EVALUATION OF DNA CONTENT AND CHROMATIN COMPLEXITY AS STRATIFICATION
PARAMETERS TO ASSESS SEVERE UROTHELIAL ATYPIAS IN URINARY CYTOLOGY
SPECIMENS OBTAINED IN A PATHOLOGY REFERENCE LABORATORY. Gerard J. O’Dowd,
Garry M. Marley, Michael Bacus, Roberto Orozco, David B. Durand, Robert
W. Veltri, Oklahoma City, OK; [presented by Dr. O’Dowd]

Diagnosis of urothelial atypia remains a prognostic dilemma for the
urologist and cytopathologist. There is a need for improved objective cellular
pathology methods to address this deficiency. This study involved the
evaluation of 58 patients having a history of bladder cancer and exhibiting
severe urothelial atypia diagnosed by a single uropathologist. These patients
were monitored over a period of about 24 months for evidence of
persistence, regression, or progression of their cytologic abnormalities. The
latter are defined as follows: persistence = no change in atypia status;
regression = a significant reduction in the cytologic findings to negative or
mild atypia; progression = increase in cytologic abnormalities to dysplasia or
carcinoma. For the purposes of this study severe atypia was defined as
urothelial changes that manifested some but not all the features of dysplasia
using both PAP and Feulgen stained 25 mm filter cell imprints. The
cytomorphologic abnormalities assessed included cellularity, nuclear size,
membrane irregularity and chromatin texture, as well as N/C ratio to
differentiate severe atypia from dysplasia. The Feulgen stained nuclear
images were then captured using a CAS-200 image analysis system
equipped with DNA ploidy and cell morphometry software. The DNA ploidy
patterns were assessed by at least two investigators and classified as
normal, out of normal range, and abnormal. Nuclear morphometry involved
the selection of four key Markovian chromatin features, and a analysis of
their complexity using two dimensional comparison plots. There was a
statistically significant correlation (Chi Square analysis) between normal DNA
content and regression (p=0.022); out of normal range DNA content and
persistence (p=0.018); and abnormal DNA content and progression
(p=0.05). Chromatin texture complexity analysis confirmed these
observations. These preliminary results suggest that quantitative image
analysis may provide adjunctive prognostic and diagnostic information of use
in the monitoring of patients exhibiting urothelial nuclear atypias.