

CLAIMS

1. A method for determining, in a patient presenting with hematuria, the level of risk for having urothelial cancer, comprising:
 - 5 a. providing a sample of urine from said patient;
 - b. quantifying a value, MI, comprising quantifying the levels of expression of human MDK, CDC2, HOXA13, and IGFBP5, and a further value, IL-8Rb, in said sample;
 - c. assessing the phenotypic variables Frequency of Hematuria (HFREQ), Age (AgeGT50), Gender, Smoking (SMK), and Red Blood Cell Count (RBC) of said patient;
 - 10 d. calculating a Genotypic plus Phenotypic Index (G+P INDEX) according to either:

formula (i), $G+P\ INDEX = (1 * HFREQ + 3 * Gender + 4 * SMK) + (5 * MI + 2 * IL-8Rb)$,

formula (ii), $G+P\ INDEX = (w1 * HFREQ + w2 * AgeGT50 + w3 * Gender + w4 * SMK + w5 * RBC) + (w6 * MI + w7 * IL-8Rb)$, or

formula (iii), $G+P\ INDEX = -8.46 + 0.79\ IGFBP5 - 1.60\ HOXA13 + 2.10\ MDK + 0.95\ CDC2 - 0.38\ IL8-Rb + 0.98\ SMK + 0.56\ HFREQ + 1.11\ Gender + 0.64\ AgeGT50$;

wherein HFREQ means the frequency of finding 3 or more red blood cells per high power field in a 6-month period; if frequency is low then HFREQ = 0, and if higher than 3 red blood cells per high power field, then 1; AgeGT50 refers to subject's age; if greater than 50 years then AgeGT50 = 1, and if less than 50 years, then 0; gender is assigned a value of 1 for male, and 0 for female; SMK means whether the subject is a current or ex-smoker; if non-smoker then SMK = 0 and if a smoker, then 1; RBC means red blood cell count; if 25 or more then RBC is set to 1, and if less than 25, then 0; and
 - 15 e. determining whether the G+P INDEX is greater than a threshold indicating the level of risk that the patient has urothelial cancer.

2. The method of Claim 1 where said threshold is selected from the group of G+P INDEX values of from 0 to 5, from 6 to 10, or from 11-15, where said value of from 0 to 5 indicates Low Risk, 6 to 10 indicates Moderate Risk, and 11-15 indicates High Risk.
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3. The method of Claim 2, where if said threshold is a G+P INDEX value of from 6-10, said patient is determined as being in need to undergo additional clinical or laboratory tests.
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4. The method of Claim 2, where if said threshold is a G+P INDEX value of from 11-15, said patient is determined as being in need to undergo additional clinical or laboratory tests.
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5. The method of Claim 2, where if said threshold is a G+P INDEX value of from 0-5, the patient is placed on a watch list for further clinical or laboratory tests.
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6. The method of any of claims 1 to 5, where the threshold is established using a statistical method, optionally wherein the statistical method is any one of Linear Discriminant Analysis (LDA), Logistic Regression (LogReg), Support Vector Machine (SVM), K-nearest 5 neighbors (KN5N), and Partition Tree Classifier (TREE).
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7. The method of any of claims 1 to 6, further comprising quantifying expression of one additional genotypic marker selected from Figure 6 or Figure 7.
8. The method of any of claims 1 to 7, where said step of quantifying genetic expression is carried out by detecting the levels of mRNA.
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9. The method of any of claims 1 to 7, wherein said step of quantifying genetic expression is carried out by detecting the levels of cDNA, optionally where said

step of quantifying genetic expression is carried out using an oligonucleotide complementary to at least a portion of said cDNA.

10. The method of any of claims 1 to 8, where said step of quantifying genetic
5 expression is carried out using qRT-PCR method using a forward primer and a reverse primer.
11. The method of any of claims 1 to 7, where said step of quantifying genetic expression is carried out by:
10 a. detecting the levels of a protein; or
b. detecting the levels of a peptide.
12. The method of any of claims 1 to 7 or 11, where said step of quantifying genetic expression is carried out using an antibody directed against said marker.
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13. The method of any of claims 1 to 7 or 11-12, where said step of quantifying genetic expression is carried out using a sandwich-type immunoassay method, or using an antibody chip.
- 20 14. The method of any of claims 1 to 7 or 11-13, where said quantifying genetic expression is carried out using a monoclonal antibody.
15. The method any of claims 1 to 7 or 11-14, where said quantifying genetic expression is carried out using a polyclonal antiserum.
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