Suppl 3. Baseline characteristics for predicting MVI.

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| **Characteristic** | **Total(n=206)** | **MVI absent****(n=134)** | **MVI present****(n=72)** | **Univariable Logistic Regression** |
| **OR (95%CI)** | ***P*** |
| **Clinical features** |  |  |  |  |  |
| Age | 55.19±10.69 | 54.69±10.85 | 56.13±10.38 | 1.013(0.986,1.041) | 0.357 |
| Gender |  |  |  |  |  |
| Male | 172(83.5%) | 108(52.4%) | 64(31.1%) |  |  |
| Female | 34(16.5%) | 26(12.6%) | 8(3.9%) | 0.519(0.222,1.216) | 0.131 |
| BCLC stage |  |  |  |  | 0.080 |
| 0 | 52(25.2%) | 32(15.5%) | 20(9.7%) |  |  |
| A | 139(67.5%) | 96(46.6%) | 43(20.9%) | 0.717(0.369,1.393) | 0.326 |
| B | 15(7.3%) | 6(2.9%) | 9(4.4%) | 2.400(0.742,7.767) | 0.144 |
| Child-Pugh stage |  |  |  |  |  |
| A | 198(96.1%) | 127(61.7%) | 71(34.5%) |  |  |
| B | 8(3.9%) | 7(3.4%) | 1(0.5%) | 0.256(0.031,2.119) | 0.206 |
| Liver disease |  |  |  |  |  |
| HBV | 181(87.9%) | 116(56.3%) | 65(31.6%) |  |  |
| None or other | 25(12.1%) | 18(8.7%) | 7(3.4%) | 0.694(0.275,1.749) | 0.439 |
| AFP-L3 |  |  |  |  |  |
| Negative | 131(63.7%) | 87(42.2%) | 44(21.4%) |  |  |
| Positive | 75(36.4%) | 47(22.8%) | 28(13.6%) | 1.178 (0.652,2.129) | 0.588 |
| AFP\_lg10 | 1.47(0.66-2.34) | 1.18(0.52-2.13) | 1.8 (0.99-2.65) | 1.607(1.175,2.196) | **0.003** |
| PIVKA-II\_lg10 | 2.05(1.52-2.79) | 2.03(1.44-2.72) | 2.17(1.67-2.98) | 1.412 (1.004,1.986) | **0.047** |
| CA199 (U/mL) | 16.45(8.5-28.3) | 17.3(9.05-28.25) | 15.1(8.05-28.5) | 0.992(0.976,1.008) | 0.306 |
| CEA (ng/mL) | 2.3(1.5-3.3) | 2.3(1.58-3.23) | 2.45(1.43-3.48) | 1.029(0.837,1.265) | 0.783 |
| ALT\_lg10 | 1.43(1.28-1.61) | 1.43(1.28-1.59) | 1.42(1.31-1.65) | 1.425(0.486,4.181) | 0.519 |
| AST\_lg10 | 1.42(1.3-1.56) | 1.42(1.28-1.52) | 1.41(1.32-1.57) | 1.299(0.431,3.920) | 0.642 |
| TP (g/L) | 68.3(64.88-73.13) | 68.3(64.88-72.95) | 68.45(64.83-73.85) | 1.005 (0.959,1.053) | 0.841 |
| ALB (g/L) | 42.55(39.6-45.53) | 42.15(39.28-45.33) | 43(40.5-46) | 1.039(0.996,1.084) | 0.076 |
| GLOB (g/L) | 26.4(23.98-29.3) | 26.25(24.18-29.23) | 26.5(23.13-29.48) | 0.984(0.927,1.046) | 0.611 |
| TBIL (μmol/L) | 14.25(11.58-18.6) | 14.8(11.98-18.35) | 13.35(10.45-18.88) | 0.984(0.939,1.031) | 0.495 |
| DBIL (μmol/L) | 5.3(4.2-7) | 5.4(4.2-7.05) | 4.8(4-6.9) | 0.972 (0.876,1.079) | 0.597 |
| IBIL (μmol/L) | 8.8(7-11.6) | 9(7.08-11.83) | 8.3(6.6 -11.53) | 0.997 (0.926,1.073) | 0.997 |
| CHE (U/L) | 7390(5947-8346) | 7315.5(5637.75-8364) | 7441.5(6489.65-8311.25) | 1.000 (1.000,1.000) | 0.097 |
| CG (ug/ML) | 1.1(0.5-2.35) | 1.1(0.5-2.6) | 1.05(0.5-2.25) | 0.948 (0.846,1.061) | 0.948 |
| TBA (μmol/L) | 5.5(3.18-11.5) | 5.9(3.55-11.53) | 4.8(2.63-11.45) | 1.004(0.974,1.035) | 0.807 |
| GGT(U/L) | 42(27.5-75.5) | 43(26-75.5) | 38.5(28-77.25) | 0.997(0.992,1.001) | 0.164 |
| AFU(U/L) | 23(19-28.25) | 23(19-28) | 24(18-29.75) | 1.010 (0.977,1.044) | 0.572 |
| CRP (mg/L) | 1.15(0.5-3.01) | 1.21(0.5-3.03) | 0.92(0.5-2.93) | 0.994(0.972,1.016) | 0.563 |
| PLT (10^9/L) | 148(112-187.5) | 146.5(110.75-189.25) | 157(113.5-187.75) | 1.002(0.997,1.006) | 0.480 |
| PT(S) | 12(11.4-12.6) | 12.05(11.4-12.8) | 11.9(11.3-12.48) | 0.802(0.596,1.078) | 0.144 |
| APTT(S) | 28.45(25.78-31.93) | 28.7(26.23-32.23) | 28.1(25.4-30.7) | 0.959 (0.901,1.022) | 0.195 |
| TT(S) | 20.3(19.3-21.1) | 20.2(19.28-21.2) | 20.35(19.3-20.9) | 1.051 (0.862,1.282) | 0.621 |
| FBG (g/L) | 2.14(1.86-2.59) | 2.09(1.83-2.53) | 2.16(1.91-2.6) | 1.298(0.872,1.932) | 0.198 |
| CHOL (mmol/L) | 3.9(3.47-4.37) | 3.9(3.47-4.42) | 3.86(3.45-4.29) | 0.973 (0.664,1.426) | 0.888 |
| TG (mmol/L) | 1.05(0.8-1.33) | 1.19(0.79-1.31) | 1.05(0.82-1.4) | 1.152(0.584,2.274) | 0.683 |
| HDL-C (mmol/L) | 1.19(1-1.42) | 1.23(1.02-1.46) | 1.2(0.99-1.34) | 0.642 (0.270,1.526) | 0.316 |
| LDL-C (mmol/L) | 2.48(2.03-2.87) | 2.42(2.01-2.92) | 2.54(2.08-2.84) | 1.045 (0.693,1.575) | 0.835 |
| HBsAg |  |  |  |  |  |
| Negative | 32(15.5%) | 22(10.7%) | 10(4.9%) |  |  |
| Positive | 174(84.5%) | 112(54.4%) | 62(30.1%) | 1.218(0.542,2.736) | 0.633 |
| HBsAb |  |  |  |  |  |
| Negative | 179(86.9%) | 120(58.3%) | 59(28.6%) |  |  |
| Positive | 27(13.1%) | 14(6.8%) | 13(6.3%) | 1.889 (0.835,4.274) | 0.127 |
| HBeAg |  |  |  |  |  |
| Negative | 154(74.8%) | 110(48.5%) | 54(26.2%) |  |  |
| Positive | 52(25.2%) | 34(16.5%) | 18(8.7%) | 0.980(0.507,1.897) | 0.980 |
| HBeAb |  |  |  |  |  |
| Negative | 75(36.4%) | 50(24.3%) | 25(12.1%) |  |  |
| Positive | 131(63.6%) | 84(40.8%) | 47(22.8%) | 1.119(0.615,2.036) | 0.713 |
| HBcAb |  |  |  |  |  |
| Negative | 6(2.9%) | 4(1.9%) | 2(1%) |  |  |
| Positive | 200(97.1%) | 130(63.1%) | 70(34%) | 1.077(0.192,6.027) | 0.933 |
| HBV/C-DNA |  |  |  |  | 0.470 |
| <50IU/ml | 97(47.1%) | 62(30.1%) | 35(17%) |  |  |
| 50-10^3 | 30(14.6%) | 22(10.7%) | 8(3.9%) | 0.644(0.260,1.599) | 0.343 |
| 10^3-10^5 | 37(18%) | 26(12.6%) | 11(5.3%) | 0.749(0.331,1.698) | 0.489 |
| >10^5 | 42(20.4%) | 24(11.7%) | 18(8.7%) | 1.329 (0.635,2.780) | 0.451 |
| **Pathologic factors** |  |  |  |  |  |
| Microscopic cirrhosis |  |  |  |  |  |
| Absent | 128(62.1%) | 83(40.3%) | 45(21.8%) |  |  |
| Present | 78(37.9%) | 51(24.8%) | 27(13.1%) | 0.976(0.541,1.763) | 0.976 |
| Satellite nodules |  |  |  |  |  |
| Absent | 183(88.8%) | 124(60.2%) | 59(28.6%) |  |  |
| Present | 23(11.2%) | 10(4.9%) | 13(6.3%) | 2.732 (1.132,6.592) | **0.025** |
| Edmondson-Steiner grade |  |  |  |  |
| I-II | 26(12.6%) | 20(9.7%) | 6(2.9%) |  |  |
| III-IV | 180(87.4%) | 114(55.3%) | 66(32%) | 1.930 (0.738,5.047) | 0.180 |
| **MRI features** |  |  |  |  |  |
| Tumor diameter (cm) | 3(2.18-4.43) | 2.9(2.2-4.13) | 3.45(2.03-5.28) | 1.105(0.945,1.293) | 0.212 |
| Tumor number |  |  |  |  |  |
| Solitary | 188(91.3%) | 126(61.2%) | 62(30.1%) |  |  |
| Multiple | 18(8.7%) | 8(3.9%) | 10(4.9%) | 2.540(0.955,6.756) | 0.062 |
| Shape |  |  |  |  |  |
| Regular | 125(60.7%) | 89(43.2%) | 36(17.5%) |  |  |
| Irregular | 81(39.3%) | 45(21.8%) | 36(17.5%) | 1.978 (1.102,3.549) | **0.022** |
| Margin |  |  |  |  |  |
| Smooth | 103(50%) | 78(37.9%) | 25(12.1%) |  |  |
| Non-smooth | 103(50%) | 56(27.2%) | 47(22.8%) | 2.619 (1.445,4.744) | **0.002** |
| Radiological capsule enhancement |  |  |  | **<0.001** |
| Complete | 79(38.3%) | 68(33%) | 11(5.3%) |  |  |
| Incomplete | 86(41.7%) | 44(21.4%) | 42(20.4%) | 5.901(2.747,12.675) | **<0.001** |
| Absent | 41(19.9%) | 22(10.7%) | 19(9.2%) | 5.339(2.204,12.931) | **<0.001** |
| Restricted diffusion |  |  |  |  |  |
| Present | 193(93.7%) | 123(59.7%) | 70(34%) |  |  |
| Absent | 13(6.3%) | 11(5.3%) | 2(1%) | 0.319(0.069,1.483) | 0.145 |
| Nonrim APHE |  |  |  |  |  |
| Present | 123(59.7%) | 97(47.1%) | 26(12.6%) |  |  |
| Absent | 83(40.3%) | 37(18%) | 46(22.3%) | 4.638 (2.515,8.554) | **<0.001** |
| Rim APHE |  |  |  |  |  |
| Absent | 136(66%) | 104(50.5%) | 32(15.5%) |  |  |
| Present | 70(34%) | 30(14.6%) | 40(19.4%) | 4.333 (2.337,8.034) | **<0.001** |
| Nonperipheral"washout" |  |  |  |  |  |
| Present | 123(59.7%) | 92(44.7%) | 31(15 %) |  |  |
| Absent | 83(40.3%) | 42(20.4%) | 41(19.9%) | 2.897(1.602,5.238) | **<0.001** |
| Enhancement pattern |  |  |  |  |  |
| Typical | 118(57.3%) | 91(44.2%) | 27(13.1%) |  |  |
| Atypical | 88(42.7%) | 43(20.9%) | 45(21.8%) | 3.527 (1.937,6.423) | **<0.001** |
| Arterial peritumoral enhancement |  |  |  |  |
| Absent | 134(65%) | 109(52.9%) | 25(12.1%) |  |  |
| Present | 72(35%) | 25(12.1%) | 47(22.8%) | 8.197(4.273,15.723) | **<0.001** |
| MRI liver cirrhosis |  |  |  |  |  |
| Absent | 57(27.7%) | 44(21.4%) | 13(6.3%) |  |  |
| Present | 149(72.3%) | 90(43.7%) | 59(28.6%) | 2.219 (1.101,4.470) | **0.026** |

**The original units of lg10 converted variables are: AFP (ng/L),** **PIVKA-II (mAU/mL), ALT(U/L), AST(U/L). *P* is the *p* value of univariate logistic regression analysis.**

**Abbreviations: MVI, microvascular invation; OR, Odd Ratio; CI, confidence interval; BCLC, Barcelona Clinic Liver Cancer; AFP, alpha-fetoprotein; PIVKA-II, protein induced by vitamin K absence or antagonist-II; CA199,** **carbohydrate antigen 19-9; CEA,** **carcinoembryonic antigen; ALT,** **alanine aminotransferase; AST, aspartate aminotransaminase; TP, total protein; ALB, albumin; GLOB, globulin; TBIL, total bilirubin; DBIL, direct bilirubin; IBIL,** **indirect bilirubin; CHE, cholinesterase; CG, glycocholic acid; TBA, total bile acid; GGT, r-glutamyltransferase; AFU, a-fucosidase; CRP,** **C-reactive protein; PLT, platelet count; PT, prothrombin time; APTT, activated partial thromboplastin time; TT, thrombin time; FBG, fibrinogen; CHOL, total cholesterol; TG, triglyceride; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; HBV, hepatitis B virus; HCV, hepatitis C virus; HBV/C-DNA, deoxyribonucleic acid of hepatitis B virus; APHE,** **arterial phase hyperenhancement.**