**Supplementary Figures**

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**Supplementary Figure 1** Distribution of study patients by degree of thrombocytopenia and response to treatment.



**Supplementary Figure 2** Framework of prediction model based on variational autoencoder.

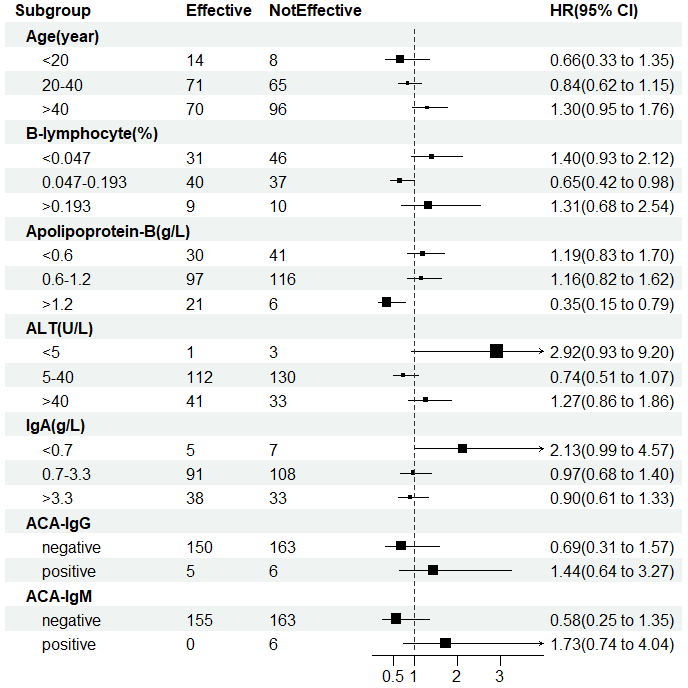
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**Supplementary Figure 3** Correlation Analysis of Features. ALT, Alanine aminotransferase; ALP, Alkaline phosphatase; C3, Complement-3; FIB, Fibrinogen; AnuA, Anti-nucleosome antibody; AMA-M2, Anti-mitochondrial antibody-M2; ACA-IgG, Anti-cardiolipin antibodies-IgG; ACA-IgM, Anti-cardiolipin antibodies-IgM.

图表

描述已自动生成

**Supplementary Figure 4** Forest Diagrams of Multivariate Analysis. ALT, Alanine aminotransferase; ALP, Alkaline phosphatase; C3, Complement-3; FIB, Fibrinogen; AnuA, Anti-nucleosome antibody; AMA-M2, Anti-mitochondrial antibody-M2; ACA-IgG, Anti-cardiolipin antibodies-IgG；ACA-IgM, Anti-cardiolipin antibodies-IgM.

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**Supplementary Figure 5** Stratified Analysis of Single Indicator. ALT, Alanine aminotransferase; ACA-IgG, Anti-cardiolipin antibodies-IgG; ACA-IgM, Anti-cardiolipin antibodies-IgM.

图表, 直方图

描述已自动生成

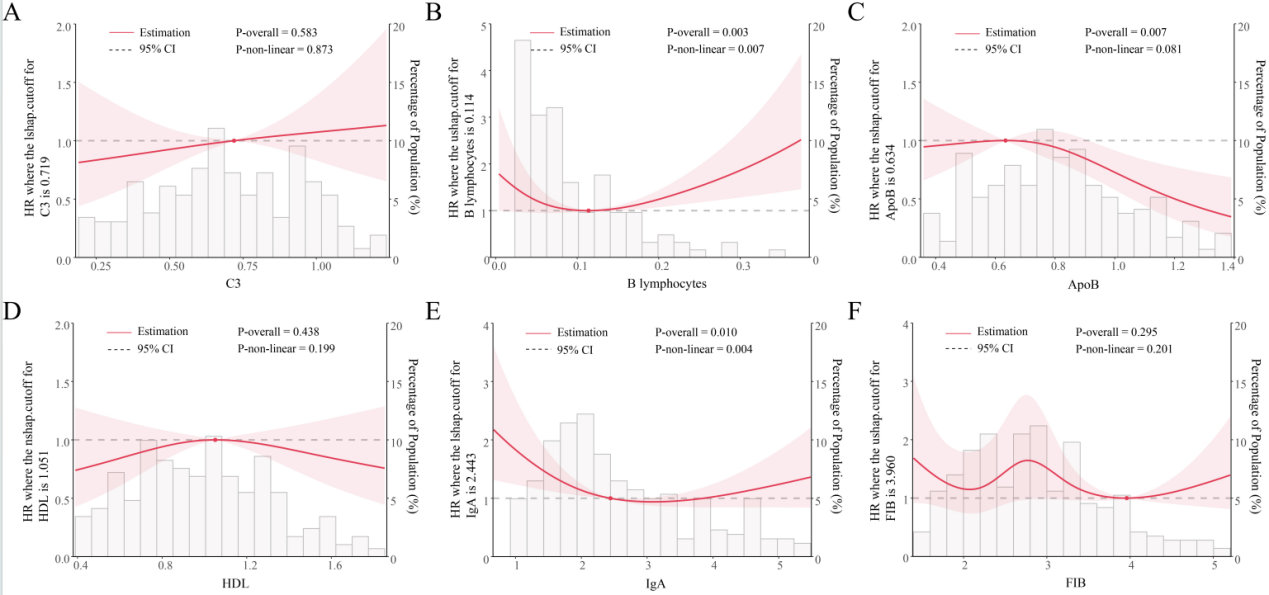
**Supplementary Figure 6** Treatment Effectiveness Probability Curve. **(A)** B-lymphocyte; **(B)** Apolipoprotein-B.

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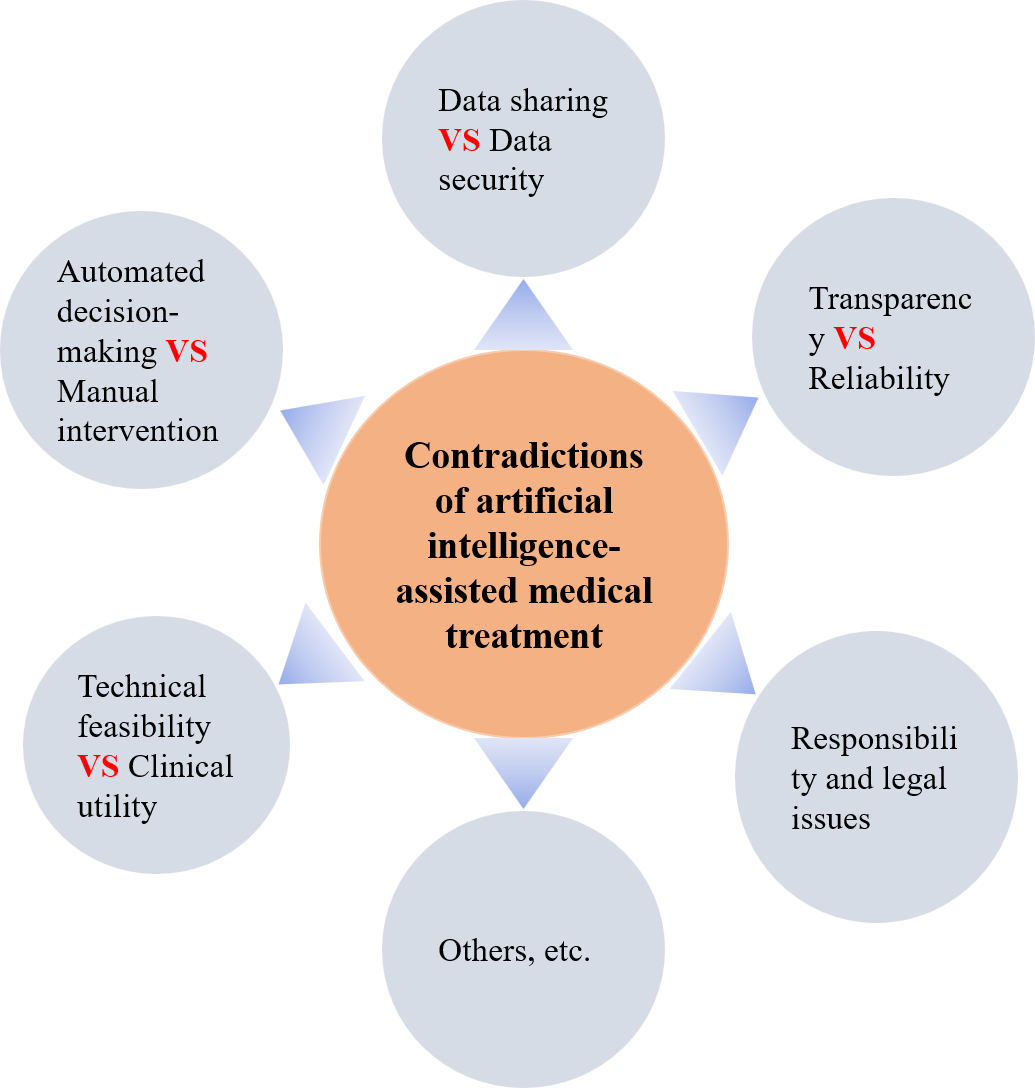
**Supplementary Figure 7** Efficacy Probability Curve of Antibodies.(A) AMA-M2, Anti-mitochondrial antibody-M2; (B) AunA, Anti-nucleosome antibody; (C) ARPA, Anti-ribosomal p protein antibody; (D) ds-DNA, Anti-dsDNA antibody.



**Supplementary Figure 8** Distribution of Generated Data and Original Data. **(A)** B-lymphocyte; **(B)** IgE; **(C)** AMA-M2, Anti-mitochondrial antibody-M2; **(D)** Treatment Effect.



**Supplementary Figure 9** RCS analysis for the factors. (A) C3, Complement-3; (B) B-lymphocyte; (C) Apo-B, Apolipoprotein-B; (D) H-cholesterol; (E) IgA; (F) FIB, Fibrinogen.



**Supplementary Figure 10** Contradictions of artificial intelligence-assisted medical treatment.

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**Supplementary Figure 11** Analysis of feature importance based on different machine learning algorithms. (A)(B)(C)(D)

**Supplementary Tables**

**Supplementary Table 1** Demographic and Clinical Characteristics of Patients in Mild-Group

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Mild-Ineffective  (n=99) | Mild-Effective  (n=98) | P value |
| Age | 45.77±16.87 | 39.24±14.38 | **0.008** |
| Female | 11/99=0.111 | 9/98=0.092 | 0.832 |
| Male | 88/99=0.889 | 89/98=0.908 | 0.832 |
| Blood lymphocytes |  |  |  |
| B-lymphocyte | 0.094±0.142 | 0.082±0.078 | 0.490 |
| Biochemical |  |  |  |
| H-cholesterol | 1.00±0.032 | 0.97±0.044 | 0.135 |
| Apolipoprotein-B | 0.78±0.27 | 0.88±0.31 | **0.032** |
| Na | 140.89±7.01 | 139.24±4.22 | **0.020** |
| ALT | 30.62±41.19 | 39.96±43.93 | 0.186 |
| ALP | 96.46±107.23 | 91.21±92.08 | 0.683 |
| Complement |  |  |  |
| C3 | 0.72±0.27 | 0.63±0.30 | **0.020** |
| Immunoglobulin |  |  |  |
| IgA | 2.54±1.54 | 2.56±1.31 | 0.463 |
| IgE | 161.18±229.59 | 259.27±373.42 | 0.047 |
| Blood coagulation |  |  |  |
| FIB | 2.93±0.94 | 2.98±0.95 | 0.862 |
| Antibodies |  |  |  |
| ACA-IgG | 2/99=0.020 | 3/98=0.031 | 0.991 |
| ACA-IgM | 2/99=0.020 | 0/98=0.000 | / |
| AnuA | 21/99=0.212 | 32/98=0.327 | 0.074 |
| AMA-M2 | 12/99=0.121 | 8/98=0.082 | 0.469 |

Data are mean±SD, n (%), where n is the total number of patients with valid data in each group. Statistical analysis was performed with the Mann–Whitney U test and the χ2 test.

**Supplementary Table 2** Single indicator stratified analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subgroup | Effective | Not Effective | HR | Low | High |
| Sex |  |  |  |  |  |
| Male | 13 | 21 | 1.695 | 1.069 | 2.687 |
| Female | 142 | 148 | 0.5901 | 0.3722 | 0.9354 |
| Age(year) |  |  |  |  |  |
| <20 | 14 | 8 | 0.6634 | 0.3258 | 1.351 |
| 20-40 | 71 | 65 | 0.8405 | 0.616 | 1.147 |
| >40 | 70 | 96 | 1.296 | 0.9548 | 1.759 |
| B-lymphocyte(%) |  |  |  |  |  |
| <0.047 | 31 | 46 | 1.405 | 0.9311 | 2.119 |
| 0.047-0.193 | 40 | 37 | 0.6548 | 0.4243 | 0.9831 |
| >0.193 | 9 | 10 | 1.311 | 0.6771 | 2.539 |
| H-cholesterol(mmol/L) |  |  |  |  |  |
| <0.94 | 74 | 70 | 0.9931 | 0.7274 | 1.356 |
| 0.94-2 | 70 | 91 | 1.074 | 0.7878 | 1.456 |
| >2 | 4 | 2 | 0.4166 | 0.1017 | 1.707 |
| Apolipoprotein-B(g/L) |  |  |  |  |  |
| <0.6 | 30 | 41 | 1.188 | 0.833 | 1.695 |
| 0.6-1.2 | 97 | 116 | 1.157 | 0.8232 | 1.625 |
| >1.2 | 21 | 6 | 0.3504 | 0.155 | 0.7921 |
| Na(mmol/L) |  |  |  |  |  |
| <135 | 16 | 10 | 1.022 | 0.5387 | 1.939 |
| 135-145 | 129 | 148 | 0.8329 | 0.5095 | 1.362 |
| >145 | 7 | 8 | 1.488 | 0.7267 | 3.046 |
| ALT(U/L) |  |  |  |  |  |
| <5 | 1 | 3 | 2.923 | 0.929 | 9.2 |
| 5-40 | 112 | 130 | 0.7383 | 0.5069 | 1.075 |
| >40 | 41 | 33 | 1.266 | 0.859 | 1.864 |
| ALP(U/L) |  |  |  |  |  |
| <47 | 39 | 28 | 0.784 | 0.5217 | 1.178 |
| 47-185 | 107 | 121 | 1.198 | 0.8495 | 1.691 |
| >185 | 8 | 17 | 0.9994 | 0.6024 | 1.658 |
| C3(g/L) |  |  |  |  |  |
| <0.8 | 87 | 87 | 0.8944 | 0.6442 | 1.242 |
| 0.8-1.6 | 47 | 61 | 1.118 | 0.8052 | 1.552 |
| IgA(g/L) |  |  |  |  |  |
| <0.7 | 5 | 7 | 2.127 | 0.9899 | 4.571 |
| 0.7-3.3 | 91 | 108 | 0.972 | 0.6754 | 1.399 |
| >3.3 | 38 | 33 | 0.8995 | 0.6102 | 1.326 |
| IgE(U/ml) |  |  |  |  |  |
| 0-100 | 67 | 86 | 1.159 | 0.8353 | 1.608 |
| >100 | 67 | 62 | 0.8628 | 0.6219 | 1.197 |
| FIB(g/L) |  |  |  |  |  |
| <2 | 27 | 25 | 1.005 | 0.6557 | 1.542 |
| 2-4 | 100 | 119 | 1.101 | 0.7715 | 1.571 |
| >4 | 19 | 16 | 0.8192 | 0.4885 | 1.374 |
| ACA-IgG |  |  |  |  |  |
| negative | 150 | 163 | 0.6932 | 0.3061 | 1.57 |
| positive | 5 | 6 | 1.443 | 0.6369 | 3.267 |
| ACA-IgM |  |  |  |  |  |
| negative | 155 | 163 | 0.5782 | 0.2472 | 1.352 |
| positive | 0 | 6 | 1.73 | 0.7395 | 4.045 |

**Supplementary Table 3** Feature Values and Encoding Methods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Data Type | Range of values | Median | Encoding |
| Age | Continuous | 0-80 | 45 | Normalization |
| Sex | Categorical | Male:0, Female:1 | / | Label Encoding |
| B-lymphocyte | Continuous | 0.047-0.193% | 0.12% | Normalization |
| H-cholesterol | Continuous | 0.94-2mmol/L | 1.47 | Normalization |
| Apolipoprotein-B | Continuous | 0.6-1.2g/L | 0.9 | Normalization |
| Na | Continuous | 135-145mmol/L | 140 | Normalization |
| ALT | Continuous | 5-40U/L | 22.5 | Normalization |
| ALP | Continuous | 47-185U/L | 116 | Normalization |
| C3 | Continuous | 0.8-1.6g/L | 1.2 | Normalization |
| IgA | Continuous | 0.7-3.3g/L | 2 | Normalization |
| IgE | Continuous | 0-100IU/ml | 50 | Normalization |
| FIB | Continuous | 2-4g/L | 3 | Normalization |
| ACA-IgG | Categorical | Negative:0,Positive:1 | / | Label Encoding |
| ACA-IgM | Categorical | Negative:0,Positive:1 | / | Label Encoding |
| AnuA | Categorical | Negative:0,Positive:1 | / | Label Encoding |
| AMA-M2 | Categorical | Negative:0,Positive:1 | / | Label Encoding |

**Supplementary Table 4** Comparison of Multi-Classifier Evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | Sensitivity | Specificity | Accuracy | YI |
| RF | 0.85 | 0.64 | 0.75 | 0.49 |
| GB | 0.85 | 0.64 | 0.75 | 0.49 |
| LR | 0.77 | 0.82 | 0.79 | 0.59 |
| KNN | 0.85 | 0.73 | 0.79 | 0.58 |
| SVM | **0.92** | 0.73 | 0.83 | 0.65 |
| NN | **0.92** | 0.73 | 0.83 | 0.65 |
| CSNN | 0.85 | 0.82 | 0.83 | 0.67 |
| VAE+NN | 0.85 | **0.91** | **0.88** | **0.76** |

KNN, k-nearest neighbor; RF, random forest; GB, gradient boosting; LR, logistic regression; SVM, support vector machine; NN, neural network; CSNN, cost-sensitive neural network; VAENN, neural network based on Variational Autoencoder.

**Supplementary Table 5** Means and Standard Deviations of Generated Data and Original Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Original data mean | Generated data mean | Original data std | Generated data std |
| Age | 40.7474 | 40.6667 | 15.0326 | 9.2245 |
| Sex | 0.9474 | 0.9725 | 0.2245 | 0.1636 |
| B-lymphocyte | 0.0816 | 0.0883 | 0.1003 | 0.0885 |
| H-cholesterol | 1.0831 | 1.0506 | 0.4153 | 0.1704 |
| Apolipoprotein-B | 0.8275 | 0.8254 | 0.2981 | 0.1413 |
| Na | 139.4293 | 139.477 | 3.4408 | 1.6577 |
| ALT | 32.7161 | 31.3295 | 39.6191 | 10.9249 |
| ALP | 82.6574 | 83.7563 | 56.5692 | 45.496 |
| C3 | 0.7039 | 0.7059 | 0.2897 | 0.1634 |
| IgA | 2.4249 | 2.3244 | 1.292 | 0.865 |
| IgE | 249.7052 | 269.3706 | 370.527 | 277.8516 |
| FIB | 2.867 | 2.9355 | 1.0717 | 0.387 |
| IgG | 0.0211 | 0.0 | 0.1443 | 0.0 |
| IgM | 0.0316 | 0.0 | 0.1758 | 0.0 |
| AnuA | 0.3158 | 0.4637 | 0.1625 | 0.3691 |
| AMAM2 | 0.1368 | 0.3445 | 0.1062 | 0.3084 |
| Treatment effect | 0.6 | 0.63 | 0.2426 | 0.23 |