

Table S1. Database Search Strategy

Database	Search Strategy
PubMed	(((((cartilage OR hyaline OR chondral OR osteochondral OR chondrocyte) AND (regeneration OR repair OR heal OR therapy OR stimulation OR restoration)) AND (knee OR tibiofemoral OR patellofemoral)) AND (osteoarthritis OR OA OR osteoarthritic OR arthritis OR arthrosis)) AND (photobiomodulation OR phototherapy OR laser OR light OR LLLT OR "low-level laser" OR "low-level light" OR PBMT))
EMBASE	('cartilage'/exp OR cartilage OR 'hyaline'/exp OR hyaline OR chondral OR osteochondral OR 'chondrocyte'/exp OR chondrocyte) AND ('regeneration'/exp OR regeneration OR 'repair'/exp OR repair OR heal OR 'therapy'/exp OR therapy OR 'stimulation'/exp OR stimulation OR restoration) AND ('knee'/exp OR knee OR tibiofemoral OR patellofemoral) AND ('osteoarthritis'/exp OR osteoarthritis OR oa OR osteoarthritic OR 'arthritis'/exp OR arthritis OR 'arthrosis'/exp OR arthrosis) AND ('photobiomodulation'/exp OR photobiomodulation OR 'phototherapy'/exp OR phototherapy OR 'laser'/exp OR laser OR 'light'/exp OR light OR llst OR 'low-level laser' OR 'low-level light' OR pbmt)
Scopus	(TITLE-ABS-KEY (cartilage OR hyaline OR chondral OR osteochondral OR chondrocyte) AND TITLE-ABS-KEY (regeneration OR repair OR heal OR therapy OR stimulation OR restoration) AND TITLE-ABS-KEY (knee OR tibiofemoral OR patellofemoral) AND TITLE-ABS-KEY (osteoarthritis OR OA OR osteoarthritic OR arthritis OR arthrosis) AND TITLE-ABS-KEY (photobiomodulation OR phototherapy OR laser OR light OR llst OR "low-level laser" OR "low-level light" OR pbmt))
Web Of Science	(cartilage OR hyaline OR chondral OR osteochondral OR chondrocyte) AND (regeneration OR repair OR heal OR therapy OR stimulation OR restoration) AND (knee OR tibiofemoral OR patellofemoral) AND (osteoarthritis OR OA OR osteoarthritic OR arthritis OR arthrosis) AND (photobiomodulation OR phototherapy OR laser OR light OR LLLT OR "low-level laser" OR "low-level light" OR PBMT)

Table S2. Light therapy parameters for *in vitro* and *in vivo* studies

Type of study	First author, year	Laser type	Wavelength (nm)	Operating Mode	Frequency (Hz) Duty Cycle (%) Pulse	Power (mW)	Power density (mW/cm ²)	Beam spot size (cm ²)	Energy per point (J)	Total energy (J)	Energy density (J/cm ²)	Ir
<i>In vitro</i>	Sakata, 2020	NR (Laser diode)	910	Pulsed	30000 0.6 200 ns	300 (mean)	600	NR	NA	NR	4 or 8	24

	Yang, 2020	He-Ne (Laser diode)	632.8	Continuous	NA	12	NR	0.91	NA	NR	5.74	60 48
	Jia, 2004	He-Ne (Laser diode)	632.8	Continuous	NA	2, 4, 6, 8, 10 and 12	NR	NR	NA	NR	1, 2, 3, 4, 5 and 6	
	Trevisan, 2020	GaAlAs (LED)	850	Continuous	NA	200	0.4	0.5	3	6	NR	
	Yamada, 2019	GaAs (Laser diode)	904	Pulsed	9500 20 60 ns	40 (mean)	NR	0.1309	NR	NR	3 and 9	
	Li, 2020	NR	10600	NR	NR	NR	80	NR	47.1	47.1	1500	
	Balbinot, 2019	GaAlAs (Laser diode)	850	Continuous	NA	100	1430	0.01	4	16	57.14	
	Stancker, 2018	GaAlAs (Laser diode)	808	Continuous	NA	50	1780	0.028	2	8	71.2	
	Sanches, 2018	GaAlAs (Laser diode)	808	Continuous	NA	50	1700	0.028	1.4	2.7	50	
<i>In vivo</i>	Assis, 2018	GaAlAs (Laser diode)	808	Continuous	NA	50	1700	0.28	1.4	2.7	50	
	Tomazoni 2017	NR (Laser diode)	830	Continuous	NA	100	3570	0.028	6	6	214.2	
	Mahmoud, 2017	NR	850	Pulsed	16 NR NR	200 (mean)	NR	NR	NR	NA	3.6	
	Tomazoni, 2016	NR (Laser diode)	830	Continuous	NA	100	3570	0.028	6	6	214.2	
	Oliveira, 2016	GaAlAs (Laser diode)	808	Continuous	NA	50	1780	0.028	4	8	144	
	Assis, 2016	GaAlAs (Laser diode)	808	Continuous	NA	50	1700	0.028	1.4	2.7	50	
	Milares, 2016	GaAlAs (Laser diode)	808	Continuous	NA	50	1700	0.028	1.4	2.7	50	

Mangueira, 2015	NR	660 and 780	Continuous	NA	30	750	0.04	NR	0.3	7.5	
Santos, 2014	GaAlAs (Laser diode)	808	Continuous	NA	50	1780	0.028	2 and 4	4 and 8	71.4 and 142.8	4
Wang, 2014	He-Ne	830	Continuous	NA	50	NR	0.028	0.13	0.78	4.8	
Dos Santos, 2014	GaAlAs (Laser diode)	685	Continuous	NA	30	NR	0.028	0.3 and 1.4	0.6 and 2.8	10 and 50	1
Bublitz, 2014	GaAlAs (Laser diode)	808	Continuous	NA	30	NR	0.028	0.3 and 1.4	0.6 and 2.8	10 and 50	1
Alves, 2014	GaAlAs (Laser diode)	808	Continuous	NA	50 and 100	1780 and 3500	0.028	4	8	142	8
Oliveira, 2013	GaAlAs (Laser diode)	830	Continuous	NA	30	NR	0.028	0.3 and 1.4	0.6 and 2.8	10 and 50	1
Alves, 2013	GaAl (Laser diode)	808	Continuous	NA	50 and 100	1780 and 3500	0.028	4	8	142.4	8
Kim, 2013a	GaAlAs (Laser diode)	850	Pulsed	16 NR NR	200 (mean)	NR	0.07	NR	NR	3.6	
Kim, 2013b	GaAlAs (Laser diode)	850	Pulsed	16 NR NR	200 (mean)	NR	0.07	NR	NR	3.6	
Lin, 2012	NR	810	Continuous	NA	NR	5	NR	NR	NR	3	
De Rosa, 2012	InGaAlP and AsGaAl (Laser diode)	660 and 808	Continuous	NA	100	3570	0.028	4	16	142	
Oshima, 2011	LEDs	630 nm (red) and 870 nm (infrared: IR).	Pulsed	NR 16 NR	NR	3.2 (red) 4 (IR)	NA	NA	88 (red) 110 (IR)	2 (red) 2.5 (IR)	
Zhao, 2011	NR	10600 (CO ₂ : IR) and 650 nm (Red)	NR	NR	NR	200 (IR) and 36 (red)	NR	NR	NR	22.93 (IR) and 4.13 (red)	
Kamali 2007	GaAs (Laser diode)	890	Pulsed	1500 NR NR	60000 (mean)	NR	1	NR	NR	4.8	

Lin, 2006	He-Ne	632	Continuous	NA	NR	3.1	NR	NR	NR	NR
Cho, 2004	GaAs & He-Ne	NR	Pulsed	2500 100% NR	NR	NR	NR	NR	NR	NR

LEGEND: He-Ne: Helium-Neon; GaAlAs: Gallium-Aluminium-Arsenide; GaAs: Gallium-Arsenide; AlGa: Aluminium-Gallium; InGaAlP: Indium-Gallium-Aluminium-Phosphide; LED: Light-emitting Diode; NR – not reported; NA – not applicable

Table S3. Median, 25 and 75 percentiles, minimum and maximum light therapy parameters values and number of reporting studies (%)

PBMT Parameters	<i>In vitro</i>	<i>In vivo</i>
<i>Laser type</i>		
He-Ne laser	67%	10%
GaAs laser	NA	10%
GaAlAs	NA	23%
Others (AlGa, INGaIP, LED)	NA	10%
Studies reporting (%)	67% (of k=3)	77% (of k=30)
<i>Wavelength (nm)</i>		
Median (25-75%)	632.8 (632.8-910)	808 (801-850)
Min-max	632.8-910	630-904
Studies reporting (%)	100% (of k=3)	97% (of k=30)
<i>Operating Mode</i>		
Continuous	67%	70%
Pulsed	33%	23%
Studies reporting (%)	100% (of k=3)	93% (of k=30)
<i>Frequency (Hz)*</i>		
Median (25-75%)		758 (16-4250)
Min-max	3000	16-9500
Studies reporting (%)	100% (of k=1)	86% (of k=7)
<i>Duty Cycle (%)*</i>		
Median (25-75%)		58 (16-100)
Min-max	0.6	16-100
Studies reporting (%)	100% (of k=1)	29% (of k=7)
<i>Pulse duration (ns)*</i>		
Median (25-75%)		60
Min-max	200	
Studies reporting (%)	100% (of k=1)	14% (of k=7)
<i>Power (mW)</i>		
Median (25-75%)	7 (2.5-10)	50 (50-100)
Min-max	1.2-300	30-60000
Studies reporting (%)	100% (of k=3)	80% (of k=30)
<i>Power Density (mW/cm²)</i>		
Median (25-75%)		1700 (4.7-1780)
Min-max	600	0.4-3570
Studies reporting (%)	33% (of k=3)	67% (of k=30)
<i>Beam spot size (cm²)</i>		
Median (25-75%)		0.028 (0.028-0.07)
Min-max	0.91	0.01-1.0
Studies reporting (%)	33% (of k=3)	77% (of k=30)
<i>Energy per point (J)</i>		
Median (25-75%)		2 (1.4-4)
Min-max	NA	0.13-6
Studies reporting (%)		60% (of k=30)

Total energy (J)		
Median (25-75%)	NR	5 (2.7-8)
Min-max		0.03-330
Studies reporting (%)		70% (of k=3)
Energy density (J/cm²)		
Median (25-75%)	4.0 (2.5-5.87)	50 (4.8-142)
Min-max	1.0-8.0	2-1500
Studies reporting (%)	100% (of k=3)	90% (of k=3)
Irradiation time (s)		
Median (25-75%)	390 (210-690)	40 (28-87.5)
Min-max	60-780	10-900
Studies reporting (%)	100% (of k=3)	100% (of k=3)
Treatment duration		
Once daily	33%	17%
3 times a week	NA	37%
5 times a week		23%
Others (once, twice a week or every other day)	67%	10%
Studies reporting (%)	100% (of k=3)	87% (of k=3)
Number of sessions		
Median (25-75%)	NA	15 (10-24)
Min-max		1-32
Studies reporting (%)		87% (of k=3)
Application technique		
Skin contact	NA	57%
Transcutaneously		23%
Laser fixation	67%	3%
Studies reporting (%)	67% (of k=3)	83% (of k=3)
Irradiation area (cm²)		
Median (25-75%)	0.91 (0.785-9.6)	0.26 (0.07-44)
Min-max	0.785-9.6	0.07-44
Studies reporting (%)	100% (of k=3)	10% (of k=3)
Number of points irradiated		
Median (25-75%)	NA	2 (1-2)
Min-max		1-6
Studies reporting (%)		83% (of k=3)

LEGEND: He-Ne: Helium-Neon; GaAlAs: Gallium-Aluminium-Arsenide; GaAs: Gallium-Arsenide; AlGa: Aluminium-Gallium; InGaAlP: Indium-Gallium-Aluminium-Phosphide; LED: Light-emitting Diode; k – number of studies; NR – not reported; NA – not applicable

Table S4. Number of studies reporting (%) biochemical, histological and behavioural outcomes in *in vitro* and *in vivo* studies

Outcomes	Number of studies
<i>In vitro</i>	
<i>Biochemical</i>	
Chondrocytes activity	67% (of k=3)
ECM synthesis/degradation	100% (of k=3)
Inflammatory & pain markers	67% (of k=3)
<i>In vivo</i>	
<i>Biochemical</i>	
Chondrocytes activity	NA
ECM synthesis/degradation	64% (of k=25)
Inflammatory & pain markers	88% (of k=25)
<i>Histological</i>	
Osteoarthritis grade	62% (of k=21)
Morphometric analysis	38% (of k=21)
Cartilage organization	90% (of k=21)
<i>Behavioural</i>	
Gait performance	29% (of k=7)
Weight bearing	57% (of k=7)
Mechanical hyperplasia	57% (of k=7)
Maximum Knee extension	14% (of k=7)

LEGEND: k:
number of
studies; NA:
applicable

not