```
C:\Users\M314386\AppData\Local\Programs\Python\Python312\python.exe C:\Users\M314386\Research\Imp\J31.py
MI Threshold: 0.0140
Number of columns in X: 24
Correlation Threshold: 0.0116
Node: DIA, Label: 0, MI Score: 0.0036
Node: COPD, Label: 0, MI Score: 0.0132
Node: HYP, Label: 0, MI Score: 0.0129
Node: ART, Label: 0, MI Score: 0.0077
Node: ARR, Label: 0, MI Score: 0.0085
Node: OST, Label: 0, MI Score: 0.0102
Node: CAN, Label: 0, MI Score: 0.0008
Node: AST, Label: 0, MI Score: 0.0088
Node: DEP, Label: 0, MI Score: 0.0099
Node: STR, Label: 0, MI Score: 0.0084
Node: CKD, Label: 0, MI Score: 0.0112
Node: CAD, Label: 0, MI Score: 0.0099
Node: CHF, Label: 0, MI Score: 0.0072
Node: LIP, Label: 0, MI Score: 0.0130
Node: SUB, Label: 0, MI Score: 0.0080
Node: agevis, Label: 1, MI Score: 0.0593
Node: sexc, Label: 0, MI Score: 0.0120
Node: Any_E4, Label: 0, MI Score: 0.0134
Node: SPM12_PIB_RATIO, Label: 0, MI Score: 0.0020
Node: SPM12_TAU_RATIO, Label: 0, MI Score: 0.0000
Node: ptau181_corrected, Label: 1, MI Score: 0.0147
Node: abeta42_40_ratio_corrected, Label: 0, MI Score: 0.0056
Node: gfap_corrected, Label: 1, MI Score: 0.0852
Node: nfl_corrected, Label: 1, MI Score: 0.0329

Correlations between variables:
                            gfap_corrected    agevis  ...       CAN  SPM12_TAU_RATIO
gfap_corrected                    1.000000  0.439939  ...  0.189801         0.111856
agevis                            0.439939  1.000000  ...  0.304875         0.099578
nfl_corrected                     0.576494  0.506336  ...  0.145955         0.064278
```

```
35 ptau181_corrected                    0.464135  0.343399
     ...  0.124140         0.103794
36 Any_E4                              -0.005889 -0.165854
     ...  0.011010         0.076966
37 COPD                                -0.006031  0.069784
     ...  0.121938        -0.009556
38 LIP                                 -0.027969 -0.009822
     ...  0.065107         0.017872
39 HYP                                  0.202087  0.277515
     ...  0.127927         0.031215
40 sexc                                -0.142240 -0.092489
     ...  0.065551         0.006490
41 CKD                                  0.156866  0.226626
     ...  0.091980         0.083545
42 OST                                  0.155085  0.194790
     ...  0.092936         0.007189
43 CAD                                  0.013579  0.130668
     ...  0.074766         0.061225
44 DEP                                  0.000728  0.009623
     ...  0.004964        -0.038169
45 AST                                 -0.062804 -0.035871
     ...  0.039604        -0.050234
46 ARR                                  0.062813  0.287241
     ...  0.119773         0.018617
47 STR                                  0.083036  0.133842
     ...  0.128799        -0.022782
48 SUB                                 -0.041658 -0.069213
     ...  0.010495        -0.063219
49 ART                                  0.004567  0.162205
     ...  0.062874        -0.013266
50 CHF                                  0.088567  0.195081
     ...  0.136242         0.062122
51 abeta42_40_ratio_corrected          -0.158430 -0.112862
     ...  0.005792        -0.044594
52 DIA                                  0.014450  0.032048
     ...  0.074479         0.036552
53 SPM12_PIB_RATIO                      0.245364  0.174025
     ...  0.123161         0.297701
54 CAN                                  0.189801  0.304875
     ...  1.000000         0.085015
55 SPM12_TAU_RATIO                      0.111856  0.099578
```

```
55   ...  0.085015         1.000000
56
57 [24 rows x 24 columns]
58
59 Top 10 features by mutual information with target:
60 gfap_corrected: 0.0852
61 agevis: 0.0593
62 nfl_corrected: 0.0329
63 ptau181_corrected: 0.0147
64 Any_E4: 0.0134
65 COPD: 0.0132
66 LIP: 0.0130
67 HYP: 0.0129
68 sexc: 0.0120
69 CKD: 0.0112
70 Unique values in target: [3 2 1]
71 Min and max of target: 1 3
72 Epoch 0, Loss: 4.6776
73 Epoch 10, Loss: 1.2398
74 Epoch 20, Loss: 0.7944
75 Epoch 30, Loss: 0.7414
76 Epoch 40, Loss: 0.7721
77 Epoch 50, Loss: 0.7147
78 Epoch 60, Loss: 0.7567
79 Epoch 70, Loss: 0.6790
80 Epoch 80, Loss: 0.6610
81 Epoch 90, Loss: 0.6497
82 Epoch 100, Loss: 0.6354
83 Epoch 110, Loss: 0.6376
84 Epoch 120, Loss: 0.6182
85 Epoch 130, Loss: 0.6077
86 Epoch 140, Loss: 0.5986
87 Epoch 150, Loss: 0.5888
88 Epoch 160, Loss: 0.5793
89 Epoch 170, Loss: 0.5665
90 Epoch 180, Loss: 0.5550
91 Epoch 190, Loss: 0.5433
92 Epoch 200, Loss: 0.5418
93 Epoch 210, Loss: 0.5376
94 Epoch 220, Loss: 0.5248
95 Epoch 230, Loss: 0.5342
```

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 96 Epoch 240, Loss: 0.5293
 97 Epoch 250, Loss: 0.5067
 98 Epoch 260, Loss: 0.5039
 99 Epoch 270, Loss: 0.5042
100 Epoch 280, Loss: 0.5075
101 Epoch 290, Loss: 0.4846
102 Epoch 300, Loss: 0.5307
103 Epoch 310, Loss: 0.5182
104 Epoch 320, Loss: 0.4871
105 Epoch 330, Loss: 0.4764
106 Epoch 340, Loss: 0.4658
107 Epoch 350, Loss: 0.4498
108 Epoch 360, Loss: 0.4754
109 Epoch 370, Loss: 0.4374
110 Epoch 380, Loss: 0.4409
111 Epoch 390, Loss: 0.4766
112 Epoch 400, Loss: 0.4339
113 Epoch 410, Loss: 0.4154
114 Epoch 420, Loss: 0.4142
115 Epoch 430, Loss: 0.4544
116 Epoch 440, Loss: 0.4691
117 Epoch 450, Loss: 0.4319
118 Epoch 460, Loss: 0.3915
119 Epoch 470, Loss: 0.3797
120 Epoch 480, Loss: 0.3620
121 Epoch 490, Loss: 0.3702
122 out shape: torch.Size([3765, 3])
123 data.y shape: torch.Size([3765])
124 Test Accuracy: 0.7238
125 Predictions distribution: tensor([ 65, 516, 172])
126 True labels distribution: tensor([ 37, 534, 182])
127 Epoch 0, Loss: 0.3224, Val Acc: 0.6318, Val F1: 0.
    5817, Val AUROC: 0.3547
128 Epoch 10, Loss: 0.1260, Val Acc: 0.2255, Val F1: 0.
    1210, Val AUROC: 0.6816
129 Epoch 20, Loss: 0.0850, Val Acc: 0.4942, Val F1: 0.
    5307, Val AUROC: 0.6603
130 Epoch 30, Loss: 0.0725, Val Acc: 0.7131, Val F1: 0.
    6343, Val AUROC: 0.6787
131 Epoch 40, Loss: 0.0691, Val Acc: 0.7197, Val F1: 0.
    6024, Val AUROC: 0.6739
```

```
Epoch 50, Loss: 0.0676, Val Acc: 0.7197, Val F1: 0.6024, Val AUROC: 0.6993
Epoch 60, Loss: 0.0654, Val Acc: 0.7197, Val F1: 0.6113, Val AUROC: 0.7148
Epoch 70, Loss: 0.0656, Val Acc: 0.6816, Val F1: 0.6004, Val AUROC: 0.7230
Early stopping at epoch 78
Test Accuracy: 0.6255, Test F1: 0.6049, Test AUROC: 0.6640
Predictions distribution: tensor([175, 567,  11])
True labels distribution: tensor([ 39, 541, 173])

Process finished with exit code 0

```