

**Cross-Sample Validation Summary Statistics
(Donor-Level Pseudobulk Spearman Correlation)**

| Atlas | Signature | N Targets | Median ρ | Mean ρ | Std ρ | Min ρ | Max ρ | % Significant | % Positive |
|-------------------|------------------|------------------|---------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|----------------------|-------------------|
| Cima | CYTOSIG | 43 | 0.114 | 0.097 | 0.266 | -0.479 | 0.673 | 72.1% | 58.1% |
| Cima | LINCYTOSIG | 156 | 0.131 | 0.156 | 0.280 | -0.420 | 0.776 | 71.8% | 69.2% |
| Cima | SECACT | 1161 | 0.191 | 0.193 | 0.264 | -0.644 | 0.920 | 76.3% | 76.1% |
| Inflammation Main | CYTOSIG | 33 | 0.321 | 0.207 | 0.369 | -0.555 | 0.788 | 90.9% | 69.7% |
| Inflammation Main | LINCYTOSIG | 123 | 0.188 | 0.195 | 0.305 | -0.565 | 0.758 | 83.7% | 76.4% |
| Inflammation Main | SECACT | 805 | 0.188 | 0.193 | 0.290 | -0.682 | 0.859 | 85.1% | 72.8% |
| Inflammation Val | CYTOSIG | 33 | 0.253 | 0.210 | 0.373 | -0.563 | 0.797 | 75.8% | 69.7% |
| Inflammation Val | LINCYTOSIG | 123 | 0.201 | 0.179 | 0.318 | -0.724 | 0.776 | 69.1% | 71.5% |
| Inflammation Val | SECACT | 805 | 0.180 | 0.178 | 0.305 | -0.720 | 0.873 | 66.7% | 70.3% |
| Inflammation Ext | CYTOSIG | 42 | 0.135 | 0.086 | 0.444 | -0.653 | 0.800 | 76.2% | 59.5% |
| Inflammation Ext | LINCYTOSIG | 155 | 0.100 | 0.106 | 0.409 | -0.867 | 0.835 | 64.5% | 56.8% |
| Inflammation Ext | SECACT | 1118 | 0.097 | 0.134 | 0.338 | -0.787 | 0.936 | 49.4% | 64.1% |
| Scatlas Normal | CYTOSIG | 1013 | 0.145 | 0.127 | 0.394 | -1.000 | 0.975 | 29.9% | 64.3% |
| Scatlas Normal | LINCYTOSIG | 3781 | 0.115 | 0.104 | 0.401 | -1.000 | 1.000 | 30.1% | 61.7% |
| Scatlas Normal | SECACT | 27154 | 0.307 | 0.275 | 0.390 | -1.000 | 1.000 | 40.9% | 75.6% |
| Scatlas Cancer | CYTOSIG | 295 | 0.212 | 0.219 | 0.324 | -0.800 | 1.000 | 62.0% | 74.9% |
| Scatlas Cancer | LINCYTOSIG | 1079 | 0.137 | 0.159 | 0.364 | -0.900 | 1.000 | 52.1% | 63.9% |
| Scatlas Cancer | SECACT | 7809 | 0.363 | 0.336 | 0.328 | -1.000 | 1.000 | 71.2% | 85.6% |
| Gtex | CYTOSIG | 43 | 0.211 | 0.248 | 0.247 | -0.246 | 0.614 | 100.0% | 81.4% |
| Gtex | LINCYTOSIG | 156 | 0.159 | 0.147 | 0.309 | -0.635 | 0.744 | 98.7% | 66.0% |
| Gtex | SECACT | 1132 | 0.395 | 0.379 | 0.281 | -0.493 | 0.869 | 98.1% | 89.8% |
| TcgA | CYTOSIG | 41 | 0.238 | 0.249 | 0.188 | -0.226 | 0.611 | 92.7% | 92.7% |
| TcgA | LINCYTOSIG | 152 | 0.205 | 0.201 | 0.292 | -0.468 | 0.736 | 98.0% | 74.3% |
| TcgA | SECACT | 1085 | 0.415 | 0.399 | 0.198 | -0.362 | 0.823 | 98.8% | 97.1% |