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

| Species, strain (sex) | Tissue | End-points | Test | Description of exposure[a] and controls | Response[b]/significance | Comments | Reference |
|---|---|---|---|---|---|---|---|
| *Rat* | | | | | | | |
| Rat, Long Evans Cinnamon (M) | Liver | IL-1β, IL-6 and TNF-α mRNA and protein | PCR and immunoblot | 2 groups (*n* = 21 each): ad lib coffee or pure water; 27 wks | Coffee vs water<br><br>Not significant: mRNA IL-1β,<br><br>mRNA IL-6,<br><br>protein IL-6 ─50%<br><br>[$P < 0.05$]<br><br>mRNA TNF-α ─80%<br><br>[$P < 0.05$]<br><br>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,1β,2,4, 6,10); TNF-α; IFN-γ | Bead-based assays | 5 groups (*n* = 6 each):<br><br>HFD + decaf coffee; HFD + water; standard diet + water; 1 mo, after 2 mo on HFD | HFD+decaf coffee vs HFD+water:<br><br>IL-6 +25% [$P < 0.05$]<br><br>IFN-γ ─20% [$P < 0.05$]<br><br>TNF-α ─40% [$P < 0.05$]<br><br>IL-4 +60% [$P < 0.05$]<br><br>IL-10 +11% [$P < 0.05$]<br><br>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 | PCR | 4 groups (*n* = 8 each):<br><br>100 mg/kg coffee + DMN, 200 mg/kg coffee + DMN, 300 mg/kg coffee + DMN; DMN only; 4 wks | Coffee vs DMN only:<br><br>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) |

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| Rat, Wistar (M) | Serum | TNF-α, IL-6 | LPS-induced cytokines | 3 groups (*n* = 16 each): 0.62% coffee (freeze-dried), 1.36% coffee; control (no coffee); 20 wks | Comparison: LPS-induced (*n* = 8) vs non-induced (*n* = 8) in each group<br><br>TNF-α, IL-6: no significant effect | | Sakamoto et al. (2001) |
|---|---|---|---|---|---|---|---|

*Mouse*

| Mouse, C57BL/6 (M) | Serum | IL-1α, IL-1β, IL-6, TNF-α | ELISA | 2 groups (*n* = 12 each): coffee; control (water); 4 wks | Coffee vs water:<br>IL-1α ─80% [*P* < 0.05]<br>IL-6 ─85% [*P* < 0.01]<br>TNF-α ─60% [*P* < 0.05]<br>Not significant: IL-1β | | Guo et al. (2014) |
|---|---|---|---|---|---|---|---|
| Mouse, C57BL/6J (M) | Epididymal fat | mRNA MCP-1, TNF-α, IL-6 | PCR | 3 groups, coffee (*n* = 6), caffeine (*n* = 6), control (water)(*n* = 5):<br>Coffee (coffee/water 1:1.5); 17 wks | Coffee or caffeine vs water:<br>Coffee<br>IL-6 ─40% P[< 0.05]<br>Not significant: MCP-1, TNF-α | | Matsuda et al. (2011) |
| Mouse, KK-A[y] (M) | Serum, epididymal fat | serum TNF-α, MCP-1, IL-6, fat mRNA level | | 2 groups (*n* = 10,11): coffee (1:1); control (water); 5 wks | Coffee vs water<br>MCP-1 mRNA fat ─35%<br>[*P* < 0.05]<br>Not significant: MCP-1 serum<br>IL-6 mRNA fat ─25%<br>[*P* < 0.05]<br>TNF-α mRNA fat ─30%<br>[*P* < 0.05]<br>Not significantt:IL-6 | Spontaneously diabetic mice | Yamauchi et al. (2010) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mouse B6, transgenic NF-κB luciferase (Cgene) (F) | Whole body, organs (liver, kidney, spleen, thymus, brain, muscle, adipose tissue, skin, heart | imaging | LPS induced luminescence | 2 groups ($n = 6$ each): LPS + coffee (extract in corn oil, Equation 0.6 g coffee bean); control (LPS) | Luminescence whole body ─40% [$P < 0.02$] liver ─30%[$P = 0.01$] kidney ─50% [$P = 0.01$] | Probably the dark roasted coffee was used | Paur et al. (2010) |
| Mouse, C57BL/6J (M) | Liver, adipose tissue | mRNA IL-1β, MCP-1 | PCR | 4 groups ($n = 8$ each): HFD; HFD + 1.1% freeze-dried decaffeinated coffee; HFD + 1.1% freeze-dried caffeinated coffee; control (normal diet) | Coffee +HFD vs HFD liver caffeinated MCP-1 ─75% [$P < 0.05$] Decaffeinated MCP-: no significant effect caffeinated IL-1β ─60% [$P < 0.01$] decaffeinated IL-1β ─75% [$P < 0.01$] adipose tissue Not significant: MCP-1 decaffeinated MCP-1 ─60% [$P < 0.01$] No significant effect: caffeinated IL-1β, decaffeinated IL-1β HFD vs control only IL-1β in liver and MCP-1 in fat higher | | Fukushima et al. (2009) |

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

[b] +, 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; $PGE_2$, prostaglandin $E_2$

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