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 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,1β,2,4, 6,10); TNF-α; IFN-γ	Bead-based assays	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	PCR	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)

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 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: IL-1α ─80% [*P* < 0.05] IL-6 ─85% [*P* < 0.01] TNF-α ─60% [*P* < 0.05] 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): Coffee (coffee/water 1:1.5); 17 wks	Coffee or caffeine vs water: Coffee IL-6 ─40% P[< 0.05] 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 MCP-1 mRNA fat ─35% [*P* < 0.05] Not significant: MCP-1 serum IL-6 mRNA fat ─25% [*P* < 0.05] TNF-α mRNA fat ─30% [*P* < 0.05] 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

4

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