



Psychological stress in early life as a predisposing factor for the development of chronic pain: Clinical and preclinical evidence and neurobiological mechanisms

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Table 1: Nociceptive behavior in animal models following postnatal early life stress

<i>Model</i>	<i>Nociceptive behavior assessed</i>	<i>Test</i>	<i>Response, (species)</i>	<i>Reference</i>
Maternal separation	Thermal nociception	Hot plate	↓ latency (R)	(Stephan et al., 2002)
			↔ no change (R)	(Uhelski and Fuchs, 2010, Kalinichev et al., 2001, Bernardi et al., 1986)
			↑ latency (R)	(Weaver et al., 2007)
		Tail-flick	↑ latency (R)	(Coutinho et al., 2002)
			↔ no change (M, R)	(Kalinichev et al., 2001, Lariviere et al., 2006, D'Amato et al., 1999)
			↔ no change (R)	(Stephan et al., 2002)
			↑ latency (post-imipramine treatment) (R)	(Stephan et al., 2002)
	Mechanical nociception	von Frey test	↔ no change (R)	(Uhelski and Fuchs, 2010)
			↓ thresholds (M)	(Pierce et al., 2014)
	Visceral nociception	Colorectal distension	↑ no. of responses (M, R)	(Coutinho et al., 2002, Gosselin et al., 2010, Moloney et al., 2012, Wouters et al., 2012, Moloney et al., 2015)
			↑ no. of responses after stress (R)	(Coutinho et al., 2002, Wouters et al., 2012)
			↓ thresholds (R)	(O'Mahony et al., 2009, Tsang et al., 2012, Chung et al., 2007, Bian et al., 2010, Chen et al., 2015)
		Vaginal balloon distension	↑ response (M)	(Pierce et al., 2014)
	Inflammatory nociceptive behavior	Formalin	↑ response (R)	(Uhelski and Fuchs, 2010)
			↔ no change (R)	(Lariviere et al., 2006)
Carrageenan (paw mechanical and thermal thresholds)		↔ no change (R)	(Uhelski and Fuchs, 2010)	
Complete Freund's Adjuvant (base of tail)		↔ no change (R)	(Lariviere et al., 2006)	
Affective nociceptive behavior	Carrageenan + PEAP	↑ affective pain behavior (R)	(Uhelski and Fuchs, 2010)	
Maternal Deprivation	Mechanical nociception	von Frey test	↑ response (female only) (R)	(Burke et al., 2013)
	Thermal nociception	Hot plate test	↓ threshold (female only) (R)	

	Neuropathic pain behavior	von Frey post SNL	↑ response (R)	
		Acetone drop test post SNL	↑ response (R)	
Maternal separation plus social isolation	Mechanical nociception	von Frey test	↔ no change (M)	(Nishinaka et al., 2015)
	Thermal nociception	Hargreaves test	↔ no change (M)	
	Neuropathic pain behavior	von Frey post pSNL	↑ response (M)	
		Hargreaves test post pSNL	↑ response (M)	
Neonatal isolation	Thermal nociception	Hot plate	↓ latency (R)	(Imanaka et al., 2008)
			↔ no change (R)	(Imanaka et al., 2006)
Neonatal limited bedding	Mechanical nociception	Muscle mechanical pressure threshold	↓ latency (R)	(Green et al., 2011)
		Paw pressure test	↔ no change (R)	(Green et al., 2011)
		von Frey test	↓ threshold (male only) (R)	(Prusator and Greenwood-Van Meerveld, 2015)
	Inflammatory nociceptive behavior	PGE ₂	Prolonged inflammatory hyperalgesia (both cutaneous and muscle) (R)	(Green et al., 2011)
	Visceral hyperalgesia	Colorectal distension	↑ response (R)	(Prusator and Greenwood-Van Meerveld, 2015, Guo et al., 2015, Holschneider et al., 2016)

Abbreviations. (M) mice, pSNL partial sciatic nerve ligation, PEAP place escape avoidance paradigm, PGE₂ prostaglandin E₂, (R) rats, SNL Spinal nerve ligation