order to identify the (normal or pathologic) topography of these guiding fibers and their relation with migrating neuroblasts, we are proposing here to replace luxol fast blue with PAS, thus taking advantage of PAS-positivity of glycogen contained in the guiding glial fibers.

From 1984 to 2004, we performed 922 fetal-perinatal post-mortem examinations (46% before the 20th week of gestation). A double PAS-cresyl violet staining was developed on these cases, using Kluver-Barrera staining as a basis: cresyl violet was employed to highlight neurons, and luxol fast blue for myelin was replaced with a PAS staining for glycogen.

Results: PAS stains glycogen contained in glial fascicles which guide neuronal migration, highlighting migration trajectories with a Magenta red; conversely, neuroblasts are selectively blue stained by cresyl violet.

Histochemical stainings normally employed to study the nervous system in adult individuals, cannot be used to investigate fetal encephalon, because there is no myelin before week 20 of gestation. The double PAS-cresyl violet staining has proved to be a valuable tool in fetal encephalon diagnosis and in the study of neuronal migration and its likely defects.

INTRODUCTION

When fetal post-mortem examinations of the Central Nervous System are performed, any lesions must be carefully detected and correctly identified from a nosographic point of view, in order to determine their etiology.