Supplementary table 1. List of symbols and abbreviations used in the tables 2-5.

Instructions

- Several modifying factors are supplemented with additional information regarding correlations, dynamics, and other information found in the literature, which is indicated with a capital in superscript ($x^{A\text{–}Z}$). Additional information is listed following the relevant table.

- For modifiers categorised in B and C, all reported changes are included; for category A only the consistent changes are included.

- Both absolute and relative values for the effects of each modifying factor on global, grey matter, white matter and regional perfusion are included in the tables, provided that they were reported in the literature. In the case of absence of numerical information, a symbol (↑/↓/↕/=) is used to indicate the observed effects on cerebral perfusion or the information provided by studies conducted with macrovascular approaches (e.g. Transcranial Doppler Ultrasound), generally limited to the effects on the middle cerebral artery (MCA).

- All absolute values mentioned in the tables are expressed in ml/100g/min, except if stated otherwise. Relative values are expressed in percentage (%). For global effects of each modifier, the average and range (if applicable) of all values found in the literature are mentioned. For regional effects, only the range is specified.

- Extra information regarding the values of perfusion changes are indicated in subscript (x_{DA}, x_{PS} …).

- When a cell is struck through, the effects of the modifier on perfusion have not yet been investigated. This is not synonym of absence of effects, which is indicated with an equal sign (=).

- In the column, all affected regions reported in literature are included. All regions are bilaterally influenced, except if mentioned otherwise—i.e., left (L) or right (R). Regions for which both an increase and decrease in perfusion have been reported for the same modifying factor, are underlined.

Categories

Prevalence and consistency label

- A – high prevalence, consistent across studies
- B – high prevalence, inconsistent across studies
- C – low prevalence

Importance label

- 1 – large effects (>24%; >15ml/100g/min)
- 2 – intermediate effects (between 14-24%; 6-15 ml/100g/min)
- 3 – small effects (<14%; <6ml/100g/min)
- 4 – unknown

Symbols and information in sub- and superscript

↑	Increased perfusion effect
↓	Decreased perfusion effect
↕	Both increased and decreased perfusion effects
=	No effect on perfusion
N	Normalized in comparison with perfusion in control subjects
NS	Not significant effect
	Not applicable or not yet investigated
(!)	Strong inter-subject differing results (↑↓=) even within one study
$x^{A\text{–}Z}$	Extra information can be found in the table footnote
*	Only investigated with macrovascular approaches (e.g. TCD, angiography, …)
$x^{\neq}$	Occasionally, distinct results have been found.
$x/\Delta y$	Perfusion change per change of parameter y (e.g., mmHg,…)
FL	Effect on perfusion during a flickering light
HA	At high altitude

Abbreviations

L	Left
R	Right
cort.	Cortex/cortices
gyr.	Gyrus/gyri
inf.	Inferior
sup.	Superior
lat.	Lateral
med.	Medial
ant.	Anterior
post.	Posterior
nucl.	Nucleus
WM	White Matter
GM	Grey Matter
PF	Prefrontal
F	Frontal
T	Temporal
P	Parietal
O	Occipital
MCA	Middle Cerebarl Artery
BA	Brodmann Area
DBP	Diastolic Blood Pressure
SBP	Systolic Blood Pressure
NRT	Nicotine Replacement Therapy
LT	Long Term

Supplementary table 2. Physiology, lifestyle and health group of perfusion-modifying factors sorted according to the relevance of the effect in the field of neuroimaging. Absolute values correspond to ml/100g/min, except if stated otherwise; relative values correspond to a percentage (%).

Factor	Cat.	Subcategory	Global effect		Regional effect			Ref
			Absolute (ml/100g/min)	**Relative (%)**	**Absolute (ml/100g/min)**	**Relative (%)**	**Regions**	
Age [A]	*A1*	*Adult[≠]*	- 0.27 /year (G) (- 0.16 → - 0.38) - 0.31 / year (GM) (- 0.11 → - 0.62) = / year (WM) - 0.22 / year (WM) (-0.19 → - 0.24)	- 0.53 /year (G) (- 0.37 → - 0.66) - 0.49 / year (GM) (- 0.16 → - 0.77) = / year (WM) - 0.45 / year (WM) (-0.30 → - 0.58)	- 0.62 → + 0.20 /year	- 1.04 → + 0.43 /year	↑ <u>Sup. T gyr.</u>, <u>intermediate T gyr.</u>, putamen. ↓ F cort., F pole, medial F., L ant. and post. F, lateral F, superoF gyr., mid. F gyr., inf. F gyr., F-T, preF cort., motor area, premotor area, somatosensory cort., anterior speech area, P cort., P-O, sup. P, inf. P lobule, T cort., L post. T, <u>sup. T gyr.</u>, <u>mid. T gyr.</u>, inf. T gyr., T-Sylvian, posterior speech area, O cort., visual cort., basal ganglia, thalamus, F WM, P WM, T WM, O WM, internal capsule, cingulate gyr., ant. cingulate cort., post. cingulate cort., parahippocampal gyr., insular cort., hippocampus, cuneus, cerebellum, lateral ventricular reg., striatum, angular gyr., subcallosal gyr., precuneus, amygdala, hypothalamus, pericalcarine gyr., supramarginal gyr., pallidum, <u>putamen</u>, caudate.	1-48
	A1	*Child[≠]*	- 1.69 /year (GM) (- 1.05 → -2.00) - 0.30 / year (WM) (- 0.14 → - 0.44)	-1.92 /year (GM) (- 1.20 → - 2.06) - 1.19/year (WM) (- 0.58 → - 1.71)	- 0.16 → - 1.92 /year	- 0.67 → - 2.22 /year	↓ F cort., F pole, F WM, ventromed. preF cort., dorsolat. preF cort., T cort., T WM, lat. T cort., P cort., P WM, inf. P lobule, O cort., O WM, cingular cort., basal ganglia, thalamus, subcortical reg.,post. cingulate cort., cerebellum.	44, 47-56
Occupation / Retirement [B]	*C2*	*Retired (inactivity)*	-1.50 /year (GM)	-2.18 /year (GM)				57
Social environment	*C3*	*Home/eventide home/hospital*	= (G)	= (G)				58
Gender [C]	*B1*	*Female[≠]*	+ 7.26 (G) (3.80 → 10.73) + 8.56 (GM) (5.70 → 12.1) + 8.73 (WM) = (G/GM/WM)	+ 12.1 (G) (11.0 → 21.9) + 8.56 (GM) (11.7 → 22.2) + 8.73 (WM) = (G/GM/WM)	+ 1.14 → + 16.1	+ 2.28 → + 23.2	↑ F cort., caudal mid. F cort., pars opercularis, pars traingularis, rostral mid. F, superior F, F pole, precentral gyr., postcentral gyr., P cort., sup. P cort., inf. P lobule, precuneus, supramarginal gyr., T cort., sup. T gyr., R inf. T lobe, entorhinal cort., O cort., visual cort., pericalcarine gyr., insula, mid-cingulate, caudal ant. cingulate cort., post. cingulate cort., caudate, pallidum, thalamus, corpus callosum.	24-41, 43, 44, 47, 49, 59-63
Menstrual cycle	*C3*		= (GM) ↓* (MCA)	= (GM) ↓* (MCA)				64-66
Pregnancy	*C4*	*Pregnancy*	- 0.59 cm/s* /week (MCA) (- 0.41 → - 0.77)	- 0.58* /week (MCA) (- 0.57 → - 0.58)				67-69
Menopause [D]	*C4*		↓* (MCA)	↓* (MCA)	↓	↓	↓ PreF reg., lower and central part of preF reg., lower part of F reg., upper and lower part of T reg., lower part of P reg., P-O reg., upper part O reg., hippocampus, pons, cerebellum, basal nuclei, thalamus.	70, 71
Diurnal Rhythm [E]	*C4*	*Later on day*	↕* (MCA)	↕* (MCA)	↓	↓	↓ Default mode network reg.: post cingulate cort., inf. P lobules (incl. angular gyr., middle T gyr.), medial. PF cort. (incl. med. and middle F gyr. and ant. cingulate cort.)	72-74
Body Mass Index	*C3*	*BMI*	= (GM) ↓* (MCA)	= (GM) ↓* (MCA)				63, 75, 76
	C4	*Fat free mass*			↑	↑	↑ R inf. T gyr. (BA37), R temporal lobe (subgyr.) (BA37), R mid. O gyr. (BA19), lingual gyr. (BA18/19), L cuneus (BA18), parahippocampal gyr. (BA30/35), cerebellum (culmen), R thalamus, midbrain, L ant. cingulate cort. (BA32), R post. cingulate cort. (BA30).	77
	C4	*Overweight*	↓	↓	↓	↓	↓ PreF cort. (BA8/9/10/11/44), L sup. orbitoF cort., R mid. orbitoF cort., R precentral gyr., R postcentral gyr., ant. cingulate cort. (BA32).	78

Physical exercise [F]	*A1*	*During*[≠]	+ 10.5 (G) (11.4 → 14.7) + 15.4 (GM) (10.5 → 20.3)	+ 22.1 (G) (24.7 → 28.0) + 21.8 (GM) (16.3 → 27.3)	+ 4.00 → + 40.3	+ 10.34 → + 70.5	↑ F reg., precentral gyr., postcentral gyr., supplementary motor area, P, T, O, insular cort., cerebellar vermis, cerebellum (hemisphere).	79-111
	B1	*After*	= (G/GM/WM) ↑ (G) + 6.00 (WM) (10.5 → 20.3)	= (G/GM/WM) ↑ (G) + 33.4 (WM) (10.5 → 20.3)	- 8.99 → +	- 19.4 → +	↑ L insula, motor area of the leg. ↓ Sensorimotor cort. (leg) (BA1-4), ant. cingulate cort. (BA24/32), R inf. thalamus, L inf. thalamus, inf. ant. insula, R inf. post. insula, L sup. ant. insula, hippocampus.	101-107, 109, 110, 112-117
Physical training [G]	*B1*	*Training* *(weeks/months)*	= (G) + 2.20 (GM) - 16.4 cm/s* (MCA) (-14.8 → - 18.6)	= (G) + 3.80 (GM) - 19.8 cm/s* (MCA) (-19.3 → - 20.6)	+ 16 → - 6.50	+ 42.1 → - 6.25	↑ R motor area, R supplementary motor area, R dorsal premotor cort., hippocampus, ant. cingulate cort., R cerebellum. ↓ Hippocampus.	106, 118-124
	B1	*Active lifestyle*	= (G/GM/WM) ↓ (G) + 5.66 (GM)	= (G/GM/WM) ↓ (G) + 12.8 (GM)	+ 20.2 → -	+ 62.9 → -	↑ F GM, F WM, P GM, P WM, precuneus, O reg., O-P area, post. cingulate cort., default mode network. ↓ F-central reg.	23, 98, 125-136
	C1	*10d training cessation*	= (GM)	= (GM)	- 39.0 → - 8.60	- 57.2 → - 31.6	↓ L inf. T gyr., L fusiform gyr., L inf. P lobule, R cerebellar tonsil, R lingual gyr., precuneus, bil. Cerebellum, bil. Hippocampus.	137
Pressure changes Altitude	*C1*	*HA – Short stay* *(hours)*	+ 9.65 (G) (9.10 → 10.2)	+ 30.1 (G) (24.0 → 36.2)	↑	+ 9.10 → + 32.8	↑ F area, P area, lat. And med. T lobe, O area, hypothalamus, pons, striatum, thalamus, cerebellum.	138-149
	C3	*HA – Medium stay (days)*	= (G) + 5.40 (G) + 8.90 cm/s* (MCA) (4.30 → 19.0) =* (MCA)	= (G) + 13.0 (G) + 15.0 cm/s* (MCA) (7.10 → 31.0) =* (MCA)				89, 104, 144-146, 148, 150-157
	C3	*HA – Long stay* *(weeks/months/ years/native)*	= (G/MCA*) + 3.00 cm/s* (MCA)	= (G/MCA*) + 4.50 cm/s* (MCA)				143-145, 149, 155, 156, 158-163
	C4	*Back after HA*	↕= (GM/MCA*) - 22.0 cm/s* (MCA)	↕= (GM/MCA*) - 32.4 cm/s* (MCA)	↕	↕	↑ Some cortical areas. ↓ T reg., L FT area.	147, 148, 154, 160, 164, 165
Divers [H]	*C4*	*Divers*	↓ (G)	↓ (G)	↓	↓	↓ Several ROI.	166, 167
	C4	*Former divers*			↓	↓	↓ Distinct reg. in F lobe, parts of post. lobe of the cerebellum.	168
Blood pressure – Hypotension *(SBP < 100 DBP < 60)*	*C4*	*Orthostatic*	= (GM) - 0.53 cm/s* /mmHg (MCA) (- 0.48 → - 0.57)	= (GM) - 0.83* /mmHg (MCA) (- 0.82 → - 0.83)	↕	↕	↑ Insula. ↓ Sensorimotor cort. (leg) (BA1-4), ant. cingulate cort. (BA24/32), inf. thalamus, inf. ant. insular, R inf. post. insular.	112, 169-175
Blood pressure – Hypertension *(SBP > 150 DBP > 90)*	*B1*	*Chronic*	↓ (G/GM/WM) = (GM/WM)	↓ (G/GM/WM) = (GM/WM)	- 26.9 → +	- 52.9 → +	↑ T-P reg.. ↓ F, Lat. Inf. F gyr., L orbitoF reg., L lat. Sup. F gyr., R F reg., L R-P reg., P, L inf. P reg., R P reg., T reg., lower T reg., L T-P reg., T, L sup. T cort., L mid. T cort., O, med. precuneus, putamen, globus pallidus, head of caudate, L hippocampus, ant. cingulate cort., L post. cingulate cort., subcallosal reg., thalamus,	19, 63, 176-184

Heart rate [≠]	*C4*		↑ (G) = (MCA*)	↑ (G) = (MCA*)	↓	↓	↓ R sup. T gyr., L parahippocampal gyr., L putamen, L amygdala, dorsorostral insula, R ventral hippocampus.	73, 185
Body temperature [I]	*C2*	*Hyperthermia*	- 5.21 /°C (G) (- 2.72 → - 7.70) = (G/GM)	- 10.2 /°C (G) (- 5.48 → - 15.0) = (G/GM)	- 5.94 → + 8.05	- 10/3 → + 16.1	↑ L dorsolat. preF cort., orbitoF cort., L inf. P lobe, L mid. T gyr., R sup. T gyr., R angular, L dorsal thalamus, post. cingulate cort., R mid. cingulate, L cerebellum. ↓ Precentral gyr., postcentral gyr., R sup. P lobe, R sup. T gyr., R fusiform gyr., L lingual gyr., precuneus, R cuneus, parahippocampal gyr., R hippocampus, R amygdala, ant. corpus callosum, ant. cingulate cort.	99, 186-195
Mobile phone [J]	*A4*	*During use (+ task)* [≠]	= (G/GM/WM)	= (G/GM/WM)	↕	↕	↑ L sup. F gyr. (BA10), R mid. F gyr. (BA8/9), R med. F gyr. (BA10), L ant. cingulate (BA32). ↓ T lobe (BA41), L fusiform gyr. (BA37).	196-198
	C4	*During use (resting)*	= (MCA*)	= (MCA*)	=	=	= Prefrontal areas, inf. T cort.	199, 200
	C4	*After use (+ task)*			↕	↕	↑ L dorsolat. PF cort. reg. (BA6/31/45), L inf. F gyr. (BA9/44), L mid. F gyr. (BA6), postcentral gyr. (BA2). ↓ R posterior lobe cerebellum.	201
	C4	*After use (+ resting)*	= (MCA*)	= (MCA*)	=	=	= Prefrontal areas, inf. T cort.	199, 200
Diet	*C4*	*High nitrate*	= (G)	= (G)	↑	↑	↑ Subcortical WM F lobe, deep WM F lobe, between dorsolateral prefrontal cort. reg. and anterior cingulate cort.	202
	C4	*Fasting (Ramadan)*	= (MCA*)	= (MCA*)				203
Hunger/Satiety	*B4*	*Satiety (immediately after meal)*			↕	↕	↑ Dorsolat. preF cort., ventromed. preF cort., dorsomed. preF gyr., ventrolat. preF cort., F operculum (BA44), inf. P reg., O cor., O-T cort., piriform cort., angular cort., insula/claustrum, precuneus, post. cingulate cort. (BA29), amygdala, cerebellum. ↓ Mid. F gy., dorsolat. preF cort., post. orbitoF reg., F operculum (BA44/45), ant. T cort., mid. T cort., fusiform gyr., precuneus, hypothalamus, angular cort., insula/claustrum, thalamus, ant. cingulate cort., hippocampus, parahippocampal area, caudate, nucleus accumbens, putamen, post. cingulate cort. (BA31), amygdala, midbrain, cerebellum.	204-207
Fat intake [K]	*C3*				↕	+ → - 12.5	↑ F operculum. ↓ Hypothalamus. = Insula, thalamus.	208, 209
Sugar intake	*C4*	*Glucose (15-60 min)*	= (ICA*/VA*)	= (ICA*/VA*)	↓	↓	↓ Hypothalamus, thalamus, insula, ant. cingulate cort., striatum. = Hippocampus, post. cingulate cort., fusiform gyr., visual cort.	210-212
	C4	*Fructose (15-60 min)*			↕	↕	↑ Hypothalamus. ↓ Thalamus, hippocampus, post. cingulate cort., fusiform cort., visual cort.. = Insula, anterior cingulate cort., striatum.	210
Thirst	*B4*	*Thirst*			↕	↕	↑ L sup. F gyr., L mid. F gyr., R med. F gyr., L inf. F gyr., pre- and postcentral gyr., supplementary motor cort., inf. P lobe, mid. T gyr., R sup. T gyr., lingual gyr., mid. O cort., (pre)cuneus, fusiform gyr., L cingulate cort., L ant. cingulate cort. (BA24), post. cingulate cort. (BA26/29), L midcingulate cort. (BA32), R post. centrum, thalamus, pulvinar (thalamus), parahippocampal reg., insula, medullary reticular formation, periaqueductal grey, ventral pons, R cerebellar culmen, cerebellar declive, vermal reg. central lobule ant. hemisphere cerebellum, pyramis. ↓ L sup. F gyr., rectal gyr., sup. orbital gyr., L mid. F gyr., R med. F gyr., L inf. F gyr., L inf. T gyr., R sup. T gyr., L ant. cingulate cort. (BA24), post. cingulate cort. (BA26/29), R caudate, pallidum, striatum, substantia nigra, subthalamus, nucleus accumbens, ventral tegmentum, midbrain, , R thalamus, pulvinar (thalamus), hypothalamus, R hippocampus, parahippocampal reg., ventral pons, R cerebellar culmen, tonsil posterior hemisphere cerebellum.	213-219
	B4	*Satiation*			↕	↕	↑ Precentral gyr., mid., inf. and sup. F cort., orbitoF cort., S1/M1, inf. P lobe, supramarginal gyr., sup. T gyr., mid. T gyr., precuneus, putamen, post. cingulate cort., ant. cingulate cort., midcingulate cort, lat. post. thalamus, insula, ant. quadrangular lobule, gracile lobule, fastigal nucleus, biventer, posterior lobule, R tonsil hemisphere, bivental lobule posterior hemisphere, ↓ Ant. quadrangular lobule, posterior lobule, central lobule, inf. semilunar lobule.	216-219

Additional information table 2

A – Age

- The decline in cerebral perfusion caused by increasing age appears to be the **steepest** after the age of 40-50 year.[3, 24, 33, 39, 42, 44]
- Some studies mention an **interaction between gender and age** in their effects on cerebral perfusion: one study reported a lack of change in cerebral perfusion in women,[16] or in men,[43] but other gender interactions with age on cerebral perfusion have been described as well.[2, 29, 36]
- One study reported no effects of age on cerebral perfusion after correcting for **partial volume effects**,[11] although other studies found no association between brain atrophy and cerebral perfusion.[33]
- Other **ASL related parameters** are simultaneously influenced by age: a global decrease of T1 and the magnitude of the peak ASL signal (dMmax) have been observed with increasing age, as well as a decrease in M0 in the MCA and ACA region in women, and globally in men; and an increased T-value in PCA region.[29, 54] Moreover, an increase in arterial-arteriole transit time (aaTT) with an average of 0.21%/year (range 0-0.8%/year) and bolus arrival time (BAT) (1.2-2.1%/year) in the posterior cingulate, precuneus and global grey matter was reported,[30] an effect which was contradicted by another study.[54] Mean transit time (MTT) appears to be increased in grey matter (0.38% year) and white matter (0.19%/year) with age.[36]
- In children, an **inverted U effect** caused by age on perfusion has been observed in several studies with a peak of global perfusion between the ages of 5 and 9 years old,[48, 52, 53, 55] although another study reported a constant perfusion until the age of 10-12 year.[49]
- In children, a gender effect on the influence of age on regional perfusion has been observed during midpuberty, with an increase of perfusion in women, whereas perfusion is decrease in men.[56]
- In children, a negative correlation between age and M0 has been observed, but not with BAT.[54]

B – Occupation/retirement

- After reaching retirement-age, the decline of perfusion, partly caused by ageing, can be delayed by continuing working or participating in regular physical activities.[57]

C – Gender

- The effect of gender on cerebral perfusion may vanish when corrected for the well-known gender difference in **hematocrit**.[60]
- The **interaction between gender and age** in their effects on cerebral perfusion is not completely clear. For example one study reported the effects of gender on perfusion starting at the age of 50 years,[33] although other studies have reported this effect only during the female reproductive years[43, 220] or before the age of 60.[39] The decrease in perfusion caused by age appears to be slower in women,[29] although distinct results have been reported as well.[30]
- Furthermore, a decrease in bolus arrival time (BAT) (-33 - -50%) and arterial arteriole transit time (aaTT) (-12.1 - -22%) has been reported.[30]

D – Menopause

- The effect of menopause on cerebral perfusion is reported not to depend on age nor time since the start of the menopause.[71]

E – Diurnal rhythm

- Blood flow velocity in the middle cerebral artery (MCAv) has been observed to behave as a cosine function throughout the day, with the minimum in velocity around noon.[72]

F – Physical exercise

- The discrepancies in the reported effects of acute exercise might be partially explained by the changes in the **partial arterial tension of CO_2**.[81, 85, 101, 108]
- The effects of acute exercises on cerebral perfusion is reported to depend on several factors such as the **load and type** of exercise.[23, 79, 84, 101, 102, 109, 118]
- Blood flow velocity of the middle cerebral artery appears to peak at an intensity of 60% of the **maximal oxygen uptake (VO_2max)**, and tends to decline at higher intensities.[82, 86, 92, 97, 98, 104, 114]
- The magnitude of the effects of acute exercises on cerebral perfusion were reported to be bigger in **active** volunteers compared to sedentary volunteers.[98]
- An **interaction between physical exercise and age** on cerebral perfusion has been reported,[94, 97] but this was not reported in another study.[91]

G – Physical training

- Effects of long-life training has been reported to depend on the **age** of the subject.[23, 122, 123, 128, 129, 131]
- The so called "age" of the MCA appears to be 10 year lower in elderly who exercised during their life, compared to sedentary elderly.[23]
- A positive association between **aerobic or cardiorespiratory fitness** and grey matter, white matter and hippocampal perfusion has been observed.[123, 133]

H – Pressure changes - Divers

- In former divers, the **bolus arrival time** (BAT) of the putamen, basal ganglia, posterior lobe of the cerebellum, distinct frontal lobe regions and the dorsolateral prefrontal cortex have been reported to be shorter.[168]

I – Body temperature

- Even after 15 minutes of hyperthermia, perfusion changes are still present.[195]
- The influence of hypothermia on cerebral perfusion has only been investigated in **neonates** undergoing cardiopulmonary bypass! A linear decrease between body temperature and cerebral perfusion has been reported. [221]

J – Mobile phone

- The regional effects described have been reported to be located on the **ipsilateral** side of where the phone was hold. The effects last even after 30 minutes after exposure.[201]

K – Fat intake

- The effects of fat intake on cerebral perfusion have been reported to be present for approximately a half an hour after fat intake and were still measurable after 2 hours.[208, 209]

Supplementary table 3. Blood components group of perfusion-modifying factors sorted according to the relevance of the effect in the field of neuroimaging. Absolute values correspond to ml/100g/min, except if stated otherwise; relative value correspond to a percentage (%).

Factor	Cat.	Subcategory	Global effect		Regional effect			Ref
			Absolute (ml/100g/min)	Relative (%)	Absolute (ml/100g/min)	Relative (%)	Regions	
Blood gases - hypoxia [A]	*B2*	*Acute*	+ 0.43 /ΔmmHg (G) (0.26 → 0.59) + 0.14 /ΔmmHg (GM) (0.09 → 0.18) = (G/GM)	+0.87 /ΔmmHg (G) (0.44 → 1.30) + 0.20 /ΔmmHg (GM) (0.15 → 0.24) = (G/GM)				116, 151, 222-248
Blood gases - hypercapnia [B]	*A1*	*Acute*[≠]	+1.65 /ΔmmHg (G) *[23-60m mHg]* (0.80 → 2.89) + 2.67 /ΔmmHg (GM) *[23-60mmHg]* + 0.46 /ΔmmHg (WM) *[23-60mmHg]*	+3.95 /ΔmmHg (G) *[23-60mmHg]* (0.95 → 8.99) + 4.17 /ΔmmHg (GM) *[23-60mmHg]* + 1.16 /ΔmmHg (WM) *[23-60mmHg]*	+ 0.87 → + 7.25 /ΔmmHg	+ 2.08 → + 12.0 /ΔmmHg	↑ F GM, F WM, R mid. F gyr., R med. Sup. F gyr., central, T, R sup. T reg., R mid. T reg., P, O GM and WM, L mid. O reg., visual cort., R insular, R hippocampus and parahippocampal reg., putamen, thalamus, ant. cingulum, cerebellum.	62, 150, 175, 233, 234, 236-241, 247-278
Blood gases – hypocapnia [C]	*A1*	*Acute*[≠]	- 0.98 /ΔmmHg (G) *[23-60mmHg]* (- 0.37 → - 1.72) - 1.22 /ΔmmHg (GM) *[23-60mmHg]* (- 0.51 → - 1.93) = (WM)	- 2.04 /ΔmmHg (G) *[23-60mmHg]* (- 1.16 → - 2.69) - 2.36 /ΔmmHg (GM) *[23-60mmHg]* (- 1.22 → - 3.50) = (WM)	-3.04 → - 4.60 /ΔmmHg	-6.58 → - 7.39 /Δmm.Hg	↓ F cort., P cort., T cort., O cort., thalamus, putamen, cerebellum.	53, 62, 157, 233, 234, 236, 237, 245, 247, 248, 269-283
Blood gases – hyperoxia [D]	*B1*	*Acute*	- 0.44 /ΔmmHg (G) (- 0.04 → - 0.84) - 0.05 /ΔmmHg (GM) - 0.02 /ΔmmHg (WM) = (G/GM/WM) ↑ (WM)	- 0.69 /ΔmmHg (G) (- 0.07 → - 1.31) - 0.07 /ΔmmHg (GM) - 0.06 /ΔmmHg (WM) = (G/GM/WM) ↑ (WM)	- 5.04 → + 27.7	- 8.23 → + 17.5	↑ R F cort., O cort., striatum, thalamus. ↓ FT paramedical cort.	150, 151, 228, 231, 233, 234, 236, 257, 262, 266, 279, 284-293
Hematocrit	*B1*	*Higher*	- 0.73 /%Hct (G) (- 0.32 → - 1.55) - 1.38 /%Hct (GM) (- 0.47 → - 2.47) - 0.38 /%Hct (WM)	- 2.28 /%Hct (G) (- 0.64 → - 3.50) - 1.93 /%Hct (GM) (- 0.59 → - 4.21) - 1.90 /%Hct (WM)	↓	↓	↓ Post. cingulate cort.	60, 62, 294-301
Blood viscosity	*C4*	*Increase*	= (GM)	= (GM)	↑	↑	↑ L P reg., P reg., L T reg..	297, 302 303
Hemoglobin	*C2*	*Higher Hb*	- 1.65 /g/dL HB (G)	- 3.56 /g/dL HB (G)	↕	↕	↑ L inf. F gyr. (BA44), L sup. T gyr. (BA37), midline cuneus (BA17), R precuneus (BA19). ↓ Mid. F gyr. (BA9/11), inf. F gyr. (BA46), L sup. O gyr. (BA19), L precuneus (BA7), cerebellum.	298, 304-306
Fibrinogen	*C2*		- 3.20 (G)	- 6.43 (G)	↓	↓	↓ P reg.	178, 297

Blood glucose – hypoglycaemia E	*B3*	*<3.6 mmol/L*	+ 2.76 /mmol/L (G) (1.20 → 5.20) - 1.70 /mmol/L (G)	+ 5.58 /mmol/L (G) (2.10 → 9.30) - 2.90 /mmol/L (G)	- 1.82 → + 2.69 /mmol/L	- 2.93 → + 5.19 /mmol/L	↑ F reg., preF cort., R med. F cort., R orbital preF cort., orbitoF cort., P reg., L sup. P cort., somatosensory cort., T reg., O reg., thalamus, basal ganglia, L ventral striatum, globus pallidus, insula, R pulvinar thalamus, thalamus, medial thalamus, ant. cingulate cort., pituitary, periaqueductal grey, brainstem, pons, cerebellum. ↓ T cort., inf. T cort., retrosplenial cort., hippocampus, brainstem, cerebellum,	307-315
Circulating homocysteine	*C1*	*Increase*	- 2.38 /µmol/L (G) = (MCA*)	- 4.33 /µmol/L (G) = (MCA*)	↕	↕	↑ P. reg. ↓ F. reg.	62, 316, 317
Cholesterol	*C4*	*Total chol.*	= (GM)	= (GM)	↓	↓	↓ P cort., T-P cort., T cort.	63, 318
	C4	*LDL*	- 0.80 cm/s (MCA*) = (MCA*)	- 1.12 (MCA*) = (MCA*)				319-321
	C4	*HDL*			↓	↓	↓ P cort., T-P cort., T cort.	318
Hyper-ketonemia	*C1*	*Acute*	+ 19.9 (G)	+ 39.0 (G)				322
	C3	*After 3 days*	= (G)	= (G)				323
ADMA	*C3*		= (G)	= (G)	-1.25	-1.04	↓ Basal ganglia.	62, 324
Free fatty acids	*C4*				↕	↕	↑ Dorsolat. and dorsomed. PF cort. ↓ (Vicinity of) ant. cingulate cort., L ventral preF cort., R hippocampus, R parahippocampal gyr., L insular cort.	204, 205

Additional information table 3

A - Blood gasses - Hypoxia

- Both a steady increase of cerebral perfusion during the first 10 minutes of hypoxia towards a steady state (measured in the ICA),[233] as an immediate response of cerebral perfusion on hypoxia in the order of seconds (measured in the MCA)[239] have been reported. Both studies report an normalization of cerebral perfusion immediately after the end of the hypoxia.
- An **interaction between CO_2 and O_2** in their effect on cerebral perfusion has been reported. [236]

B – Blood gasses - Hypercapnia

- An immediate effect of an increased and normalized CO_2 on cerebral perfusion has been reported. [239]
- In most subjects, the influence of changing CO_2 on perfusion comprises two phases of variable increase in cerebral perfusion. Only in a few subjects, an immediate increase towards to a steady state has been observed. [264]
- Between the **range of 23 mmHg and 60 mmHg CO_2**, a linear association between cerebral perfusion and partial arterial tension of carbon dioxide (P_aCO_2) has been reported. Outside this range, the effect of CO_2 levels off. [241, 270]
- An **interaction between CO_2 and O_2** in their effect on cerebral perfusion has been reported. [236]

C – Blood gasses - Hypocapnia

- The effects of hypocapnia on cerebral perfusion have been reported to comprise two components: after an initial fast decrease of perfusion, a slow adaptation to normalization has been reported after about 5 minutes of hypocapnia.[233]
- After the normalization of the CO_2 values, perfusion has been reported to restore immediately,[280] but distinct results have been reported.[325]
- Between the **range of 23 mmHg and 60 mmHg CO_2**, a linear association between cerebral perfusion and P_aCO_2 has been reported. Outside this range, the effect of CO2 levels off.[241, 270]
- An **interaction between CO_2 and O_2** in their effect on cerebral perfusion has been reported.[236]

D – Blood gasses - Hyperoxia

- An **interaction between CO_2 and O_2** in their effect on cerebral perfusion has been reported as cerebral perfusion has been reported only to be influenced by hyperoxia if the P_aCO_2 is higher than 45-50 mmHg.[233, 236]

E – Blood glucose - Hypoglycaemia

- After 10 minutes of hypoglycaemia, an increase in cerebral perfusion has been reported.[312] The peak in cerebral perfusion occurs between 45 and 51 minutes of hypoglycaemia and the effects remain measureable even after 90 minutes of blood glucose normalization. Normalization of cerebral perfusion has been reported 24 hours after blood glucose normalization. [312, 313]

Supplementary table 4. Mental state, personality and cognition group of perfusion-modifying factors sorted according to the relevance of the effect in the field of neuroimaging. Absolute values correspond to ml/100g/min, except if stated otherwise; relative values correspond to a percentage (%).

Factor	Cat.	Subcategory	Global effect		Regional effect			Ref
			Absolute (ml/100g/min)	Relative (%)	Absolute (ml/100g/min)	Relative (%)	Regions	
Stress [A]	*C3*		= (G)	= (G)	↑	↑	↑ R venral preF cort., ant. cingulate cort., insula, putamen, cerebellum.	326, 327
Anxiety [B]	*B1*	*All*	- 10.1 (G) (- 9.80 → - 10.4) = (G)	- 12.9 (G) (- 12.5 → - 13.2) = (G)	- 25.7 → +	- 23.3 → +	↑ Dorsolat. preF cort., orbitoF cort., L ventrolat. preF cort., postcentral gyr., sup. P lobe, T poles, putamen, L midcingulate cort., ant. cingulate cort., ant. insula, L nucleus caudatus, cerebellum. ↓ F cort., high F cort., preF cort., dorsolat. preF cort., medial preF cort., orbitoF cort., P cort., R inf. P lobe, high P cort., L T cort., temporopolar cort., R mid. T cort., O cort., R infralimbic cort., thalamic area, L hippocampus,	328-335
	C4	*Low → Moderate*	↑	↑	↑	↑	↑ OrbitoF cort. (BA4/14), preF cort. (BA8), sensorymotor cort. (BA5/6/16), P cort. (BA7), midT-P cort. (BA9), post. T-P, cort. (BA10).	335, 336
	C4	*Moderate → High*	↓	↓	↓	↓	↓ OrbitoF cort. (BA4/14), preF cort. (BA8), sensorymotor cort. (BA5/6/16), P cort. (BA7), midT-P cort. (BA9), post. T-P, cort. (BA10).	335, 336
Yoga / meditation [C]	*C4*	*During exercise*	= (G)	= (G)	↕	↕	↑ Sup. and inf. F gyr. (BA41/42), med. preF cort., R paracentral lobule (BA31), L precentral gyr. (BA6), postcentral gyr. (BA43), sup. and inf. P lobe, sup., mid. and inf. T gyr., sup., mid. and inf. O gyr., lingual gyr., fusiform gyr., L hippocampus, parahippocampal gyr., cingulate gyr., L caudate, insula, L amygdala. ↓ Sup. F gyr. (BA8), orbital gyr. (BA11), L med. F gyr. (BA25), L precentral gyr., L sup. P lobule (BA7), R inf. P lobule (BA40), inf. T gyr. (BA20), L mid. O gyr. (BA19), R inf. O cort., L sup. O cort., angular gyr., fusiform gyr. (BA20/37) R (pre)cuneus (BA19), L lentiform nucleus,	337-339
	C4	*After exercise*			↕	↕	↑ Dorsolat. preF cort., inf. F cort., orbitoF cort., R precentral gyr., dorsomedial cort., sensorimotor cort., precuneus, midbrain, ant. and post. cingulate cort., cingulate body, thalamus, L insula. ↓ Sup. P cort., L inf. T cort., R lat. T lobe.	339, 340
	C4	*Experienced*			↑	↑	↑ PreF cort., mid. F cort., P cort., inf. T lobe, thalamus, putamen, caudate, L insula, amygdala, brainstem, cerebellum.	340, 341
Mood	*B3*	*Sad*	↑ (G)	↑ (G)	- 2.50 → + 1.80	- 4.73 → + 3.81	↑ PreF cort. (BA9), L med. preF cort. (BA25), L orbitoF cort., R med. F gyr., R sup. F gyr. (BA6), precentral gyr. (BA4/6), sup. T gyr. (BA22/38/39), R mid. T gyr. (BA21/22), L inf. T gyr. (BA20), R inf. T gyr. (BA37), R ant. T area (BA21), T-O cort., R mid. O gyr. (BA18), R inf. O gyr. (BA18), fusiform gyr. (BA19/36/37), cuneus, primary visual cort. (BA17), L cingulate gyr., ant. cingulate cort., R putamen, caudate, L insula, thalamus, hypothalamus, midbrain, amygdala, hippocampus, L parahippocampal gyr. (BA28), O-T cort. (BA18/19/37), cerebellum. ↓ OrbitoF gyr. (BA11), inf. F lobule (BA10/46), L mid. F gyr. (BA46), inf. P lobule (BA7/40), R sup. T gyr., R midT gyr., inf. T lobule (BA20), lat. and med. O gyr., R O cort., R mid. O gyr. (BA18), R precuneus (BA7), L cuneus (BA18), lingual gyrus (BA18/19), primary visual cort. (BA17), secondary visual cort. (BA18/19), L cingulate gyr. (BA31), L amygdala, hippocampus, L parahippocampal gyr.	171, 342-349
	B3	*Happy*	= (G) ↑ (MCA*)	= (G) ↑ (MCA*)	- 1.4 → +	- 2.84 → +	↑ L sup. F gyr., preF cort. (BA9), P operculum, mid. post. T cort., sup. T gyr. (BA22/39), mid T gyr. (BA21), T pole, R mid. and inf. O gyr. (BA18), primary and secondary visual cort., R entorhinal cort., L lingual gyr. (BA18), L ant. cingulate cort., fusiform gyr. (BA36/37), caudate, L putamen, ventral striatum, thalamus, hypothalamus, midbrain, cerebellum. ↓ L orbitoF cort. (BA11), inf. med. F cort., inf. F lobule (BA10/46), L mid. F gyr. (BA8), L sup. F gyr. (BA10), L precentral cort., R sup. F gyr., R P operculum, inf. P lobule (BA7/40), mid. T gyr. (BA20/21), L inf. T cort., O-T cort., L precuneus, ant. cingulate cort., L mid. cingulate, L post. cingulate cort. (BA23), cerebellum.	171, 342-348, 350
	C4	*Disgust*			↕	↕	↑ Inf. mid. T gyr., fusiform gyr., primary visual cort., secondary visual cort., dorsal ant. cingulate cort. (BA32), thalamus, cerebellum. ↓ R dorsolat. F cort., inf. med. F cort., R retrosplenial cingulate cort.,	348, 350
	C4	*Worry*			↕	↕	↑ Ventrolat. preF cort. (BA10), orbito-F gyr., sup. T gyr. (BA42), R thalamus, R insula, R amygdala. ↓ Inf., mid. and sup. T gyr., R ant. T tip, O-T gyr., L supramarginal gyr., L angular gyr., hippocampus, insula, amygdala.	351, 352
	C4	*Anger*			↑	↑	↑ OrbitoF cort., sup. T gyr., mid. T gyr., insula, cerebellum.	346

Cognitive capacity [D]	*B4*	↑*IQ (g factor)*	= (G) ↑ (GM)	= (G) ↑ (GM)	↑	↑	↑ R orbitoF cort., sup. T gyr., insula.	58, 353-355
	C4	↑*Processing speed/attention*	↑ (BA*/ICA*) = (MCA*)	↑ (BA*/ICA*) = (MCA*)	↕	↕	↑ Mid. and sup. F reg., calcarine sulcus, P reg., cerebellum. ↓T gyr., O cort., putamen.	22, 355-357
	C4	↑*Attention*	↓ (GM) = (GM)	↓ (GM) = (GM)	=	=	= F, T, P, O.	32
	C4	↑*Executive function*	= (GM) ↑ (BA*/ICA*)	= (GM) ↑ (BA*/ICA*)	↕	↕	↑ L ant. cingulate cort. ↓ Dorsal medioF gyr., putamen.	185, 354-356
	C4	↑*Fluid ability*	↑ (BA*/ICA*)	↑ (BA*/ICA*)	↕	↕	↑ PreF cort. areas, ant. cingulate cort. ↓ Precentral reg., T gyr., putamen.	354, 355, 357
	C4	↑*MMSE*	= (BA*/ICA*)	= (BA*/ICA*)				356
	B4	↑*Memory perform.*	= (G/MCA*/BA*/ICA*) ↑ (BA/ICA*)	= (G/MCA*/BA*/ICA*) ↑ (BA/ICA*)	↕	↕	↑ Mid. orbitoF lobe, L nucleus caudatus, cerebellum. ↓ Sup. F gyrus, F operculum, postcentral gyr., mid. T gyr., T pole, T cort., R angular gyr., R ant. cingulate cort., post. cingulate cort., amygdala, hippocampus.	22, 354-359
	C4	*Cognition (several tests)*	↑ (GM)	↑ (GM)	↑	↑	↑ O-P reg..	19, 128, 356
	C4	*After short (30min) training*			↑	↑	↑ R ventromed. preF cort., R sup. T cort., L cuneus, L ant. insula, L parahippocampal, R pulvinar, R peristriate, L post. cingulate cort.	360
	B1	*After long-term training (>4 weeks)*	+ 3.70 (G) = (GM)	+ 7.90 (G) = (GM)	+ → +16.6	+ → +39.0	↑ R inf. F cort., R lat. preF cort., R inf. F gyr., R mid. F gyr., L sup. med. F gyr., L T gyr., precuneus, L ant. cingulate cort., post. cingulate cort.	361-363
Creativity	*C4*		↑(GM) = (WM)	↑(GM) = (WM)	↕	↕	↑ Precentral gyr., culmen, L middle F gyr. (BA6/10), R F rectal gyr. (BA11), L F orbital gyr. (BA47), L inf. T gyr. (BA20). ↓ Precuneus.	353, 364
Personality traits	*A4*	*Extraversion*	= (G/GM)	= (G/GM)	↕	↕	↑ F cort. (BA10/11), Broca, mid. and sup. F gyr. (BA6), precentral gyr. (BA6), supplementary motor area (BA6/8), sup. P gyr. (BA7), supramarginal gyr. (BA40), R ant. T cort. (BA20), (pre)cuneus (BA7), ant. cingulate cort., sup. ant. cingulate cort., post. cingulate cort., sup. post. cingulate cort., mid. cingulate (BA24), R ant. insular cort., R putamen, R caudate, thalamus, L hippocampus, cerebellum. ↓ T reg., central reg.	365-370
	A4	*Introversion*	= (G)	= (G)	↑	↑	↑ T reg., central reg., ant. cingulate cort., R post. insular cort., L amygdala, pulvinar nucleus, T lobe (BA39).	365, 366
	C4	*Novelty seeking*			↑	↑	↑ Cuneus, L ant. cingulate cort., R ant. insula, R post. insula, L thalamus, cerebellum.	368, 371
	C4	*Psychoticism*			↓	↓	↓ R thalamus, R caudate, R putamen.	367, 368
	C4	*Harm avoidance*			↓	↓	↓ R sup. F gyr., R precentral gyr., R postcentral gyr., L inf. T gyr., L fusiform gyr., L parahippocampal gyr., R orbitoinsular junction,	368, 371
	C4	*Reward dependence*			↓	↓	↓ L sup. F gyr., R mid. F gyr., L precentral gyr., R sup. T gyr., L precuneus, ant. cingulate cort., R ant. insula, parahippocampal gyr.,	371
	C4	*Persistence*			↑	↑	↑ R caudate, R putamen.	368
	C4	*Neuroticism*	↓ (GM)	↓ (GM)	↓	↓	↓Mid F gyr. (BA6), orbitoF cort., supplementary motor area (BA6/8), T pole, (pre)cuneus (BA7), angular gyr., L amygdala, insula.	367-370

Sleep [E]	*C4*	*Wake/Sleep trans.*	+ 5.10 cm/s (MCA*)	+ 11.1 (MCA*) (9.70 → 12.5)				372, 373
	A1	*NREM≠*	- 5.65 (G) (- 3.60 → - 11.4) - 13.0 (GM) (- 4.00 → - 27.6) = (WM)	- 14.0 (G) (- 7.05 → - 18.63) - 13.3 (GM) (- 4.60 → - 28.5) = (WM)	- 14.0 → +	- 29.0 → +	↑ L pericentral cort. (BA3/4), L inf. P lobule (BA40), L post. sup. T gyr. (BA22), ant. mid. T gyr. (BA21/22), R mid. O gyr. (BA19), cuneus/calcarine (BA17/18), R fusiform gyr. (BA19), ↓ F cort., inf. F gyr. (BA44), sup. and med. F gyr. (BA6/8/9/10/11/46), R orbitoF cort. (BA11), med. preF cort. (BA10), dorsolat. preF cort. (BA9/46), opercular (BA45), precentral cort., F-P cort., L P cort., inf. P gyr. (BA39/40/46), sup. P gyr. (BA7), supramarginal gyr. (BA40), T cort., sup., med. and inf. T cort. (BA20/21/37/38/42), R post. T cort., T pole (BA38), R Sylvian opercular, O cort., L mid. O gyr. (BA18), precuneus, angular gyr. (BA39), ant. cingulate cort. (BA24/32), post. cingulate cort. (BA23/24), thalamus, insula, nucleus caudatus, ventral striatum, putamen, basal ganglia, R pontomesencephalic tegmentum, midbrain, pons, brainstem, cerebellum.	373-386
	B1	*REM*	= (G) + 41.7 (GM) ↕= (MCA*)	= (G) + 26.0 (GM) (8.00 → 44.0) ↕= (MCA*)	↕	- 5.68 → + 8.50	↑ Precentral gyr., caudal orbtioF cort., med. preF cort., R post. P operculum (BA40), T cort., O cort., visual associative cort., entorhinal cort., ant. cingulate cort. (BA24/32), caudate, amygdala, thalamus, parahippocampal gyr., hippocampus, fusiform gyr. (BA19/37), dorsal mesencephalon, pontine tegmentum, midbrain, vermis cerebellum. ↓Dorsolat. preF cort. (BA8/9/10/11/46), lat. orbitoF cort. (BA11), opercular (BA45), inf. F cort., inf. mesial F cort., lat. F cort., P cort. (BA40), angular gyr. (BA39), supramarginal gyr. (BA40), precuneus, post. cingulate cort. (BA23/31), post. insula,	373-376, 382-385, 387, 388
	C2	*Waking up*	↓ (G) - 11.7 (GM)	- 17.5 (G) - 13.5 (GM)	↕	- 3.51 → + 4.42	↑ Anterior hypothalamus and preoptic area, caudate, pons, cerebellum. ↓ Dorsolat. preF cort. (BA9/46), sup. T gyr. (BA22), inf. T gyr. (BA19/37), mid. T cort. (BA21), lat. O cort. (BA18/19), angular gyr. (BA39), striate (BA17),hippocampus,	372-376, 381-383
	C2	*Awakened* $_{ST2}$	+ 5.70 (G)	+ 14.3 (G)	↑	↑	↑ Orbital operculum (BA47), dorsal operculum (BA45), lat. and caudal orbital cort. (BA25/46), med. preF cort. (BA9), ant. cingulate cort. (BA24/32), ant. insula, dorsomedial thalamus, caudate, brainstem, midbrain reticular formation, cerebellum.	389
Drowsiness / sleepiness [F]	*C4*				↕	↕	↑ R lat. O cort., precuneus, R insular cort., O pole. ↓ L precentral gyr.	390
Open eyes [G]	*C1*		+ 1.10 (G)	+ 2.96 (G)	+ 9.60 → + 24.4 $_{FL}$	+ 20.4 → +48.9 $_{FL}$	↑ O lobe, visual cort., post. part primay visual cort., anterior part V1, association visual cort.	391-395
Mental activity [H]	*C1*		+ 3.06 cm/s (MCA*) (2.72 → 3.40)	+ 5.30 cm/s (MCA*) (4.70 → 5.90)	- → + 15.60	- → + 24.4	↑ L ant. sup. preF cort., mid. and post. sup. preF cort., R sup. polar, R inf. polar, ant. mid. F cort., ant. intermediate preF cort., L post. intermediate preF cort., R ant. inf. F cort., R mid. inf. F cort., sup. F gyr. (BA8/9/10/11), med. F gyr. (BA10/11), mid. F gyr. (BA6/8), precentral gyr. (BA6), L Broca, R supramarginal cort., precuneus (BA7), angular gyr., parahippocampal gyr. (BA19/35/36), R hippocampus. ↓ Inf. F gyr. (BA9/47), mid. F gyr. (BA8/11/46), sup. F gyr. (BA11), L precentral gyr. (BA4), L uncus (BA20), inf. T gyr. (BA20), R mid. T gyr. (BA39), sup. T gyr. (BA22/38), mid. O gyr. (BA18/19), L inf. O gyr. (BA18), L fusiform gyr. (BA36), insula, cerebellum.	396-398
Arousal [I]	*C3*		↑* (MCA*)	+2.0* (MCA*)	+ 1.03 → + 4.67	+ 1.30 → + 6.03	↑ F area, inf. F gyr. (BA45), R insula (BA13).	195, 399-403

Additional information table 4

A – Stress

- An **inverted U effect** caused by stress on cerebral perfusion is plausible, as individual differences have been reported.[404]
- The effects of stress on cerebral perfusion have been reported to be sustained for about 10 minutes after the ending of the stressful task.[327]
- A positive association between the **subjects stress rating** and cerebral perfusion in the ventrorostral prefrontal cortex and left insula/putamen has been reported.[327]

B - Anxiety

- The reported dissimilar effects of low versus high anxiety indicates an **inverted U effect** of anxiety on cerebral perfusion.[335]
- Regionally different perfusion patterns have been reported for both **state and trait** anxiety. [329, 330]

C – Yoga/meditation

- The regions of which cerebral perfusion is affected by meditation, depend on the **method** of meditation.[339]
- During a meditation exercise, an association between the changes of cerebral perfusion and the **depth of meditation** has been reported.[339]

D – Cognitive capacity

- The magnitude of perfusion changes and the affected regions caused by a long-term cognitive training have been reported to depend on the **type of training**.[362, 363]

E – Sleep

- The effects of sleep on cerebral perfusion and the affected regions have been reported to depend on the **sleep stage** and the **sleep cycle**.[383] During **NREM** sleep, perfusion appears to progressively decrease through the deepening of NREM stages.[372, 373, 376, 383] During **REM** sleep, cerebral perfusion normalizes up to the pre-sleep baseline perfusion level and even higher, depending on sleep cycle. [373, 383, 385]
- The effects of **falling asleep and waking up** on cerebral perfusion have been reported to be measurable after 6-20 seconds after the transition of theta to alpha wave rhythm.[372]
- The decreasing effect of **spontaneously awakening** on cerebral perfusion has also been reported during night-time spontaneous awakening. This effect has been reported to last even more than 30 minutes after waking up, depending on the subject.[373, 383]

F – Drowsiness/sleepiness

- No associations between cerebral perfusion and **subjective sleepiness** have been reported. Some small positive and negative associations between regional perfusion and **drowsiness** have been reported, both in rested as in sleep restricted subjects.[390]

G – Open eyes

- The effects of opening the eyes during the perfusion scan has been reported to depend on **the level of light** in the scanner and/or scanner room and a possible visual stimulation such as a flickering light or a video.[391-395]

H – Mental activity

- The redistribution in regional perfusion caused by thinking has been reported to depend on the **type of the task**: visual, verbal, route finding, thinking about past or near future. [396-398]

I – Arousal

- The magnitude of perfusion change induced by arousal has been reported to depend on the **type of task**.[405]
- An association between the change in perfusion and the **task outcome parameters** (e.g. hit rates, reaction time,…) has been reported. After a couple of minutes, perfusion has been reported to normalize and even decrease under the baseline level due to less concentration during the completion of the task. [400]

Supplementary table 5. Caffeine and recreational drugs group of perfusion-modifying factors sorted according to the relevance of the effect in the field of neuroimaging. Absolute values correspond to ml/100g/min, except if stated otherwise; relative values correspond to a percentage (%).

Factor	Cat.	Subcategory	Global effect		Regional effect			Ref
			Absolute (ml/100g/min)	Relative (%)	Absolute (ml/100g/min)	Relative (%)	Regions	
Caffeine [A]	*A2*	*Acute*[≠]	-2.75 (G) (- 2.40 → - 3.10) - 11.9 (GM) (- 7.52 → - 21) - 9.75 (WM) (- 7.00 → - 12.5)	-10.2 (G) (- 5.10 → - 18.9) - 22.7 (GM) (- 18.6 → - 27.0) - 25.2 (WM) (- 18.4 → - 32)	- 14.5→ +	- 19.8 → +	↑ F cort., preF cort., sup. F cort., P cort., L sup. P cort., P-T cort., T cort., O cort. ↓ F cort., mid. and inf. F gyr., preF cort., sup. F cort., P cort., sup. P cort., P-T cort., T cort., O cort., R mid. O gyr., visual cort., R cuneus, caudate, putamen, pallidus, thalamus, hippocampus, post. cingulum, precuneus.	62, 406-420
	C3	*Chronic*	= (GM/WM/MCA*) - 5.50 cm/s (MCA*)	= (GM/WM/MCA*) ↓ (MCA*)				417-419
	C4	*Abstinence 24h* (compared to caffeine satiety)	↑ (GM) + 6.05 cm/s (MCA*)	↑ (GM) + 9.40 (MCA*)				415-417
	C4	*Abstinence 14d*	= (MCA*)	= (MCA*)				417
Energy drink	*C4*	*Acute*	- 7.90 cm/s (MCA*) (- 7.40 → - 9.0)	- 11.7 (MCA*) (- 11.3 → - 12.1)				421-423
Nicotine / Smoking [B]	*B2*	*Acute* [B]	+ 9.0 (G) (!) - 10.4 (G) (!) (- 7.75 → - 13.0) = (G/GM) (!) + 5.00 (GM) (4.00 → 6.00)	+ 25.0 (G) (!) - 17.6 (G) (!) (- 13.2 → - 22.0) = (G/GM) (!) + 10.2 (GM) (8.20 → 12.2)	↕	↕	↑ R inf. F cort., agranular reg. of the orbitoF cort., R mid. F cort., R P cort., R sup. T cort., O cort. (BA17/18), primary visual cort., R fusiform gyr., R hippocampus, thalamus, subgenual and L dorsal ant. cingulate cort., nucleus accumbens, pons, cerebellum. ↓ OrbitoF cort., R P cort., L P operculum, L T cort., R fusiform gyr., O cort., bil hippocampus, L parahippocampal gyr., nucleus accumbens, ventral basal ganglia, R amygdala, L dorsal ant. cingulate cort.,	424-435
	B2	*Chronic*	- 6.37 (GM) (- 1.50 → - 11.1) = (GM)	- 9.16 (GM) (- 2.0 → - 15.5) = (GM)	↕	↕	↑ Ventral striatum. ↓ R F pole, R pars orbitalis, lat. and med. orbitoF cort., P cort., inf. P lobule, sup. T gyr., O cort., R supramarginal gyr., R isthmus of cingulate cort., post. cingulate cort.	19, 63, 436-444
	B2	*Abstinence 24h* (compared to smoking satiety)	= (G) - 10.0 (GM)	= (G) - 16.9 (GM)	- 6.70 → + 14.0	↕	↑ Med. orbitoF cort., L orbitoF cort., dorsolat. preF cort., ant. cingulate cort. (inf. part), ventral striatum. ↓ R preF cort.	434, 435, 445, 446
	C2	*Former smoker* (compared to control)	- 12.0 (GM) (- 2.10 → - 24.9)	- 16.8 (GM) (- 2.80 → - 34.8)	↓	↓	↓ P cort., O cort.	19, 439-442
	C4	*Acute NRT gum*			↑	↑	↑ Ventral striatum. = Med. F GM, thalamus.	435

Alcohol [C]	*B1*	*Acute*	+ 8.58 (G) = (G/WM) (5 → 11.9) - 9.84 (G) ↑ (GM)	+ 12.7 (G) (9.26 → 16.5) = (G/WM) - 6.00 (G) ↑ (GM)	- 25.5 → + 14.2	- 36.6 → + 20.4	Regional redistribution among almost all regions: ↑ PreF cort., sup. F cort., inf. F gyr. (BA47), med. G gyr. (BA6/10/25), caudal mid. F gyr., R central cort., sup. F cort. (BA6), precentral gyr. (BA4), L R P cort., R inf. P lobule (BA40), F-T cort., T cort., sup. T gyr. (BA13), mid. T gyr. (BA21), L inf. T cort. (BA20/37), R subcallosal gyr. (BA47), O cort., R supramarginal gyr. (BA40), post. reg., R ant. reg.,ant. cingulate cort. (BA32/33), L cingulate gyr. (BA31), L parahippocampal gyr. (BA30), R putamen, thalamus, insula (BA13), cerebellum. ↓ R sup. F cort., L central cort., L P cort.	447-459
	B2	*Chronic*	- 2.43 (G) (- 1.85 → - 3.00) + 3.30 (G) (1.80 → 4.80) = (GM)	- 7.46 (G) + 4.48 (G) = (GM)	- → + 9.83	- → + 17.4	↑ Mid. F cort. extending to inf. and sup. F gyr., orbitoF cort., pars opercularis, dors. preF cort., med. F gyr. extending to inf. and mid. F gyr. and ant. cingulate cort., paracentral cort., pre- and postcentral gyr. extending to inf. and mid. F gyr., inf. P lobule, sup. T cort., L T-O reg., O pole, (pre)cuneus, hippocampus, ant. cingulate cort., post. cingulate cort., cingulate gyr., caudate, putamen, thalamus, insula. ↓ Ant. F cort., mid. F reg. (BA9), post. F cort., P cort., inf. P lobule (BA40), ant. T cort., post. T cort., O cort., L precuneus (BA7), R cingulate cort. (BA32).	63, 460-468
	C1	*Abstinence 24h* (compared to drinking satiety)	- 18.4 (G)	- 27.3 (G)				448, 469
	B1	*Abstinence LT* (compared to drinking satiety)	↕ (G) + 14.0 (GM) = (WM)	↕ (G) + 20.3 (GM) = (WM)	- → + 26.0	- → + 33.8	↑ PreF cort., premotor cort., sensorymotor cort., inf. and med. P cort., T-basal reg., sup., mid., med. and inf. T reg., T-O reg., T-P reg., ant. and post. cingulate cort., calcarine cort., thalamus, striatum, cerebellum. ↓L orbitoF cort., preF cort., ant. F reg., mid. F reg.	462, 463, 470-475
Recreational Opioids [D]	*B4*	*Acute*	↑ (WM)	↑ (WM)	↕	↕	↑ L precentral gyr., L inf. and mid. F cort., F pole, ant. T lobes, R operculum, precuneus, ant. cingulate cort., thalamus, amygdala, brainstem, cerebellum. ↓ Precentral gyr., med. F cort., F-P reg., angular cort., T-O reg., inf. T gyr., fusiform gyr., precuneus, ant. cingulate cort., putamen, insula.	476-481
	C4	*Chronic*	= (G) ↑ (MCA*)	= (G) ↑ (MCA*)	↕	↕	↑ Cranial sup. F cort., L mesioF cort.,sup. central cort., L inf. central cort., sup. P cort., L inf. P cort., L sup. T cort., thalamus, ↓ F cort., caudal sup. F cort., R mesioF cort., R inf. P cort., L P cort., sup O cort., R sup. T cort., R inf. T cort., inf. O cort., basal ganglia, thalamus, hippocampus.	482, 483
	B4	*Abstinence* (compared to using)	↓ (G) = (G)	↓ (G) = (G)	↕	↕	↑ Small regions in F, T, O lobes and apex reg., thalamus. ↓ F cort., orbitoF cort., P cort., T cort., cerebellum.	483-489
Amphetamines [E]	*A2*	*Acute*	= (GM)	= (GM)	- 17.0 → +	- 20.0 → +	↑ L mesial preF zones (BA8/10), med. F cort., inf. orbitoF cort. (BA11), R sup. F gyr., P lob (BA40), paracentral lobule (BA31/40), transverse T gyr., L parahippocampal gyr., ant. and post. cingulate cort., ventral tegmentum, amygdala, putamen, globus pallidus, nucleus caudatus, thalamus, brainstem pons, cerebellum. ↓ F reg., preF cort., motor cort. (BA6), posterolat. T lobe, R lat. T lobe, Sylvian fissure, O reg., visual cort., fusiform gyr., cingulate cort., basal ganglia, insular cort.	490-495
	C4	*Chronic*	↓ (BA*/ICA*)	↓ (BA*/ICA*)	↓	↓	↓ Small local defects.	496, 497
	A4	*Abstinence* (compared to control)	↓ (G)	↓ (G)	↕	↕	↑ L T-P WM, L O reg., R O cort., midline structure. ↓ Mesiodorsal preF cort., R lat. P reg., R O cort., midline structure, ant. cingulate cort., putamen, insular cort., striatum, thalamus, cingulum, pons.	498-501
Cocaine [F]	*B1*	*Acute*	- 10.0 (G) ↓ (GM/WM) ↑ (GM)	- 28.6 (G) - 14.1 (GM) - 3.30 (WM)	↕	-36.6 → +28.1	↑ F cort., sup. and inf. F cort., central cort., P cort., anteromesial T cort., R nucleus caudatus, ant. and post. cingulate cort., insula, amygdala, L post. hippocampus, midlin reg. between caudate heads, superior to BA25, L cerebellum. ↓ R inf. F cort., sup. F cort., R lat. orbitoF cort., F lobe, preF cort., precentral cort., P and T lobe, O cort.,limbic lobe, sublobar reg., R post. hippocampus, R caudate head, L nucleus caudate, putamen, globus pallidus, thalamus, inf. and ant. cingulate cort., brainstem, midbrain, cerebellum.	502-508
	B4	*Chronic*	- 5.50 cm/s (MCA*)	- 9.0 (MCA*)	↓	↓	↓ PreF cort., ant. brain structures, F cort., caudolat. preF cort., anteroF cort., lat. F cort., P cort., inf. P cort., T cort., sup. T cort., L mid. T gyr. O cort., basal ganglia, thalamus, cerebellum,	508-516
	C4	*Abstinence* (compared to control)	↓ (G)	↓ (G)	↕	↕	↑ F cort., P cort., post. cingulate gyr. ↓ PreF cort., orbitoF cort., lat. F cort., sup. post. F cort., sup. F gyr., R precentral gyr., P cort., T cort., anterolat. T cort., O cort., mid. F cingulate gyr., R sup. cingulate gyr., ant. cingulate gyr., cerebellum	487, 498, 516-526
	C2	*Former user 6mo*	- 6.70 (G)	- 12.3 (G)	↓	↓	↓F reg., post. P areas, L T cort., R post. T cort.	527
	C4	*Former user >1yr*	= (G)	= (G)	↕	↕	↑ F WM, T-P WM, globus pallidus. ↓ T GM, putamen.	528

Cannabis [G]	*A2*	*Acute*[≠]	+ 5.29 (GM) (2.51 → 7.51)	+ 8.14 (GM) (3.29 → 13.8)	- → + 10.8	- → + 11.2	↑ F cort., P cort., T cort., insula, cingulate cort., basal ganglia, thalamus, amygdala, hippocampus, L cerebellum. ↓ R postcentral gyr., O gyr.	529-534
	B1	*Chronic*	= (G) ↓ (G) ↑ (MCA*)	= (G) ↓ (G) ↑ (MCA*)	- 18.2 → + 7.20	- 29.7 → + 12.6	↑ R ant. cingulate cort., R precuneus. ↓ Ventral preF cort. (BA11), med. F gyr., L sup. T gyr., L mid. T gyr., L supramarginal gyr., L insula, post. cerebellum, vermis cerebellum.	535-539
	B4	*Abstinence* (compared to using)	= (G/GM) ↕ (MCA*)	= (G/GM) ↕ (MCA*)	↓	↓	↓ PreF cort., sup. F cort., F-T cort., central cort., P-T cort.	535-538, 540
Solvents and inhalants [H]	*C1*	*Acute*	+ 14.2 (GM)	+ 20.9 (GM)	+ 12.7 → + 15.9	+ 17.8 → +24.7	↑ F reg., central reg., P reg., T reg., O reg.	541
	B4	*Chronic*	= (G/GM) ↓ (GM)	= (G/GM) ↓ (GM)	↕	↕	↑ L O reg. ↓ PreF cort., T cort., F cort., thalamus.	541-546
MDMA [I]	*C3*	*1.5 – 3w* *after acute intake*	= (G)	= (G)	- 4.20 → -5.30	- 8.37 → -10.0	↓ Dorsal lat. F cort., somatosensory cort., sup. P cort., visual cort., caudate, thalamus, R hippocampus, R amygdala.	547, 548
	C3	*Abstinence*	-1.0 (G)	-2.30 (G)	=	=		547
LSD	*C4*	*Acute*	= (G)	= (G)	↑	↑	↑ Visual cort.	549, 550
Psilocybin [J]	*C4*	*Acute*			↓	↓	↓ Med. preF cort., lat. orbitoF cort., F operculum, precentral gyr., sup. F gyr., mid. F gyr., inf. F gyr., retrosplenial cort., precuneus, angular gyr., supramarginal gyr., thalamus, putamen, hypothalamus, rostral and dorsal ant. cingulate cort., post. cingulate cort., paracingulate cort.	551

Additional information table 5

A – Caffeine
- The effects of a caffeine drink have been reported to depend on the **habitual caffeine int**ake: the effects are greater in subjects with a lower daily caffeine intake,[409, 415, 418] and encounter a strong dependency on the pre-caffeine perfusion state.[407, 415]
- An association between the **salivary caffeine content** and cerebral perfusion has not been reported.[415]
- The reported decrease in cerebral perfusion has been reported to last until 45 to 75 min after the caffeine intake.[407]
- As suspected, **caffeinated tea and soft drinks** have been reported to exert similar effects on cerebral perfusion, which are not reported in decaffeinated coffee.[410, 412]
- The effects of **chronic caffeine** use on cerebral perfusion are not well documented, but it is suggested that cerebral perfusion is normalized in chronic caffeine drinkers due to a downregulation of the vascular adenosine receptors.[415]

B – Nicotine/smoking
- Both an increased, decreased and normal cerebral perfusion after the use of one nicotine containing product has been reported, even within the same study using the subject's favorite cigarette brand. This might be explained by the variability of the smokers' cerebral vascular reactivity.[429]
- Some negative associations between regional cerebral perfusion and the **nicotine plasma concentration** have been reported, but not with cotinine nor the Fagerström dependence score.[429-431]
- The effects of **the second cigarette of the day and denicotinized cigarettes** on regional perfusion have been reported to be lower than the effect of the first standard cigarette.[425, 432, 433]
- The acute effects on regional perfusion have been reported to normalize about 15 minutes after smoking the cigarette for most, but not all regions.[430, 431]
- The magnitude of the decrease in cerebral perfusion in chronic nicotine users has been reported to depend on the **daily nicotine intake**,[436] and to depend on the **age of the user**.[437]
- A negative association between cerebral perfusion and the **numbers of years smoked** has been reported, but not between cerebral perfusion and pack year, Fagerström scores nor the interval since smoking the last cigarette.[444]
- A positive association between cerebral perfusion and the **abstinence induced craving score** has been reported, as well as a negative association between het cerebral blood flow and the Minnesota withdrawal score.[435, 445]
- It has been reported that the effects of long term nicotine withdrawal on cerebral perfusion are caused by **non-nicotine related components of smoking**, such as the use of denicotinized cigarettes. [443]
- A linear association between the change of the global perfusion during the withdrawal period and the **duration of the withdrawal** period has been observed.[439]

C – Alcohol
- An **interaction between the acute alcohol intake and the gender** has been reported as alcohol appears to non-significantly increase regional perfusion in female, but decrease regional perfusion in men.[457] Another paper however reported a bigger effect of alcohol on global perfusion in women compared to men. [447]
- A positive association between cerebral perfusion and the **acetate level** and the **blood alcohol concentration (BAC)** have been reported.[453]
- The short-term effects of alcohol have been reported to be **dose-dependent**.[451, 458]
- No associations between the cerebral blood flow and the **duration of alcoholism**, the total alcohol dose of the previous year, the total lifetime alcohol consumption, the days since last heavy drinking, sobriety, drinking severity measures nor the withdrawal score have been reported.[463, 464, 466, 471, 472, 475] Negative associations between cerebral perfusion and the alcohol intake during the previous month and the weekly alcohol consumption rate has been reported.[464, 465]
- The acute effects of alcohol are reported to last at least **2 hours** after consumption. [447]

D – Recreational opioids
- The redistribution in the regional cerebral perfusion after the acute intake of recreational opioids has been reported to be related to the time passed after the intake, more specifically to the experience of "**rush**" versus "**euphoria**". [480]
- No associations between the cerebral perfusion and the **type of opioid** nor the **age** of the individual have been noted, but a positive association between cerebral perfusion and the **duration of abstinence** and the scraving scores have been reported.[482, 552]
- The effects of abstinence of recreational opioids on cerebral perfusion have been reported to be subject to withdrawal effects, but mainly induced by the use of anti-addiction medication (e.g. Buprenorphine) and appear to be dose-related.[487, 489]

E – Amphetamines
- The effects of chronic amphetamine use were not reported in every study subject.
- No association between cerebral perfusion and the length of abstinence, the total cumulative amphetamine dose, the weeks since last amphetamine use, the time of first use nor the duration of dependency.[496, 499-501] However, one study reported a negative association between cerebral perfusion and the duration of amphetamine use.[500]

F – Cocaine
- Only the effects on regional perfusion after an acute intake of cocaine have been reported to be **dose-dependent**.[502]
- The effects on regional perfusion have been reported to be normalized about 40 minutes after cocaine intake.[502]
- Different short-term effects of cocaine on cerebral perfusion have been reported in **non-users versus habitual cocaine users.** [508]
- No associations between cerebral perfusion and the **lifetime usage of cocaine**, the lifetime number of days using cocaine and the number of days using cocaine during the last 90 days, the age of first use, and the total years of cocaine use have been reported.[498, 508, 509]
- Some studies reported an **interaction between gender and chronic and abstinence effects** of cocaine in their effect on regional perfusion.[513, 518, 525, 528]

G – Cannabis
- The maximum acute effects of cannabis intake on cerebral perfusion has been reported to occur after 30 minutes. Those changes in perfusion have been reported to be normalized after 60 to 120 minutes.[529, 532]
- The effects of the intake of cannabis on cerebral perfusion has been reported to be **dose dependent**, but no association between the effects on cerebral perfusion and the **plasma levels of tetrahydrocannabinol** has been found.[529, 532]
- No associations between cerebral perfusion and the weekly number of joints, the days per month using cannabis, the days since last cannabis use nor the duration of cannabis use have been reported.[536, 538-540, 553]

H – Solvents and inhalants
- The effects of inhalants and solvents on cerebral perfusion are mostly investigated in **professional painters**.
- An association between the effects of chronic exposure to inhalants and/or solvents on cerebral perfusion and the dose and the length of exposure has been reported.[542, 543]

I – MDMA
- The effects of an acute intake of MDMA on cerebral perfusion has been reported to be **dose related**.[547]

J – Psilocybin
- A negative association between the regional perfusion and the **intensity of the subjective effects** of psilocybin intake has been reported.[551]

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