Clinical Rheumatology

No evidence of abnormal metabolic or inflammatory activity in the brains of patients with rheumatoid arthritis: examination via whole-brain magnetic resonance spectroscopic imaging (MRSI).

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| ROI                  | LAC/CR FSS VAS | DAS28 swollen | DAS28 tender | NAA/CR FSS VAS | DAS28 swollen | DAS28 tender | Temperature (°C) |
|----------------------|----------------|---------------|--------------|----------------|---------------|--------------|------------------|
| Precentral R         | 0.008          | 0.023         | -0.296       | 0.416          | 0.281         | -0.033       | 0.323 0.065 0.234 |
| Precentral L         | 0.028          | 0.043         | -0.195       | 0.098          | 0.385         | 0.081        | -0.337 0.136 0.064 |
| Frontal Lobe R       | 0.152          | -0.113        | -0.385       | 0.287          | 0.238         | -0.139       | -0.438 -0.156 -0.128 |
| Frontal Lobe L       | 0.048          | -0.094        | -0.209       | 0.250          | 0.456         | -0.020       | -0.275 -0.054 -0.006 |
| Rolandic Oper R      | -0.208         | 0.238         | -0.131       | -0.093         | 0.130         | -0.153       | 0.157 -0.371 0.064 |
| Rolandic Oper L      | -0.096         | 0.187         | 0.092        | 0.483          | 0.150         | -0.028       | 0.166 0.283 0.287 |
| Supp Motor Area R    | 0.128†         | -0.018†       | -0.363†      | 0.292†         | 0.174†        | -0.113†      | 0.217† 0.054† 0.109† |
| Supp Motor Area L    | 0.065          | 0.051         | -0.248       | 0.214          | 0.442         | 0.092        | -0.128† -0.109† 0.116† |
| Insula R             | -0.118         | -0.099        | -0.195       | 0.219          | 0.329         | 0.000        | -0.396 -0.326 -0.198 |
| Insula L             | -0.132         | -0.196        | -0.391       | 0.244          | 0.448         | 0.251        | 0.250 0.088 0.123 |
| Anterior Cingulum R  | 0.142†         | -0.454†       | -0.589*†     | 0.292†         | 0.047†        | 0.201†       | -0.089† -0.011† -0.254† |
| Anterior Cingulum L  | -0.073         | -0.425        | -0.700**     | 0.306          | -0.065        | -0.114       | -0.461 -0.207 -0.318 |
| Mid Cingulum R       | 0.084          | -0.235        | -0.198       | 0.124          | 0.281         | -0.039       | 0.050† -0.229† -0.014† |
| Mid Cingulum L       | -0.239         | -0.312        | -0.494       | 0.230          | 0.142         | -0.117       | 0.197 -0.128 0.061 |
| Posterior Cingulum R | -0.101†        | -0.118†       | -0.203†      | 0.356†         | 0.050†        | 0.118†       | 0.029† 0.186† 0.285† |
| Posterior Cingulum L | 0.135          | 0.020         | -0.167       | 0.351          | 0.023         | 0.184        | 0.472 0.442 0.513 |
| Brain Region               | Hippocampus R | Hippocampus L | Calcarine R   | Calcarine L  | Cuneus R  | Cuneus L  | Lingual Gyrus R | Lingual Gyrus L  | Occipital Lobe R | Occipital Lobe L | Fusiform Gyrus R | Fusiform Gyrus L   | Postcentral Gyrus R | Postcentral Gyrus L | Parietal Lobe R | Parietal Lobe L  | Precuneus R   | Precuneus L  | Paracentral Lobule R |
|----------------------------|---------------|---------------|---------------|--------------|-----------|-----------|----------------|----------------|-----------------|----------------|----------------|----------------|-------------------|-------------------|----------------|----------------|---------------|--------------|-------------------|
|                           | -0.126        | 0.138         | -0.135        | -0.348       | -0.402    | -0.129    | -0.199         | -0.391          | -0.126          | -0.084         | 0.081          | -0.051             | 0.056             | 0.171             | 0.104           | -0.177        | -0.104       | 0.064†          |
|                           | -0.298        | -0.045        | -0.014        | -0.119       | -0.068    | -0.099    | -0.303         | -0.383          | -0.176          | 0.136          | -0.028         | -0.323            | 0.125             | 0.075             | 0.227           | 0.017         | -0.130       | 0.084†          |
|                           | -0.449        | -0.053        | -0.192        | -0.117       | -0.304    | -0.050    | -0.427         | -0.505          | -0.145          | -0.268         | -0.134         | -0.170            | 0.205             | 0.104             | 0.047           | 0.157         | 0.120        | -0.261†         |
|                           | 0.346         | 0.379         | 0.340         | -0.093       | 0.396     | 0.081     | 0.582*         | 0.081           | 0.028           | -0.087         | 0.205          | 0.385             | 0.185             | 0.259             | 0.104           | 0.169         | 0.120        | 0.470†          |
|                           | 0.247         | 0.207         | -0.014        | -0.003       | 0.266     | 0.122     | 0.218          | 0.317           | 0.320           | 0.062          | 0.170          | 0.317             | 0.241             | 0.259             | 0.104           | 0.266         | 0.105        | 0.436†          |
|                           | 0.262         | 0.374         | 0.056         | -0.315       | 0.086     | -0.051    | 0.416          | 0.232           | 0.067           | -0.095         | 0.259          | 0.332             | -0.259            | -0.233            | 0.050           | 0.169         | 0.056        | 0.113†          |
|                           | -0.135†       | 0.309         | -0.073        | 0.056        | 0.129     | -0.048    | 0.045          | -0.138          | 0.253           | -0.031         | 0.219          | -0.031            | -0.233            | -0.096            | 0.000           | 0.112         | 0.114        | -0.037††       |
|                           | -0.033†       | 0.436         | -0.340        | -0.391       | -0.402    | -0.652*   | 0.315          | 0.206           | 0.043           | -0.612*        | 0.206          | 0.034             | 0.248             | -0.081            | -0.162          | -0.064        | -0.470        |
|                           | 0.233†        | 0.572*        | -0.014        | 0.056        | -0.028    | -0.435    | 0.084          | 0.114           | -0.224          | -0.458         | 0.221†         | 0.037             | 0.135†            | 0.131             | 0.011           | -0.536        |
|                           |               |               |               |               |          |          |               |                 |                 |               |               |                  |                   |                   |               |               |              |               | 0.290          |
| Region                | R Value | L Value | Ratio Difference | Temperature | VAS Value | VAS p-value | VAS p-value | VAS p-value | VAS p-value |
|-----------------------|---------|---------|------------------|-------------|-----------|-------------|-------------|-------------|-------------|
| Paracentral Lobule L  | 0.214   | 0.043   | -0.089           | 0.489       | 0.320     | 0.061       | -0.353††    | -0.308††    | -0.133††    |
| Caudate R             | -0.281  | -0.332  | -0.335           | 0.208       | 0.130     | 0.117       | -0.517      | -0.570*     | -0.469      |
| Caudate L             | -0.326  | 0.037   | -0.237           | -0.037      | 0.337     | -0.109      | -0.084      | 0.244       | 0.234       |
| Putamen R             | -0.140  | -0.159  | -0.312           | 0.332       | -0.108    | 0.017       | 0.042       | -0.315      | -0.114      |
| Putamen L             | -0.149  | -0.380  | -0.402           | 0.079       | 0.249     | 0.059       | 0.199       | 0.136       | 0.120       |
| Pallidum R            | 0.121   | -0.051  | -0.318           | 0.098       | -0.326    | -0.114      | -0.278      | -0.164      | -0.293      |
| Pallidum L            | 0.360   | 0.167   | 0.053            | -0.275      | -0.247    | 0.045       | 0.555†      | 0.055†      | 0.377†      |
| Thalamus R            | -0.205  | -0.147  | -0.159           | 0.469       | 0.349     | 0.379       | -0.11       | -0.128      | 0.006       |
| Thalamus L            | -0.020  | 0.150   | 0.151            | 0.129       | 0.30      | 0.170       | 0.107       | 0.153       | 0.234       |
| Temporal Lobe R       | -0.230  | -0.298  | -0.204           | 0.011       | 0.082     | -0.075      | 0.242       | -0.133      | 0.237       |
| Temporal Lobe L       | -0.107  | -0.040  | -0.117           | 0.132       | -0.221    | -0.262      | 0.017       | -0.159      | 0.190       |
| Cerebellum            | -0.045  | 0.020   | -0.229           | -0.177      | 0.150     | 0.036       | -0.112      | -0.255      | 0.159       |

**VAS**: visual analog scale
*p<0.05  **p<0.01
n=13 (unless an exception is noted); †: n=12; ††: n=11

Spearman correlations between metabolite ratios and temperature in regions of interest and clinical outcome data in RA patients. None of the results survived corrections for multiple comparisons (equivalent to uncorrected p<0.0023).