**Supplementary figure legends.**

**Fig. S1. Survival curves for patients with HBV-ACLF who received SMT alone or SMT+PE.** **A-C**. 28-day (A), 90-day (B), and 1-year (C) survival curves for HBV-ACLF patients with MELD grade 2. **D-F**. 28-day (D), 90-day (E), and 1-year (F) survival curves for HBV-ACLF patients with MELD grade 4. **G-I**. 28-day (G), 90-day (H), and 1-year (I) survival curves for HBV-ACLF patients with ACLF grade 3. SMT, standard medical therapy; PE, plasma exchange; HBV-ACLF, hepatitis B virus-associated acute-on-chronic liver failure.

**Fig. S2. Survival curves for 166 pairs of matched patients with HBV-ACLF who received SMT alone or SMT+PE.** **A-C**. 28-day (A), 90-day (B), and 1-year (C) survival curves for HBV-ACLF patients with MELD grade 2. **D-F**. 28-day (D), 90-day (E), and 1-year (F) survival curves for HBV-ACLF patients with MELD grade 4. **G-I**. 28-day (G), 90-day (H), and 1-year (I) survival curves for HBV-ACLF patients with ACLF grade 3. SMT, standard medical therapy; PE, plasma exchange; HBV-ACLF, hepatitis B virus-associated acute-on-chronic liver failure.

**Fig. S3. Changes in SIRS scores in166 pairs of matched patients with HBV-ACLF who received SMT alone or SMT+PE.** SIRS, systemic inflammatory response syndrome; SMT, standard medical therapy; PE, plasma exchange; HBV-ACLF, hepatitis B virus-associated acute-on-chronic liver failure.

**Supplementary table 1 Prognostic factors at 28 days, 90 days, and 1 year in HBV-ACLF patients treated with SMT alone or in combination with SMT and PE-based NB-ALSS (Univariate COX regression analysis)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Univariate** | p value | HR | 95% CI HR | Time point |
| Parameter | Lower Bound | Upper Bound |
| PE (yes) | 0.007  | 0.601  | 0.414  | 0.871  | 28 day |
| Age (year) | <0.001 | 1.042  | 1.025  | 1.059  |
| Sex (male) | 0.610  | 0.865  | 0.494  | 1.513  |
| HE (≥3) (yes) | <0.001 | 3.203  | 1.910  | 5.374  |
| Respiratory failure (yes) | 0.003  | 2.452  | 1.347  | 4.463  |
| Circulatory failure (yes) | 0.332  | 1.999  | 0.494  | 8.095  |
| Infection (yes) | 0.103  | 1.368  | 0.939  | 1.994  |
| Meld score | <0.001 | 1.072  | 1.040  | 1.104  |
| Meld-Na score | <0.001 | 1.085  | 1.050  | 1.121  |
| CRP (μg/L) | 0.009  | 1.013  | 1.003  | 1.023  |
| ALT (U/L) | 0.696  | 1.000  | 1.000  | 1.000  |
| AST (U/L) | 0.777  | 1.000  | 1.000  | 1.000  |
| GGT (U/L) | 0.450  | 1.001  | 0.998  | 1.004  |
| AKP (U/L) | 0.041  | 0.996  | 0.993  | 1.000  |
| Tbil (μmol/L) | 0.030  | 1.001  | 1.000  | 1.002  |
| Alb (g/L) | 0.836  | 0.996  | 0.961  | 1.033  |
| Na+ (mmol/L) | 0.018  | 0.960  | 0.929  | 0.993  |
| K+ (mmol/L) | 0.488  | 0.904  | 0.680  | 1.202  |
| Cr (μmol/L) | 0.279  | 1.001  | 0.999  | 1.003  |
| BUN (mmol/L) | 0.572  | 1.003  | 0.992  | 1.014  |
| PT (s) | 0.052  | 1.013  | 1.000  | 1.027  |
| INR | <0.001 | 1.233  | 1.113  | 1.365  |
| WBC (×109/L) | 0.117  | 1.035  | 0.991  | 1.082  |
| HGB (g/L) | 0.830  | 0.999  | 0.991  | 1.007  |
| PLT (×109/L) | 0.129 | 0.997  | 0.993  | 1.001  |
| PE (yes) | 0.033  | 0.720  | 0.532  | 0.974  | 90 day |
| Age (year) | <0.001 | 1.040  | 1.026  | 1.053  |
| Sex (male) | 0.775  | 0.938  | 0.604  | 1.456  |
| HE (≥3) (yes) | <0.001 | 2.652  | 1.642  | 4.284  |
| Respiratory failure (yes) | 0.006  | 2.147  | 1.240  | 3.714  |
| Circulatory failure (yes) | 0.584  | 1.476  | 0.366  | 5.954  |
| Infection (yes) | 0.230  | 1.211  | 0.886  | 1.655  |
| Meld score | <0.001 | 1.072  | 1.044  | 1.101  |
| Meld-Na score | <0.001 | 1.087  | 1.057  | 1.118  |
| CRP (μg/L) | 0.021  | 1.011  | 1.002  | 1.021  |
| ALT (U/L) | 0.986  | 1.000  | 1.000  | 1.000  |
| AST (U/L) | 0.718  | 1.000  | 1.000  | 1.000  |
| GGT (U/L) | 0.151  | 1.002  | 0.999  | 1.004  |
| AKP (U/L) | 0.047  | 0.997  | 0.995  | 1.000  |
| Tbil (μmol/L) | <0.001 | 1.002  | 1.001  | 1.003  |
| Alb (g/L) | 0.877  | 0.998  | 0.969  | 1.027  |
| Na+ (mmol/L) | 0.001  | 0.953  | 0.927  | 0.980  |
| K+ (mmol/L) | 0.495  | 0.923  | 0.733  | 1.162  |
| Cr (μmol/L) | 0.210  | 1.001  | 0.999  | 1.003  |
| BUN (mmol/L) | 0.595  | 1.002  | 0.993  | 1.012  |
| PT (s) | 0.005  | 1.016  | 1.005  | 1.028  |
| INR | <0.001 | 1.246  | 1.138  | 1.365  |
| WBC (×109/L) | 0.081  | 1.033  | 0.996  | 1.071  |
| HGB (g/L) | 0.515  | 0.998  | 0.991  | 1.004  |
| PLT (×109/L) | 0.015 | 0.996  | 0.993  | 0.999  |
| PE (yes) | 0.016  | 0.701  | 0.526  | 0.935  | 1 year |
| Age (year) | <0.001 | 1.036  | 1.023  | 1.049  |
| Sex (male) | 0.740  | 0.931  | 0.611  | 1.419  |
| HE (≥3) (yes) | <0.001 | 2.411  | 1.497  | 3.883  |
| Respiratory failure (yes) | 0.014  | 1.981  | 1.147  | 3.421  |
| Circulatory failure (yes) | 0.721  | 1.290  | 0.320  | 5.197  |
| Infection (yes) | 0.721  | 1.290  | 0.320  | 5.197  |
| Meld score | <0.001 | 1.070  | 1.043  | 1.098  |
| Meld-Na score | <0.001 | 1.085  | 1.055  | 1.115  |
| CRP (μg/L) | 0.024  | 1.011  | 1.001  | 1.020  |
| ALT (U/L) | 0.786  | 1.000  | 1.000  | 1.000  |
| AST (U/L) | 0.658  | 1.000  | 1.000  | 1.000  |
| GGT (U/L) | 0.151  | 1.002  | 0.999  | 1.004  |
| AKP (U/L) | 0.074  | 0.998  | 0.995  | 1.000  |
| Tbil (μmol/L) | <0.001 | 1.002  | 1.001  | 1.003  |
| Alb (g/L) | 0.862  | 0.998  | 0.970  | 1.026  |
| Na+ (mmol/L) | <0.001 | 0.952  | 0.927  | 0.979  |
| K+ (mmol/L) | 0.472  | 0.923  | 0.743  | 1.148  |
| Cr (μmol/L) | 0.277  | 1.001  | 0.999  | 1.002  |
| BUN (mmol/L) | 0.719  | 1.002  | 0.993  | 1.011  |
| PT (s) | 0.001  | 1.018  | 1.007  | 1.028  |
| INR | <0.001 | 1.240  | 1.133  | 1.358  |
| WBC (×109/L) | 0.044  | 1.036  | 1.001  | 1.072  |
| HGB (g/L) | 0.617  | 0.998  | 0.992  | 1.005  |
| PLT (×109/L) | 0.012 | 0.996  | 0.993  | 0.999  |

**Abbreviations**: HBV-ACLF, hepatitis B virus-associated acute-on-chronic liver failure; PE, plasma exchange; HE, hepatic encephalopathy; Meld score, Model for end-stage liver disease score; Na+, serum sodium; INR, international normalized ratio; CRP, c-reactive protein; HR, hazard ratio.

**Supplementary table 2 Prognostic factors in HBV-ACLF patients treated with PE-based NB-ALSS (Univariate COX regression analysis)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Univariate** | p value | HR | 95% CI HR | Time point |
| Parameter | Lower Bound | Upper Bound |
| PE times | 0.010  | 0.723  | 0.565  | 0.926  | 28 day |
| Mean plasma dose | 0.508  | 1.000  | 0.999  | 1.000  |
| Therapy timing | 0.075  | 0.947  | 0.891  | 1.006  |
| Age (year) | 0.001  | 1.042  | 1.016  | 1.068  |
| Sex (male) | 0.782  | 0.887  | 0.378  | 2.081  |
| HE (≥3) (yes) | 0.043  | 2.596  | 1.029  | 6.546  |
| Respiratory failure (yes) | 0.042  | 2.427  | 1.033  | 5.702  |
| Circulatory failure (yes) | 0.694  | 1.489  | 0.206  | 10.788  |
| Infection (yes) | 0.402  | 0.768  | 0.414  | 1.424  |
| Meld score | 0.004  | 1.065  | 1.021  | 1.112  |
| Meld-Na score | 0.002  | 1.075  | 1.026  | 1.127  |
| CRP (μg/L) | <0.001 | 1.020  | 1.009  | 1.031  |
| ALT (U/L) | 0.017  | 1.001  | 1.000  | 1.001  |
| AST (U/L) | 0.154  | 1.000  | 1.000  | 1.001  |
| GGT (U/L) | 0.154  | 1.002  | 0.999  | 1.006  |
| AKP (U/L) | 0.080  | 0.996  | 0.991  | 1.001  |
| Tbil (μmol/L) | 0.690  | 1.000  | 0.999  | 1.002  |
| Alb (g/L) | 0.615  | 0.986  | 0.933  | 1.042  |
| Na+ (mmol/L) | 0.128  | 0.964  | 0.920  | 1.010  |
| K+ (mmol/L) | 0.509  | 1.155  | 0.753  | 1.771  |
| Cr (μmol/L) | 0.111  | 1.003  | 0.999  | 1.007  |
| BUN (mmol/L) | 0.001  | 1.057  | 1.022  | 1.092  |
| PT (s) | 0.108  | 1.017  | 0.996  | 1.037  |
| INR | <0.001 | 1.295  | 1.124  | 1.492  |
| WBC (×109/L) | 0.500  | 1.022  | 0.960  | 1.087  |
| HGB (g/L) | 0.368  | 1.006  | 0.993  | 1.019  |
| PLT (×109/L) | 0.822 | 1.001  | 0.994  | 1.007  |
| PE times | 0.008  | 0.781  | 0.651  | 0.937  | 90 day |
| Mean plasma dose | 0.242  | 1.000  | 1.000  | 1.000  |
| Therapy timing | 0.182  | 0.974  | 0.937  | 1.012  |
| Age (year) | <0.001 | 1.042  | 1.022  | 1.063  |
| Sex (male) | 0.957  | 0.983  | 0.521  | 1.855  |
| HE (≥3) (yes) | 0.075  | 2.128  | 0.925  | 4.894  |
| Respiratory failure (yes) | 0.021  | 2.367  | 1.137  | 4.926  |
| Circulatory failure (yes) | 0.977  | 0.971  | 0.135  | 6.981  |
| Infection (yes) | 0.338  | 0.795  | 0.496  | 1.272  |
| Meld score | 0.010  | 1.052  | 1.012  | 1.094  |
| Meld-Na score | 0.004  | 1.063  | 1.020  | 1.109  |
| CRP (μg/L) | 0.001  | 1.019  | 1.007  | 1.030  |
| ALT (U/L) | 0.055  | 1.000  | 1.000  | 1.001  |
| AST (U/L) | 0.129  | 1.000  | 1.000  | 1.001  |
| GGT (U/L) | 0.014  | 1.003  | 1.001  | 1.006  |
| AKP (U/L) | 0.137  | 0.997  | 0.994  | 1.001  |
| Tbil (μmol/L) | 0.118  | 1.001  | 1.000  | 1.002  |
| Alb (g/L) | 0.649  | 0.990  | 0.949  | 1.033  |
| Na+ (mmol/L) | 0.036  | 0.960  | 0.925  | 0.997  |
| K+ (mmol/L) | 0.707  | 1.067  | 0.760  | 1.498  |
| Cr (μmol/L) | 0.362  | 1.002  | 0.998  | 1.005  |
| BUN (mmol/L) | 0.001  | 1.054  | 1.023  | 1.087  |
| PT (s) | 0.009  | 1.022  | 1.006  | 1.039  |
| INR | <0.001 | 1.277  | 1.117  | 1.460  |
| WBC (×109/L) | 0.260  | 1.028  | 0.980  | 1.079  |
| HGB (g/L) | 0.906  | 1.001  | 0.990  | 1.011  |
| PLT (×109/L) | 0.511 | 0.998  | 0.993  | 1.003  |
| PE times | 0.025  | 0.827  | 0.700  | 0.977  | 1 year |
| Mean plasma dose | 0.640  | 1.000  | 1.000  | 1.000  |
| Therapy timing | 0.625  | 0.992  | 0.961  | 1.024  |
| Age (year) | <0.001 | 1.038  | 1.019  | 1.057  |
| Sex (male) | 0.722  | 0.892  | 0.475  | 1.676  |
| HE (≥3) (yes) | 0.121  | 1.928  | 0.841  | 4.420  |
| Respiratory failure (yes) | 0.035  | 2.188  | 1.055  | 4.537  |
| Circulatory failure (yes) | 0.874  | 0.853  | 0.119  | 6.125  |
| Infection (yes) | 0.413  | 0.831  | 0.533  | 1.295  |
| Meld score | 0.024  | 1.046  | 1.006  | 1.087  |
| Meld-Na score | 0.008  | 1.057  | 1.015  | 1.102  |
| CRP (μg/L) | 0.001  | 1.018  | 1.007  | 1.030  |
| ALT (U/L) | 0.076  | 1.000  | 1.000  | 1.001  |
| AST (U/L) | 0.115  | 1.000  | 1.000  | 1.001  |
| GGT (U/L) | 0.012  | 1.003  | 1.001  | 1.006  |
| AKP (U/L) | 0.209  | 0.998  | 0.995  | 1.001  |
| Tbil (μmol/L) | 0.089  | 1.001  | 1.000  | 1.002  |
| Alb (g/L) | 0.838  | 0.996  | 0.958  | 1.036  |
| Na+ (mmol/L) | 0.036  | 0.961  | 0.927  | 0.997  |
| K+ (mmol/L) | 0.710  | 1.063  | 0.770  | 1.468  |
| Cr (μmol/L) | 0.387  | 1.001  | 0.998  | 1.005  |
| BUN (mmol/L) | 0.001  | 1.053  | 1.022  | 1.084  |
| PT (s) | 0.005  | 1.023  | 1.007  | 1.039  |
| INR | 0.001  | 1.257  | 1.096  | 1.442  |
| WBC (×109/L) | 0.217  | 1.030  | 0.983  | 1.078  |
| HGB (g/L) | 0.801  | 1.001  | 0.992  | 1.011  |
| PLT (×109/L) | 0.517 | 0.998  | 0.994  | 1.003  |

**Abbreviations**: PE, plasma exchange; HE, hepatic encephalopathy; INR, international normalized ratio; BUN, blood urea nitrogen; CRP, c-reactive protein; PT, prothrombin time; HR, hazard ratio.