## Table 4.11 Studies on coffee drinking and chronic inflammation in experimental systems

<table>
<thead>
<tr>
<th>Species, strain (sex)</th>
<th>Tissue</th>
<th>End-points</th>
<th>Description of exposure and controls</th>
<th>Response and significance</th>
<th>Comments</th>
<th>Reference</th>
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</thead>
</table>
| Rat, Long Evans Cinnamon (M) | Liver | IL-1β, IL-6 and TNF-α mRNA and protein | 2 groups (n = 21 each): ad lib coffee or pure water; 27 wks | Coffee vs water  
Not significant: mRNA IL-1β, mRNA IL-6, protein IL-6 ─50%  
[P < 0.05]  
mRNA TNF-α ─80%  
[P < 0.05]  
Not significant: protein TNF-α | This mutant strain accumulates Fe, Cu in liver causing continuous oxidative stress | Katayama et al. (2014) |
| Rat, Wistar (M) | Liver | IL-1α, IL-2, 4, 6, 10; TNF-α; IFN-γ | 5 groups (n = 6 each): HFD + decaf coffee; HFD + water; standard diet + water; 1 mo, after 2 mo on HFD | HFD+decaf coffee vs HFD+water:  
IL-6 +25% [P < 0.05]  
IFN-γ −20% [P < 0.05]  
TNF-α −40% [P < 0.05]  
IL-4 +60% [P < 0.05]  
IL-10 +11% [P < 0.05]  
Not significant: IL-1α, IL-1β | Coffee dose equivalent to 6 cups espresso; HFD to develop nonalcoholic steatohepatitis | Vitaglione et al. (2010) |
| Rat, Sprague Dawley (M) | Liver | mRNA IL1-β, TNF-α | 4 groups (n = 8 each): 100 mg/kg coffee + DMN, 200 mg/kg coffee + DMN, 300 mg/kg coffee + DMN; DMN only; 4 wks | Coffee vs DMN only:  
all levels coffee significantly suppressed gene expression of IL1-β, and TNF-α (no quantitative data given) | DMN did induce liver fibrosis | Shin et al. (2010) |
### Table 4.11

<table>
<thead>
<tr>
<th>Animal Species</th>
<th>Tissue</th>
<th>Method</th>
<th>Treatment</th>
<th>Cytokines Assayed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rat, Wistar (M)</td>
<td>Serum</td>
<td>LPS-inducedcytokines</td>
<td>3 groups ($n = 16$ each): 0.62% coffee (freeze-dried), 1.36% coffee; control (no coffee); 20 wks</td>
<td>TNF-α, IL-6</td>
<td>Comparison: LPS-induced ($n = 8$) vs non-induced ($n = 8$) in each group. TNF-α, IL-6: no significant effect.</td>
</tr>
<tr>
<td>Mouse</td>
<td>Serum</td>
<td>IL-1α, IL-1β, IL-6, TNF-α</td>
<td>2 groups ($n = 12$ each): coffee; control (water); 4 wks</td>
<td>IL-1α</td>
<td>Coffee vs water: Coffee or caffeine vs water: Coffee or water:</td>
</tr>
<tr>
<td>Mouse, C57BL/6J (M)</td>
<td>Epididymal fat</td>
<td>mRNA MCP-1, TNF-α, IL-6</td>
<td>3 groups, coffee $(n = 6)$, caffeine $(n = 6)$, control (water) $(n = 5)$: Coffee (coffee/water 1:1.5); 17 wks</td>
<td>MCP-1, TNF-α</td>
<td>Coffee vs water: Coffee or caffeine vs water: Coffee or water:</td>
</tr>
<tr>
<td>Mouse, KK-AY (M)</td>
<td>Serum, epididymal fat</td>
<td>serum TNF-α, MCP-1, IL-6, fat mRNA level</td>
<td>2 groups $(n = 10,11)$: coffee (1:1); control (water); 5 wks</td>
<td>MCP-1 mRNA fat</td>
<td>Coffee vs water: Coffee or caffeine vs water: Coffee or water:</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Mouse</th>
<th>Whole body, organs (liver, kidney, spleen, thymus, brain, muscle, adipose tissue, skin, heart)</th>
<th>imaging</th>
<th>LPS induced luminescence</th>
<th>Luminescence whole body</th>
<th>Probable coffee used</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse B6, transgenic NF-κB luciferase (Cgene) (F)</td>
<td>Whole body, organs (liver, kidney, spleen, thymus, brain, muscle, adipose tissue, skin, heart)</td>
<td>imaging</td>
<td>LPS induced luminescence</td>
<td>LPS + coffee (extract in corn oil, Equation 0.6 g coffee bean); control (LPS)</td>
<td>Luminescence whole body $\sim$40% $[P &lt; 0.02]$ liver $\sim$30% $[P = 0.01]$ kidney $\sim$50% $[P = 0.01]$</td>
<td>Probably the dark roasted coffee was used</td>
</tr>
<tr>
<td>Mouse, C57BL/6J (M)</td>
<td>Liver, adipose tissue</td>
<td>mRNA IL-1β, MCP-1</td>
<td>PCR</td>
<td>4 groups ($n = 8$ each): HFD; HFD + 1.1% freeze-dried decaffeinated coffee; HFD + 1.1% freeze-dried caffeinated coffee; control (normal diet)</td>
<td>Coffee + HFD vs HFD liver caffeinated MCP-1 $\sim$75% $[P &lt; 0.05]$ Decaffeinated MCP-1: no significant effect caffeinated IL-1β $\sim$60% $[P &lt; 0.01]$ decaffeinated IL-1β $\sim$75% $[P &lt; 0.01]$ adipose tissue Not significant: MCP-1 decaffeinated MCP-1 $\sim$60% $[P &lt; 0.01]$ No significant effect: caffeinated IL-1β, decaffeinated IL-1β HFD vs control only IL-1β in liver and MCP-1 in fat higher</td>
<td>Fukushima et al. (2009)</td>
</tr>
</tbody>
</table>

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*a* unless otherwise specified, the term coffee is used to mean brewed, caffeinated coffee

*+*, positive; $-$, negative; differences: exposed vs control

DMN, dimethylnitrosamine; F, female; HFD, high fat diet; IFN, interferon; i.p. intraperitoneal; LPS, lipopolysaccharide; M, male; mo, month; PGE₂, prostaglandin E₂
References


