

Disease models and human diseases for which beneficial effects of hydrogen have been documented

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Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration				
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Brain	Cerebral infarction	Ohsawa et al, 2007; Ono et al, 2011; Ji et al, 2011; Liu et al, 2011b; Cui et al, 2014; Zhao et al, 2015 Ono et al, 2017	○	○		○	○	○		○	
	Cerebral superoxide production	Sato et al, 2008		○						○	
	Restraint-induced dementia	Nagata et al, 2009		○						○	
	Cerebral ischemia-induced cognitive impairment	Ge et al, 2012		○						○	
	Sepsis-induced cognitive impairment	Zhou et al, 2012a; Liu et al, 2015		○					○	○	
	Hepatectomy-induced cognitive dysfunction	Tian et al, 2016		○						○	
	Traumatic brain injury-induced cognitive deficits	Hou et al, 2012		○						○	
	Gender-dependency in improvement of cognitive impairment	Hou et al, 2018		○						○	

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration					
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Brain	Alzheimer's disease	Li et al, 2010; Wang et al, 2011a		○				○				
	Senile dementia in senescence- accelerated mice	Gu et al, 2010		○						○		
	Parkinson's disease	Fu et al, 2009; Fujita et al, 2009; Ito et al, 2012; Yoritaka et al, 2013; Matsumoto et al, 2013		○			○			○	○	
	Hemorrhagic infarction	Chen et al, 2010b		○								○
	Intracerebral hemorrhage	Manaenko et al, 2011; Manaenko et al, 2013		○								○
	Brain trauma	Ji et al, 2010		○								○
	Traumatic brain injury	Ji et al, 2012; Yuan et al, 2015; Liu et al, 2017; Fu et al, 2018; Yuan et al, 2018		○					○	○		
	CO intoxication	Sun et al, 2011b; Wang et al, 2012a; Wang et al, 2012c; Shen et al, 2013		○					○			
	Transient global cerebral ischemia	Hugyecz et al, 2011		○								○

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration					
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others	
Brain	Common carotid artery occlusion-induced cerebral ischemia	Nagatani et al, 2012		○								○
	Brain injury after subarachnoid hemorrhage	Zhan et al, 2012; Zhuang et al, 2012; Zhuang et al, 2013; Hong et al, 2014; Shao et al, 2015		○	○				○			○
	Cerebral vasospasm after subarachnoid hemorrhage	Hong et al, 2012		○					○			
	Deep hypothermic circulatory arrest-induced brain damage	Shen et al, 2011		○					○			
	Surgically induced brain injury	Eckermann et al, 2011; Xin et al, 2017		○					○			○
	Cerebral artery occlusion-induced ischemia	Li et al, 2012c		○					○			
	LPS-induced neuroinflammation and sickness behavior	Spulber et al, 2012		○	○				○			○
	Brain Injury Induced by Cardiopulmonary Bypass	Chen et al, 2017			○							○

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Brain	Brain injury induced by bilateral common carotid artery occlusion	Nagatani et al, 2013		○								○
	Neurological outcome after cardiac arrest and resuscitation	Huo et al, 2014		○					○			
	Neurogenerative changes induced by traumatic brain injury	Dohi et al, 2014		○								○
	Chlorpyrifos-induced neurotoxicity	Wang et al, 2014		○								○
	Neurological function in stroke	Takeuchi et al, 2015		○								○
	Ischemic brain injury	Han et al, 2015		○								○
	Hypoxia/Reoxygenation	Wei et al, 2015		○					○			
	ALS	Zhang et al, 2015		○								○
	Autoimmune encephalomyelitis	Zhao et al, 2016		○								○
	Depression	Gao et al, 2017		○								○
	Depressive-like behavior	Zhang et al, 2016		○								○

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			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others			
Brain	Brain damage and inflammation after traumatic brain injury	Tian et al, 2016		○								○		
	Cerebral ischemia/reperfusion injury	Cui et al, 2016; Li et al, 2016; Gao et al, 2017; Wang et al, 2017		○								○	○	
	Hypoxic-ischemic encephalopathy	Nemeth et al, 2016											○	
	Isoflurane-induced cognitive impairment	Li et al, 2017	○	○					○			○		
	Anxiety-like behaviors	Wen et al, 2017 Masuda et al, 2017			○							○	○	
	Cognitive Impairment	Lang et al, 2017; Nishimaki et al, 2017			○							○	○	
	Oxidative stress in hippocampus	Paulis et al, 2018			○								○	
	Neurological outcome after cerebral ischemia/reperfusion	Huang et al, 2018			○									○
	Vascular dementia	Jiang et al, 2018			○									○

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			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Nerve/Spinal Cord	Spinal cord injury	Chen et al, 2010a; Wang et al, 2015; Chen et al, 2018		○				○		○	
	Spinal cord ischemia/reperfusion	Huang et al, 2011b; Zhou et al, 2013			○			○		○	
	Neuropathic pain	Chen et al, 2013; Kawaguchi et al, 2014; Gu et al, 2014; Chen et al, 2015; Wang et al, 2018		○				○		○	
	Astrogliosis	Liu et al, 2014	○	○			○		○		
	Remifentanil-induced hyperalgesia	Zhang et al, 2014a; Shu et al, 2015		○				○			
	Remifentanil-induced hypernociception	Zhang et al, 2014b		○				○			
	Death in neural cells	Kashiwagi et al, 2014	○				○				
	Peripheral nerve autografting	Zhang et al, 2016		○				○			
	Neuroblastoma cell death	Murakami et al, 2017	○				○				
	Post-herpetic neuralgia	Ma et al, 2017		○				○			
Autonomic nerve function	Mizuno et al, 2018							○			
Eye	Glaucoma	Oharazawa et al, 2010		○							○
	Corneal alkali-burn	Kubota et al, 2011; Cejka et al, 2017		○	○			○			○

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Eye	Retina injury	Wei et al, 2012; Tian et al, 2013; Feng et al, 2012; Qi et al, 2015; Zhang et al, 2016		○							○	
	LPS-induced retinal microglia cells inflammation	Liu et al, 2013		○							○	
	Selenite-induced cataract	Yang et al, 2013			○							○
	Optic nerve crush	Sun et al, 2014			○							○
	Retinal ischemia-reperfusion injury	Liu et al, 2015; Wang et al, 2016; Wu et al, 2018			○							○
	Retinal oxidative stress	Yokota et al, 2015		○								○
	Photoreceptor degeneration	Chen et al, 2016			○							○
	Corneal endothelial damage in phacoemulsification cataract surgery	Igarashi et al, 2016										○
	Dry eye	Chu et al, 2017				○						○
	Endotoxin-induced uveitis	Yan et al, 2017; Yan et al, 2018				○					○	○
	Retinitis pigmentosa	Yan et al, 2017				○						○
	Retinal degeneration	Tao et al, 2017				○						○
Corneal photodamage	Cejka et al, 2017a										○	

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Eye	UV-induced corneal photodamage	Cejka et al, 2017b			○					○		
Ear	Hearing loss	Kikkawa et al, 2009; Taura et al, 2010; Lin et al, 2011	○	○				○		○		
	Ouabain-induced auditory neuropathy	Qu et al, 2012a		○							○	
	Noise-induced hearing loss	Zhou et al, 2012b; Kurioka et al, 2014; Chen et al, 2014		○				○		○		
	Cisplatin-induced ototoxicity	Qu et al, 2012b; Kikkawa et al, 2014	○	○				○				○
	Ototoxy	Fransson et al, 2017		○							○	
	Ischemia hearing loss	Ogawa et al, 2017		○				○				
Lung	Oxygen-induced lung injury	Sun et al, 2011c; Huang et al, 2010; Zheng et al, 2010; Huang et al, 2011a; Kawamura et al, 2013		○				○		○		
	Lung transplantation	Kawamura et al, 2010; Kawamura et al, 2012; Zhou et al, 2013		○							○	
	Paraquat-induced lung injury	Liu et al, 2011a		○				○				

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Lung	Radiation-induced lung injury	Terasaki et al, 2011; Chuai et al, 2011		○							○	
	Burn-induced lung injury	Qiu et al, 2010; Fang et al, 2011		○							○	
	Intestinal ischemia/reperfusion-induced lung injury	Mao et al, 2009		○							○	
	LPS-induced lung injury	Qiu et al, 2011; Xie et al, 2012a; Liang et al, 2012; Liu et al, 2015; Zhang et al, 2015; Dong et al, 2017		○						○	○	○
	Lung ischemia/reperfusion injury	Li et al, 2012b; Shi et al, 2012; Takahashi et al, 2017		○		○					○	
	Septic shock-induced lung and intestine injuries	Liu et al, 2013		○								○
	Hemorrhagic shock-induced lung injury	Shi et al, 2013; Du et al, 2014a		○							○	○
	Inflammatory response of cardiopulmonary bypass	Fujii et al, 2013		○								○
	Chronic obstructive pulmonary disease (COPD)	Ning et al, 2013; Liu et al, 2017; Liu et al, 2017		○							○	○

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Lung	Lung perfusion after cardiac death	Haam et al, 2015			○						○
	Molecular changes in lung allografts	Tanaka et al, 2012	○								○
	Lung injury associated with sepsis	Zhai et al, 2015; Tao et al, 2016	○					○			
	Smoke inhalation-induced lung injury	Chen et al, 2015	○					○			
	Hemorrhagic shock-induced lung injury	Kohama et al, 2015	○								○
	Lung transplantation	Noda et al, 2014; Liu et al, 2015	○								○
	Seawater instillation-induced acute lung injury	Diao et al, 2016			○						○
	Air pollution-induced lung injury	Gong et al, 2016								○	○
	Pulmonary Emphysema	Suzuki et al, 2017	○								○
	Lung injury induced by limb ischemia/reperfusion	Zou et al, 2018	○						○		
Trachea	Ovalbumin (OVA)-induced asthma	Xiao et al, 2013; Zhang et al, 2018	○						○		○

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Heart	Acute myocardial infarction	Zhang et al, 2011; Sun et al, 2009; Hayashida et al, 2008; Yoshida et al, 2012; Sakai et al, 2012; Jing et al, 2014; Katsumata et al, 2017 Asanuma et al, 2017	○	○	○		○		○		
	Cardiac transplantation	Nakao et al, 2010a; Noda et al, 2012; Noda et al, 2013		○					○	○	○
	Left ventricular hypertrophy	Yu et al, 2012; Matsuoka et al, 2018		○				○		○	
	Radiation-induced cardiac injury	Qian et al, 2010a		○					○		
	Sleep apnea-induced cardiac hypoxia	Hayashi et al, 2011		○						○	
	Functional outcome of postcardiac arrest	Hayashida et al, 2012		○						○	
	Brain injury after cardiac arrest	Huang et al, 2013; Hayashida et al, 2014		○	○			○		○	
	Ischemia-reperfusion injury and nitrotyrosine production	Shinbo et al, 2013		○						○	

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Heart	Myocardial ischemia-reperfusion injury	Tan et al, 2013; Zhao et al, 2014; Zhang et al, 2015; Pan et al, 2015; Zalesak et al, 2017; Gao et al, 2017	○	○			○		○	○	
	Left ventricular remodeling induced by hypoxia	Kato et al, 2014	○						○		
	Cardiac dysfunction in diabetes	Wu et al, 2015	○					○			
	Ischemia-induced myocardial injury	Xie et al, 2014	○				○				
	Post-cardiac arrest syndrome	Tamura et al, 2016				○			○		
	Doxorubicin-induced heart failure	Wu et al, 2014	○					○			
	Doxorubicin-induced cardiac injury	Gao et al, 2017	○					○			
	LPS-induced heart failure	Tao et al, 2015	○					○			
	Cardiac function and neurological outcome after cardiac arrest	Wang et al, 2016	○							○	
Post Cardiac arrest myocardium injury	Wang et al, 2017			○					○		

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Heart	Pressure overload-induced cardiac hypertrophy	Fan et al, 2018		○					○			
	Neurological outcome after cardiac arrest	Chen et al, 2017		○								○
Liver	Schistosomiasis-associated chronic liver inflammation	Gharib et al, 2001		○								○
	Liver ischemia/reperfusion	Fukuda et al, 2007; Liu et al, 2014; Matsuno et al, 2014; Zhang et al, 2015; Li et al, 2017; Li et al, 2017; Lu et al, 2017		○	○	○			○			○
	Hepatitis	Kajiya et al, 2009a		○								○
	Non-alcoholic steatohepatitis	Kawai et al, 2012; Zhai et al, 2017; Wang et al, 2017	○	○								○
	Obstructive jaundice	Liu et al, 2010; Liu et al, 2016		○								○
	Carbon tetrachloride-induced hepatopathy	Sun et al, 2011a		○								○
	Radiation-induced adverse effects for liver tumors	Kang et al, 2011										○
	Hepatic gene expression	Nakai et al, 2011		○								○
	Liver injury during hepatectomy	Xiang et al, 2012										○

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Liver	Liver failure after hepatectomy	Tan et al, 2014		○				○				
	Liver fibrosis	Koyama et al, 2013		○						○		
	Chronic hepatitis B	Xia et al, 2013								○		
	Endotoxin-induced liver dysfunction	Xu and Zhang, 2013		○					○			
	Hemodynamics of cirrhosis	Lee et al, 2014		○					○			
	Acetaminophen-induced hepatotoxicity	Zhang et al, 2015		○					○			
	Liver regeneration	Yu et al, 2015		○								○
	Liver function after scald	Liu et al, 2014		○					○			
	Hypoxia/reoxygenation injury	Yu et al, 2015		○	○				○		○	
	Ethanol-induced fatty liver	Lin et al, 2017		○							○	
Kidney	Hemodialysis	Nakayama et al, 2007; Nakayama et al, 2009; Nakayama et al, 2010; Terawaki et al, 2014; Tange et al, 2015; Nakayama et al, 2017						○			○	○
	Peritoneal dialysis	Terawaki et al, 2013							○			○

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Kidney	nephrotoxicity induced by an anti-cancer drug cisplatin	Nakashima-Kamimura et al, 2009; Kitamura et al, 2010; Matsushita et al, 2011b		○				○		○	
	Gentamicin-induced nephrotoxicity	Matsushita et al, 2011a		○					○		
	Kidney transplantation	Cardinal et al, 2010		○					○		
	Renal ischemia/reperfusion	Wang et al, 2011b; Shingu et al, 2010; Abe et al, 2012; Zeng et al, 2014; Li et al, 2016a; Li et al, 2016b; Nishida et al, 2018		○			○	○			○
	Melamine-induced urinary stone	Yoon et al, 2011b		○						○	
	Diabetic nephropathy	Katakura et al, 2012		○						○	
	Chronic kidney disease	Zhu et al, 2011		○						○	
	Acute Kidney Injury (AKI)	Chen et al, 2017		○						○	
	Renal injury induced by unilateral ureteral obstruction	Xu et al, 2013		○						○	
	Ferric nitrilotriacetate-induced nephrotoxicity	Li et al, 2013		○						○	

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Kidney	Cardio-renal injury in salt-sensitive rats	Zhu et al, 2013		○							○	
	Rhabdomyolysis in kidney injury	Gu et al, 2014		○							○	
	Renal injury in spontaneous hypertensive rats (SHR)	Xin et al, 2014		○							○	
	Acute kidney injury during septic shock	Liu et al, 2014		○								○
	Contrast-induced kidney injury	Homma et al, 2015		○								○
	Nephrolithiasis	Peng et al, 2015		○								○
	Acute kidney injury in severe burn	Guo et al, 2015		○							○	
	Acute kidney injury after liver transplantation	Du et al, 2016		○							○	
	Kidney injury and fibrosis	Xing et al, 2017		○	○				○			○
Pancreas	Acute pancreatitis	Chen et al, 2010c; Zhang et al, 2012; Zhang et al, 2013; Ren et al, 2014; Zhou et al, 2016; Han et al, 2016	○	○				○	○			○
	Trauma-induced acute pancreatic	Ren et al, 2012		○							○	

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Pancreas	Taurocholate-induced pancreatitis	Shin et al, 2015		○						○		
	Ishemia/Reperfusion injury after pancreas transplantation	Lou et al, 2015		○						○		
	Acute necrotizing pancreatitis	Shi et al, 2016		○						○		
Testicle	Testicular ischemia/reperfusion injury	Jiang et al, 2012a; Lee et al, 2012		○						○		○
	Radiation-induced testicular damage	Jiang et al, 2012b		○						○		
	Radiation-induced germ cell damage	Chuai et al, 2012a		○						○		
	Radiation-induced spermatogenesis and hematopoiesis	Chuai et al, 2012b		○						○		
	Nicotine-induced testicular injury	Li et al, 2013		○						○		
	Sperm motility	Nakata et al, 2015		○						○		
	Cigarette smoke-induced testicular injury	Chen et al, 2015		○						○		
	Spinal cord hemisection- induced testicular injury	Ge et al, 2017		○						○		

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Ovary	Cisplatin-induced ovarian injury	Meng et al, 2015		○				○				
	Immune premature ovarian failure	He et al, 2016		○				○				
	Ovarian ischemia reperfusion injury	Gokalp et al, 2016		○				○				
Uterus	Endometriosis	He et al, 2016		○								○
Stomach	Stress-induced gastric ulceration	Liu et al, 2012		○				○				
	Aspirin-induced gastric injury	Xue et al, 2014; Zhang et al, 2014		○								○
Intestine	Intestinal transplantation	Buchholz et al, 2008; Zheng et al, 2009; Buchholz et al, 2011		○				○	○			○
	Ulcerative colitis	Kajiya et al, 2009b; He et al, 2013; Shen et al, 2017		○					○	○		○
	Intestinal ischemia/reperfusion injury	Chen et al, 2011; Shigeta et al, 2015 Wu et al, 2017		○					○	○		
	Intestinal injury in hemorrhagic shock	Du et al, 2015		○					○			
	Postoperative ileus	Okamoto et al, 2016		○					○			

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Intestine	Intestinal Translocation	Ikeda et al, 2017		○				○			
	Radiation-induced gastrointestinal injury	Xiao et al, 2018		○						○	
	Intestinal environment	Higashimura et al, 2018		○						○	
Esophageal	Migration and apoptosis	Li et al, 2017	○						○	○	
	Gastroesophageal reflux disease	Franceschelli et al, 2018					○			○	
Blood vessel	Atherosclerosis	Ohsawa et al, 2008		○						○	
	Aortic atherosclerosis	Song et al, 2012		○						○	
	Neointima formation after carotid balloon-induced injury	Qin et al, 2012; Chen et al, 2013	○	○				○	○		
	Intimal hyperplasia in arterialized vein graft	Sun et al, 2012a		○						○	
	Vascular dysfunction	Zheng et al, 2012		○						○	
	Advanced glycation end product-induced endothelial cells injury	Jiang et al, 2013	○							○	
	Aneurysm induced by calcium chloride	Chen et al, 2013; Song et al, 2013; Chen et al, 2014		○							○

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Blood vessel	Endothelial function	Sakai et al, 2014				○					○
	Monocyte-endothelial cell adhesion and vascular endothelial permeability	Xie et al, 2015; Yu et al, 2015	○								○
	Atherosclerotic plaque formation	Song et al, 2015a			○						○
	Proliferation and migration of vascular smooth muscle	Zhang et al, 2016	○	○					○		○
Muscle	Inflammatory and mitochondrial myopathies	Ito et al, 2011									○
	Muscle fatigue	Aoki et al, 2012; DA Ponte et al, 2017									○
	Gastrocnemius muscle atrophy	Fujita et al, 2011			○						○
	Ischemia-reperfusion injury in skeletal muscle	Huang et al, 2015			○						○
	Soft tissue injury	Ostojic et al, 2014									○
	Oxidative stress after racing exercise	Yamazaki et al, 2015									○
	Duchenne muscular dystrophy	Hasegawa et al, 2016			○						○
Bone/ Cartilage	NO-induced cartilage toxicity	Hanaoka et al, 2011	○								○

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Bone/ Cartilage	Microgravity-induced bone loss	Sun et al, 2012b		○							○	
	Osteopenia	Guo et al, 2012		○							○	
	TNF α -induced osteoblast injury	Cai et al, 2013	○								○	
	Viability of osteochondral tissue	Yamada et al, 2014	○								○	
	Osteoclast differentiation	Li et al, 2014	○								○	
	Steroid-associated femoral head necrosis; Li et al, 2017	Huang et al, 2016									○	
Joint	Rheumatoid arthritis	Ishibashi et al, 2012; Ishibashi et al, 2014; Meng et al, 2016		○				○			○	○
	Psoriasis-associated arthritis	Ishibashi et al, 2015						○			○	○
Tooth	Periodontitis	Kasuyama et al, 2011; Azuma et al, 2015		○				○				○
	Lipid deposition of aorta in periodontitis	Ekuni et al, 2012		○								○
	Periodontal tissues with aging	Tomofuji et al, 2014		○								○
	Oxidative stress in gingival fibroblast	Xiao et al, 2016	○									○

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Tooth	Gingival oxidative stress and alveolar bone resorption	Yoneda et al, 2017		○							○	
	Oral biofilm-dependent disease	Kim et al, 2017	○ (bacteria)				○				○	
	Gingival oxidative stress	Shamim 2018	○								○	
Skin	UV radiation-induced cell-injury in fibroblast and wrinkle formation in keratinocytes	Kato et al, 2012	○					○				○
	UV radiation-induced skin injury	Yoon et al, 2011a; Guo et al, 2012; Zhang et al, 2018	○	○					○	○		○
	Acute erythematous skin disease	Ono et al, 2012								○		
	Ischemia/reperfusion injury in skin flap	Zhao et al, 2013		○						○		
	UVB-mediated skin injury	Ignacio et al, 2013a		○								○
	Pressure ulcer	Li et al, 2013	○						○		○	
	Atopic dermatitis	Ignacio et al, 2013b; Yoon et al, 2014 Kajisa et al, 2017	○	○						○	○	
	Radiation-induced dermatitis and skin injury	Watanabe et al, 2014		○								○

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration					
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others	
Skin	Burn-wound progression	Guo et al, 2015		○					○			
	Burn-induced inflammation	Wang et al, 2015		○					○			
	Skin ischemia/reperfusion injury	Liu et al, 2015		○					○			
	Local radiation-induced dermatitis	Mei et al, 2014		○					○			
	Skin Aging	Wu et al, 2017	○						○			
	Psoriasis	Zhu et al, 2018										○
	Cleansing effect of keratin- plug	Tanaka et al, 2018							○			○
	Cutaneous ischaemia/reperfusion injury in a model of pressure ulcer	Fang et al, 2018		○								○
Metabolism	Diabetes mellitus type I	Li et al, 2011; Amitani et al, 2013		○			○		○			
	Diabetes mellitus type II	Kajiyama et al, 2008; Wang et al, 2012		○			○		○		○	
	Metabolic syndrome	Nakao et al, 2010b; Hashimoto et al, 2011; Song et al, 2013		○			○				○	
	Hypercholesterolemia	Zong et al, 2012; Song et al, 2015b		○			○		○			

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration						
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others		
Metabolism	Diabetes/obesity	Kamimura et al, 2011		○								○	
	Erectile dysfunction in diabetes mellitus	Fan et al, 2012		○								○	
	Diabetic retinopathy	Feng et al, 2012; Xiao et al, 2012		○								○	
	Fatty acid uptake and lipid accumulation in hepatic cells	Iio et al, 2013		○							○		
	Fatty acid metabolism	Kamimura et al, 2016		○								○	
	Bone loss in diabetic rats	Guo et al, 2017		○								○	
Perinatal disorders	Neonatal cerebral hypoxia	Cai et al, 2008; Domoki et al, 2010; Cai et al, 2009; Yang et al, 2016; Varga et al, 2018		○	○		○				○	○	○
	Preeclampsia	Yang et al, 2011; Ushida et al, 2016		○							○	○	
	Brain injury during maternal hypoxia	Liu et al, 2011		○									○
	Hyperoxia-induced retinopathy in neonate	Huang et al, 2012		○								○	
	Anesthetic-induced cognitive impairment in neonate	Yonamine et al, 2013		○									○

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration				
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Perinatal disorders	Necrotizing enterocolitis in neonate	Sheng et al, 2013		○				○			
	Fetal hippocampal damage	Mano et al, 2014		○					○		
	Neonatal germinal matrix hemorrhage	Lekic et al, 2012		○						○	
	LPS-induced fetal lung injury	Hattori et al, 2015		○					○		
	Neurovascular dysfunction	Oláh et al, 2015				○				○	
	Deficits in neonatal maternal behavior caused by inhalation anesthetic	Takaenoki et al, 2015		○							○
	Neonatal bronchopulmonary dysplasia	Muramatsu et al, 2016		○						○	
	LPS-induced fetal brain injury	Imai et al, 2016		○						○	
	Hypoxia-ischemia neonatal brain injury	Bai et al, 2016		○						○	
Inflammation/ Allergy	Type I allergy	Itoh et al, 2009		○						○	

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration				
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Inflammation/ Allergy	Sepsis	Xie et al, 2010a; Li et al, 2012a; Xie et al, 2012; Liu et al, 2014a; Liu et al, 2014b; Li et al, 2014; Li et al, 2015a; Li et al, 2015b; Yu et al, 2017; Iketani et al, 2016; Hong et al, 2017; Ikeda et al, 2017		○				○	○	○	
	Zymosan-induced inflammation	Xie et al, 2010b; Hong et al, 2016		○							○
	Carrageenan edema and TNF- α production in macrophage	Xu et al, 2012	○	○			○	○			
	LPS/IFN γ -induced NO production	Itoh et al, 2011	○	○			○			○	
	Inflammation in LPS- stimulated macrophages	Chen et al, 2013	○				○				
	Allergic-rhinitis	Zhao et al, 2017; Yu et al, 2017; Xu et al, 2017; Xu FF, et al, 2017; Jin et al, 2018		○		○	○			○	
Cancer	Growth of tongue carcinoma cells	Saitoh et al, 2008; Saitoh et al, 2009	○						○		

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration				
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Cancer	Lung cancer cells-induced angiogenesis	Ye et al, 2008	○				○				
	Radiation-induced thymic lymphoma	Zhao et al, 2011		○				○			
	Killing effect of cancer cells	Kagawa et al, 2012	○								○
	Antitumor effect	Dole et al, 1975		○							○
	Enhancement of antitumor effect in combination therapy	Runtuwene et al, 2015		○							○
	Liver function of colorectal cancer patients	Yang et al, 2017							○		
Hypertension	Monocrotaline-induced pulmonary hypertension	Wang et al, 2011c; He et al, 2013; Kishimoto et al, 2015		○				○		○	
Others	Decompression sickness	Ni et al, 2011		○				○			
	Viability of pluripotent stromal cells	Kawasaki et al, 2010	○								○
	Radiation-induced cell damage	Qian et al, 2010b; Qian et al, 2010c	○					○			
	Oxidized LDL-induced cell toxicity	Song et al, 2011	○					○			

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration					
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others	
Others	High glucose-induced oxidative stress	Yu et al, 2011	○				○					
	AAPH-induced oxidative stress	Yanagihara et al, 2005		○							○	
	Life span	Yan et al, 2010			○		○					
	Acute severe exercise-induced oxidative stress	Koyama et al, 2008; Tsubone et al, 2013			○	○					○	
	Exercise-induced metabolic acidosis	Ostojic et al, 2014				○					○	
	Platelet aggregation	Takeuchi et al, 2012		○			○		○	○		○
	Radiation-induced apoptosis	Yang et al, 2012		○							○	
	Radical production and blood fluidity	Kato et al, 2012		○							○	
	Graft versus-host disease (GVHD) in bone marrow transplantation	Qian et al, 2013		○							○	
	Chronic GVHD	Qian and Shen, 2016; Qian et al, 2016		○			○				○	○
	Aplastic anemia	Zhao et al, 2013		○							○	
	Radiation-induced immune dysfunction	Zhao et al, 2014		○							○	

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration								
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others				
Others	Acute peritonitis	Zhang et al, 2014		○									○		
	Hemorrhage shock	Du et al, 2014; Matsuoka et al, 2017		○								○		○	
	Hematopoietic stem-cell transplantation	Yuan et al, 2015		○									○		
	Signaling pathway	Sobue et al, 2015		○									○	○	
	Tissue concentration	Liu et al, 2014		○									○	○	○
	Human lymphocyte cells against 12C6+ heavy ion radiation.	Yang et al, 2013		○									○		
	Bladder outlet obstruction	Miyazaki et al, 2015			○									○	
	Oral palatal wound	Tamaki et al, 2016			○									○	
	Cell death and senescence	Han et al, 2016; Han et al, 2017		○										○	
	Cellular senescence	Hara et al, 2016		○										○	
	Hidden blood loss	Qian et al, 2017			○									○	
	Irradiation-induced hematopoietic stem cell injury	Zhang et al, 2017			○									○	
	Reactive oxygen scavenging activity in cultured cell	Hamasaki et al, 2017		○										○	
	Immune activity	Hu et al, 2017				○								○	
Oxidative Stress	Lee et al, 2017		○										○		

Organs/ Diseases	Disease models / Human diseases	Authors / Reported year	Species				Administration				
			Cell	Rodent	Other animals	Human	Medium	Saline	Water	Gas	Others
Others	Postoperative Intra-Abdominal Adhesion band formation	Liu et al, 2017		○						○	
	Growth suppression induced by mycotoxin-contaminated diet	Zheng et al, 2018			○						○
	Antifatigue effect	Ara et al, 2018		○							○
	Meta-analysis of gene expression	Nishiwaki et al, 2018		○							○

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