**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\(^{\text{ABBREV}}\)). 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 regional effects, only the range is specified.
- Extra information regarding the values of perfusion changes are indicated in subscript (x\(_{\text{ABBREV}}\)).
- 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.

### Symbols and information in sub- and superscript

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<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>↑</td>
<td>Increased perfusion effect</td>
</tr>
<tr>
<td>↓</td>
<td>Decreased perfusion effect</td>
</tr>
<tr>
<td>♂</td>
<td>Both increased and decreased perfusion effects</td>
</tr>
<tr>
<td>=</td>
<td>No effect on perfusion</td>
</tr>
<tr>
<td>N</td>
<td>Normalized in comparison with perfusion in control subjects</td>
</tr>
<tr>
<td>NS</td>
<td>Not significant effect</td>
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</table>

### 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 Cerebral Artery
- BA: Brodmann Area
- DBP: Diastolic Blood Pressure
- SBP: Systolic Blood Pressure
- NRT: Nicotine Replacement Therapy
- LT: Long Term

### 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%; >15 ml/100g/min)
- 2: intermediate effects (between 14-24%; 6-15 ml/100g/min)
- 3: small effects (<14%; <6 ml/100g/min)
- 4: unknown
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<tr>
<th>Factor</th>
<th>Cat.</th>
<th>Subcategory</th>
<th>Global effect</th>
<th>Regions</th>
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<td>Relative (%)</td>
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<td>(ml/100g/min)</td>
<td>(%)</td>
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<td>- 0.22 /year (WM)</td>
<td>- 0.45 /year (WM)</td>
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<td>+ 7.26 (G)</td>
<td>+ 12.1 (G)</td>
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<td>+ 8.56 (GAM)</td>
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<td>+ 8.73 (WM)</td>
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<td>Occupation / Retirement</td>
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<td>Home/eventide home/hospital</td>
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<td>= (GAM)</td>
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<td>C4</td>
<td>Pregnancy</td>
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<td>- 0.58* /week (MACA)</td>
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<td>Menopause</td>
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<td>↑ (MACA)</td>
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<td>↑ (MACA)</td>
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<td>Fat free mass</td>
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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 (%).
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<th>+ 10.5 (G)</th>
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<th>+ 4.00 + 40.3</th>
<th>+ 10.34 + 70.5</th>
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<td>↑ (G)</td>
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<td>(10.5 + 20.3)</td>
<td>(10.5 + 20.3)</td>
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<td>Training (weeks/months)</td>
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<td>↑ (G)</td>
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<td>Pressure changes Altitude</td>
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<td>HA – Short stay (hours)</td>
<td>- 4.00 (G)</td>
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<td>C1</td>
<td>HA – Medium stay (days)</td>
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<td>C1</td>
<td>HA – Long stay (weeks/months/year/native)</td>
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<td>↓ (G)</td>
<td>↓ (G)</td>
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<td>(- 10.2)</td>
<td>(- 10.2)</td>
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<tr>
<td>Blood pressure – Hypotension (SBP &lt; 100 DBP &lt; 60)</td>
<td>C4</td>
<td>Orbostatic</td>
<td>↑ (G)</td>
<td>↑ (G)</td>
<td>↑ (G)</td>
<td>↑ (G)</td>
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<td>(- 10.2)</td>
<td>(- 10.2)</td>
<td>(- 10.2)</td>
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<tr>
<td>Blood pressure – Hypertension (SBP &gt; 150 DBP &gt; 90)</td>
<td>B1</td>
<td>Chronic</td>
<td>↑ (G)</td>
<td>↑ (G)</td>
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<td>(- 10.2)</td>
<td>(- 10.2)</td>
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<tr>
<td>Heart rate</td>
<td>C4</td>
<td>↑ (G)</td>
<td>↑ (G)</td>
<td>↓</td>
<td>↓</td>
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<td>= (MCA*)</td>
<td>= (MCA*)</td>
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<th>Body temperature</th>
<th>C2</th>
<th>Hyperthermia</th>
<th>- 5.21°C (G) (- 5.48 → - 15.98)</th>
<th>- 10.2°C (G) (- 2.72 → - 7.70)</th>
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<th>- 10/3 → + 16.1</th>
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<td>= (G/GM/WM)</td>
<td>= (G/GM/WM)</td>
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<table>
<thead>
<tr>
<th>Mobile phone</th>
<th>A4</th>
<th>During use (+ task)</th>
<th>= (G/GM/WM)</th>
<th>= (G/GM/WM)</th>
<th>↑</th>
<th>↑</th>
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<td></td>
<td></td>
<td>= (MCA*)</td>
<td>= (MCA*)</td>
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</table>

| After use (+ rest) | C4 | = (MCA*) | = (MCA*) | ↑ | ↑ |
|                    |    | = (G/GM/WM) | = (G/GM/WM) |    |    |

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<th>Diet</th>
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<th>High nitrate</th>
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<th>= (G)</th>
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<td>= (MCA*)</td>
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<th>Hunger/Satiety</th>
<th>B4</th>
<th>Satiety (immediately after meal)</th>
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<thead>
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<th>Fat intake</th>
<th>C3</th>
<th>↑</th>
<th>+ → 12.5</th>
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<th>Sugar intake</th>
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<th>Glucose (15-60 min)</th>
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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. 7, 25, 56, 60, 78
- 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, 25 or in men, 56 but other gender interactions with age on cerebral perfusion have been described as well. 7, 27, 58
- One study reported no effects of age on cerebral perfusion after correcting for partial volume effects, 78 although other studies found no association between brain atrophy and cerebral perfusion. 49
- Other ASL related parameters are simultaneously influenced by age: a global decrease of T1 and the magnitude of the peak ASL signal (dVmax) 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. 79 80 Moreover, an increase in arterial-arteriole transit time (aatT) with an average of 0.21%/year (range 0.08%/year) and bolus arrival time (BAT) (1.2–2.1%/year) in the posterior cingulate, precuneus and global grey matter was reported, 80 an effect which was contradicted by another study. 80 Mean transit time (MTT) appears to be increased in grey matter (0.38% year) and white matter (0.19%/year) with age. 80
- 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, 84, 85, 88 although another study reported a constant perfusion until the age of 10-12 year. 89
- 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. 90
- In children, a negative correlation between age and M0 has been observed, but not with BAT. 80

B – Occupation/retirement
- After reaching retirement-age, the decline of perfusion, partly caused by aging, can be delayed by continuing working or participating in regular physical activities. 97

C – Gender
- The effect of gender on cerebral perfusion may vanish when corrected for the well-known gender difference in haematocrit. 50
- 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, 35 although other studies have reported this effect only during the female reproductive years 94, 98, 109 or before the age of 60. 98 The decrease in perfusion caused by age appears to be slower in women, 51 although distinct results have been reported as well.
- Furthermore, a decrease in bolus arrival time (BAT) (1.6–5.0%) and arterial arteriole transit time (aatT) (0.3–2.3%) has been reported. 68

D – Menopause
- The effect of menopause on cerebral perfusion is reported not to depend on age nor time since the start of the menopause. 77

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 CO2. 81, 95, 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. 100 102, 103, 108, 114
- Blood flow velocity of the middle cerebral artery appears to peak at an intensity of 60% of the maximal oxygen uptake (VO2max), and tends to decline at higher intensities. 92, 96, 97, 98, 100, 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, 106 106 but this was not reported in another study. 75

G – Physical training
- Effects of long-life training has been reported to depend on the age of the subject. 84, 85, 101, 102, 108, 114
- The so called "age" of the MCA appears to be 10 year lower in elderly who exercised during their life, compared to sedentary elderly. 92
- A positive association between aerobic or cardiorespiratory fitness and grey matter, white matter and hippocampal perfusion has been observed. 103, 111

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. 208

I – Body temperature
- Even after 15 minutes of hyperthermia, perfusion changes are still present. 209
- 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 held. The effects last even after 30 minutes after exposure. 83

K – Fat intake
- The effects of fat intake on cerebral perfusion have been reported to be present for approximately half an hour after fat intake and were still measurable after 2 hours. 208, 226
### 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 (%).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cat.</th>
<th>Subcategory</th>
<th>Global effect</th>
<th>Regional effect</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood gases - hypoxia</strong></td>
<td>A</td>
<td>Acute</td>
<td>+ 0.43 /mmHg (G) (0.26 - 0.59)</td>
<td>+0.87 /mmHg (G) (0.44 - 1.30)</td>
<td>116, 151, 222-244</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ 0.14 /mmHg (GM) (0.09 - 0.18)</td>
<td>+ 0.20 /mmHg (GM) (0.15 - 0.24)</td>
<td></td>
</tr>
<tr>
<td><strong>Blood gases - hypercapnia</strong></td>
<td>B</td>
<td>Acute</td>
<td>+1.65 /mmHg (G) [23-60 mmHg] (0.80 - 2.89)</td>
<td>+3.95 /mmHg (G) [23-60 mmHg] (0.95 - 8.99)</td>
<td>62, 103, 175, 233, 236, 237, 241, 247, 278</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ 2.67 /mmHg (GM) [23-60 mmHg]</td>
<td>+ 4.17 /mmHg (GM) [23-60 mmHg]</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>+ 0.46 /mmHg (WM) [23-60 mmHg]</td>
<td>+ 1.16 /mmHg (WM) [23-60 mmHg]</td>
<td></td>
</tr>
<tr>
<td><strong>Blood gases - hypocapnia</strong></td>
<td>C</td>
<td>Acute</td>
<td>- 0.98 /mmHg [G] [23-60 mmHg] (-0.57 - 1.72)</td>
<td>- 2.04 /mmHg [G] [23-60 mmHg] (-1.16 - 2.69)</td>
<td>53, 62, 157, 233, 234, 236, 237, 246, 247, 248, 269, 283</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- 2.22 /mmHg (GM) [23-60 mmHg] (-0.51 - 1.93)</td>
<td>- 2.36 /mmHg (GM) [23-60 mmHg] (-1.22 - 3.50)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>= (WM)</td>
<td>= (WM)</td>
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</tr>
<tr>
<td><strong>Blood gases - hyperoxia</strong></td>
<td>D</td>
<td>Acute</td>
<td>- 0.44 /mmHg (G) (-0.04 - 0.84)</td>
<td>- 0.69 /mmHg (G) (-0.07 - 1.31)</td>
<td>150, 151, 228, 231, 233, 234, 236, 257, 258, 262, 266, 279, 284, 293</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 0.05 /mmHg (GM)</td>
<td>- 0.07 /mmHg (GM)</td>
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<td></td>
<td></td>
<td></td>
<td>- 0.02 /mmHg (WM)</td>
<td>= (GM/GM/WM)</td>
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</tr>
<tr>
<td><strong>Hematocrit</strong></td>
<td>B</td>
<td>Higher</td>
<td>- 0.73 /%Hct (G) (-0.32 - 1.55)</td>
<td>- 2.28 /%Hct (G) (-0.64 - 3.50)</td>
<td>62, 64, 294, 301</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 1.38 /%Hct (GM) (-0.47 - 2.47)</td>
<td>- 1.93 /%Hct (GM) (-0.59 - 2.41)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 0.38 /%Hct (WM)</td>
<td>- 1.90 /%Hct (WM)</td>
<td></td>
</tr>
<tr>
<td><strong>Blood viscosity</strong></td>
<td>C</td>
<td>Increase</td>
<td>= (GM)</td>
<td>= (GM)</td>
<td>297, 302</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>= (GM)</td>
<td>= (GM)</td>
<td></td>
</tr>
<tr>
<td><strong>Hemoglobin</strong></td>
<td>C</td>
<td>Higher Hb</td>
<td>- 1.65 g/dL HB (G)</td>
<td>- 3.56 g/dL HB (G)</td>
<td>298, 304, 305</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>=</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td><strong>Fibrinogen</strong></td>
<td>C</td>
<td></td>
<td>- 3.20 (G)</td>
<td>- 6.43 (G)</td>
<td>178, 197</td>
</tr>
</tbody>
</table>
Blood glucose — hypoglycaemia

<table>
<thead>
<tr>
<th>Blood glucose</th>
<th>Hypoglycaemia</th>
<th>B3</th>
<th>&lt;3.6 mmol/L</th>
<th>+ 2.76 (mmol/l) (G)</th>
<th>(1.10 → 5.30)</th>
<th>- 1.70 (mmol/l) (G)</th>
<th>- 2.90 (mmol/l) (G)</th>
<th>- 1.82 → + 2.69 (mmol/l)</th>
<th>- 2.93 → + 5.19 (mmol/l)</th>
</tr>
</thead>
</table>

Circulating homocysteine

<table>
<thead>
<tr>
<th>Circulating homocysteine</th>
<th>C1</th>
<th>Increase</th>
<th>- 2.38 (mmol/l) (G) = (MCA*)</th>
<th>- 4.33 (mmol/l) (G) = (MCA*)</th>
<th>↓</th>
<th>↑</th>
</tr>
</thead>
</table>

Cholesterol

<table>
<thead>
<tr>
<th>Cholesterol</th>
<th>C4</th>
<th>Total chol.</th>
<th>- 0.80 cm³/s (MCA*)</th>
<th>- 1.12 (MCA*)</th>
<th>↓</th>
<th>↓</th>
</tr>
</thead>
</table>

Hyperketonemia

<table>
<thead>
<tr>
<th>Hyperketonemia</th>
<th>C1</th>
<th>Acute</th>
<th>+ 19.9 (G)</th>
<th>+ 39.0 (G)</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

ADMA

<table>
<thead>
<tr>
<th>ADMA</th>
<th>C3</th>
<th>After 3 days</th>
<th>= (G)</th>
<th>= (G)</th>
<th>-1.25</th>
<th>-1.04</th>
</tr>
</thead>
</table>

Free fatty acids

<table>
<thead>
<tr>
<th>Free fatty acids</th>
<th>C4</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Additional information table 3

A - Blood gases - Hypoxia

- Both a steady increase of cerebral perfusion during the first 10 minutes of hypoxia towards a steady state (measured in the ICA) as an immediate response of cerebral perfusion on hypoxia in the order of seconds (measured in the MCA) 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. 230

B - Blood gases - Hypercapnia

- An immediate effect of an increased and normalized CO$_2$ on cerebral perfusion has been reported. 230

- 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 a steady state has been observed. 230

- 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$_{CO_2}$) has been reported. Outside this range, the effect of CO$_2$ levels off. 230, 231

- An interaction between CO$_2$ and O$_2$ in their effect on cerebral perfusion has been reported. 230

C - Blood gases - Hypocapnia

- The effects of hypocapnia on cerebral perfusion have been reported to comprise two components: an initial fast decrease of perfusion, a slow adaptation to normalization has been reported after about 5 minutes of hypocapnia. 230

- After the normalization of CO$_2$ values, perfusion has been reported to restore immediately, 230 but distinct results have been reported. 231

- Between the range of 23 mmHg and 60 mmHg CO$_2$, a linear association between cerebral perfusion and P$_{CO_2}$ has been reported. Outside this range, the effect of CO$_2$ levels off. 230, 231

- An interaction between CO$_2$ and O$_2$ in their effect on cerebral perfusion has been reported. 230

D - Blood gases - Hypoxia

- 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$_{CO_2}$ is higher than 45-50 mmHg. 230, 231

E - Blood glucose - Hypoglycaemia

- After 10 minutes of hypoglycaemia, an increase in cerebral perfusion has been reported. 232 The peak in cerebral perfusion occurs between 45 and 51 minutes of hypoglycaemia and the effects remain measurable even after 90 minutes of blood glucose normalisation. Normalization of cerebral perfusion has been reported 24 hours after blood glucose normalization. 232, 233

204, 205

231, 232

230, 233

230, 232
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 (%).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cat.</th>
<th>Subcategory</th>
<th>Global effect</th>
<th>Regional effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Absolute (ml/100g/min)</td>
<td>Relative (%)</td>
</tr>
<tr>
<td>Stress</td>
<td>C3</td>
<td></td>
<td>= (g)</td>
<td>= (g)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>- 10.1 (g) (-9.60 → -10.4)</td>
<td>= (g)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>B1</td>
<td>Low → Moderate</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Yoga / meditation</td>
<td>C4</td>
<td>Experienced</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td></td>
<td>all</td>
<td>= (g)</td>
<td>= (g)</td>
</tr>
<tr>
<td>Mood</td>
<td>B3</td>
<td>Sad</td>
<td>↑ (g)</td>
<td>↑ (g)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Happy</td>
<td>↑ (MCA*)</td>
<td>↑ (MCA*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disgust</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worry</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anger</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

*↑: Increase, ↓: Decrease, =: No change, (): Range, (G): Statistical significance at the level of P < 0.05.
<table>
<thead>
<tr>
<th>Cognitive capacity&lt;sup&gt;b&lt;/sup&gt;</th>
<th>B4</th>
<th>↑IQ (g factor)</th>
<th>↑</th>
<th>↑</th>
<th>↓</th>
<th>↑</th>
<th>↑</th>
<th>↑</th>
<th>58, 253-255</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C4</td>
<td>↑Processing speed/attention</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>22, 305-307</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>↑Attention</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>↑Executive function</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>185, 354</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>↑Fluid ability</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>356</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>↑MMSE</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>155, 394</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>↑Memory perform.</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>22, 354-359</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Cognition (several tests)</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>356</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>After short (30min) training</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>360</td>
</tr>
<tr>
<td>B1</td>
<td>After long-term training (&gt;4 weeks)</td>
<td>+ 3.70 (g)</td>
<td>= (GM)</td>
<td>= (WM)</td>
<td>+ 7.90 (g)</td>
<td>+ 16.6</td>
<td>+ 39.0</td>
<td>361-365</td>
<td></td>
</tr>
</tbody>
</table>

| Creativity | C4 | ↑GM | ↑GM | ↓ | ≧ | ≧ | ↑ | ↑ | 363, 364 |

<table>
<thead>
<tr>
<th>Personality traits</th>
<th>A4</th>
<th>Extraversion</th>
<th>= (G/GM)</th>
<th>= (G/GM)</th>
<th>≧</th>
<th>↑</th>
<th>↑</th>
<th>↑</th>
<th>365-370</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A4</td>
<td>Introversion</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>365-366</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Novelty seeking</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>366-374</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Psychoticism</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>367-382</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Harm avoidance</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>371</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Reward dependence</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>128, 356-357</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Persistence</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>128, 356-357</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Neuroticism</td>
<td>= (G/GM)</td>
<td>= (G/GM)</td>
<td>≧</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>32, 355-355</td>
</tr>
<tr>
<td>C4</td>
<td>Wake/Sleep trans.</td>
<td>+ 5.10 cm/s (MCA*)</td>
<td>+ 11.1 (MCA*) (9.70 → 12.5)</td>
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</tr>
<tr>
<td>A1</td>
<td>NREM*</td>
<td></td>
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</tr>
<tr>
<td>B1</td>
<td>REM</td>
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</tr>
<tr>
<td>C2</td>
<td>Waking up</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
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<td></td>
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</tr>
<tr>
<td>C2</td>
<td>Awakened @22</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drowsiness / sleepiness</th>
<th>C4</th>
<th>+ 1.10 (g)</th>
<th>+ 2.96 (g)</th>
<th>+ 9.60 → + 24.4 fl.</th>
<th>+ 20.4 → + 48.9 fl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open eyes</td>
<td>C1</td>
<td>O pale, visual cortex, post. part. primary visual cortex, anterior part V1, association visual cortex</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mental activity</th>
<th>C1</th>
<th>+ 3.06 cm/s (MCA*) (2.72 → 3.40)</th>
<th>+ 5.30 cm/s (MCA*) (4.70 → 5.90)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- + 15.60</td>
<td>- + 24.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arousal</th>
<th>C3</th>
<th>↑* (MCA*)</th>
<th>+ 2.0* (MCA*)</th>
<th>+ 1.03 → + 4.67</th>
<th>+ 1.30 → + 6.03</th>
</tr>
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</table>
### A – Stress
- An inverted U effect caused by stress on cerebral perfusion is plausible, as individual differences have been reported.\(^{604}\)
- The effects of stress on cerebral perfusion have been reported to be sustained for about 10 minutes after the ending of the stressful task.\(^{527}\)
- A positive association between the subjects’ stress rating and cerebral perfusion in the ventrorostral prefrontal cortex and left insula/putamen has been reported.\(^{605,606}\)

### B – Anxiety
- The reported dissimilar effects of low versus high anxiety indicates an inverted U effect of anxiety on cerebral perfusion.\(^{327}\)
- Regionally different perfusion patterns have been reported for both state and trait anxiety.\(^{327,329,330}\)

### 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.\(^{318}\)

### 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.\(^{372,373,378,383}\) During NREM sleep, perfusion appears to progressively decrease through the deepening of NREM stages.\(^{372,373,378,383}\) During REM sleep, cerebral perfusion normalizes up to the pre-sleep baseline perfusion level and even higher, depending on sleep cycle.\(^{372,373,383}\)
- 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.\(^{395-398}\)

### 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 (%).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cat.</th>
<th>Subcategory</th>
<th>Global effect</th>
<th>Relative (%)</th>
<th>Regional effect</th>
<th>Regions</th>
<th>Ref</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Absolute (ml/100g/min)</td>
<td>Relative (%)</td>
<td>Absolute (ml/100g/min)</td>
<td>Relative (%)</td>
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</tr>
<tr>
<td>Caffeine*</td>
<td>A2</td>
<td>Acute*</td>
<td>-2.75 (±0.6)</td>
<td>-10.2 (±0.6)</td>
<td>-14.5 → +</td>
<td>-19.8 → +</td>
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<td></td>
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<td></td>
<td>[2.40 → 3.10]</td>
<td>(5.10 → 18.9)</td>
<td>(18.6 → 27.0)</td>
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<td></td>
<td>-11.9 (±0.8)</td>
<td>-22.7 (±0.8)</td>
<td>(18.4 → 22.0)</td>
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<td></td>
<td>-9.75 (±1.9)</td>
<td>-25.2 (±1.9)</td>
<td>(18.4 → 22.0)</td>
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<td>[7.00 → 12.5]</td>
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<td>C3</td>
<td>Chronic</td>
<td>+ (GM/MCA*)</td>
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<td>-5.0 (±0.5)</td>
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<td>(7.40 → 9.0)</td>
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<td>Nicotine /</td>
<td>B2</td>
<td>Acute*</td>
<td>+ 9.0 (±1)</td>
<td>25.0 (±1)</td>
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<td>Smoking*</td>
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<td>+ 10.4 (±1)</td>
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<td>C4</td>
<td>Abstinence 24h</td>
<td>+ (GM)</td>
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<td>Acute</td>
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<td>Chronic</td>
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<td>B2</td>
<td>Abstinence 24h</td>
<td>- (GM)</td>
<td>(GM)</td>
<td>- 6.70 → 14.0</td>
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<td>Former smoker</td>
<td>-12.0 (±0)</td>
<td>-16.8 (±0)</td>
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<td>[2.30 → 24.9]</td>
<td>(2.80 → 34.8)</td>
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<td>C2</td>
<td>Acute NRT gum</td>
<td>+ (GM)</td>
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<td>B1</td>
<td>+ 8.58 (G)</td>
<td>- 2.43 (G)</td>
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<tr>
<td>C1</td>
<td>Abstinence 24h</td>
<td>+ 14.0 (G)</td>
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<td>(compared to drinking safety)</td>
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<td></td>
<td>- 18.4 (G)</td>
<td>+ 20.3 (G)</td>
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<td>↓ (G)</td>
<td>↓ (G)</td>
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</tbody>
</table>

| B2 | - 1.85 → 3.00 | + 3.30 (1.40 → 4.80) |
|    | - 7.46       | + 4.84 (G) |
|    | (G/MWM)      | = (GM)    |
|    | ≈ (GM)       | ≈ (GM)    |

<p>| C2 | Former user (6mo) | - 6.70 (6) |
|    | ≈ (G)           | ≈ (G)     |
| C3 | Former user (&gt;2yr) | - 12.3 (6) |
|    | ≈ (G)           | ≈ (G)     |</p>
<table>
<thead>
<tr>
<th>Substance</th>
<th>Type</th>
<th>Acute^</th>
<th>Chronic</th>
<th>Abstinence</th>
<th>1.5 – 3w after acute intake</th>
<th>Acute</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis</td>
<td>A2</td>
<td>+ 5.29 (GM)</td>
<td>+ 8.14 (GM)</td>
<td>- $\rightarrow$ 10.8</td>
<td>- $\rightarrow$ 11.2</td>
<td></td>
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<tr>
<td></td>
<td>B1</td>
<td>$\uparrow$ (G/M)</td>
<td>$\downarrow$ (G/M)</td>
<td>$\uparrow$ 18.2 $\rightarrow$ 7.20</td>
<td>$\downarrow$ 29.7 $\rightarrow$ 12.6</td>
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<tr>
<td></td>
<td>B4</td>
<td>$\uparrow$ (MCA*)</td>
<td>$\downarrow$ (MCA*)</td>
<td>$\downarrow$</td>
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</tr>
<tr>
<td>Solvents and</td>
<td>C1</td>
<td>+ 14.2 (GM)</td>
<td>+ 20.9 (GM)</td>
<td>+ 12.7 $\rightarrow$ 15.9</td>
<td>+ 17.8 $\rightarrow$ 24.7</td>
<td></td>
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<tr>
<td>inhalants</td>
<td>B4</td>
<td>$\uparrow$ (G/M)</td>
<td>$\downarrow$ (G/M)</td>
<td>$\uparrow$</td>
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</tr>
<tr>
<td>MDMA</td>
<td>C3</td>
<td>= (G)</td>
<td>= (G)</td>
<td>= - 4.20 $\rightarrow$ -5.30</td>
<td>= -8.37 $\rightarrow$ -10.0</td>
<td>$\downarrow$</td>
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</tr>
<tr>
<td>LSD</td>
<td>C4</td>
<td>= (G)</td>
<td>= (G)</td>
<td>$\uparrow$</td>
<td>$\uparrow$</td>
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<tr>
<td>Psilocybin</td>
<td>C4</td>
<td>= (G)</td>
<td>= (G)</td>
<td>$\downarrow$</td>
<td>$\downarrow$</td>
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</tr>
</tbody>
</table>

^ Changes indicated as $\uparrow$ for increase, $\downarrow$ for decrease, $\rightarrow$ for change in direction.

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520-534

535-539

540

541

541-546

547, 548

549, 550

551
Additional information table 5

A – Caffeine
- The effects of a caffeine drink have been reported to depend on the habitual caffeine intake: the effects are greater in subjects with a lower daily caffeine intake, and encounter a strong dependency on the pre-caffeine perfusion state.
- An association between the salivary caffeine content and cerebral perfusion has not been reported.
- The reported decrease in cerebral perfusion has been reported to last until 45 to 75 min after the caffeine intake.
- As suspected, caffeinated tea and soft drinks have been reported to exert similar effects on cerebral perfusion, which are not reported in decaffeinated coffee.
- 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.

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.
- Some negative associations between regional cerebral perfusion and the nicotine plasma concentration have been reported, but not with cotinine nor the Fagerström dependence score.
- 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.
- The acute effects on regional perfusion have been reported to normalize about 15 minutes after smoking the cigarette for most, but not all regions.
- The magnitude of the decrease in cerebral perfusion in chronic nicotine users has been reported to depend on the daily nicotine intake, and to depend on the age of the user.
- 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.
- A positive association between cerebral perfusion and the abstinence induced craving score has been reported, as well as a negative association between the cerebral blood flow and the Minnesota withdrawal score.
- 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.
- A linear association between the change of the global perfusion during the withdrawal period and the duration of the withdrawal period has been observed.

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. Another paper however reported a bigger effect of alcohol on global perfusion in women compared to men.
- A positive association between cerebral perfusion and the acetate level and the blood alcohol concentration (BAC) have been reported.
- The short-term effects of alcohol have been reported to be dose-dependent.
- 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.
- Negative associations between cerebral perfusion and the alcohol intake during the previous month and the weekly alcohol consumption rate has been reported.
- The acute effects of alcohol are reported to last at least 2 hours after consumption.

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”.
- 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 craving scores have been reported.
- 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.

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. However, one study reported a negative association between cerebral perfusion and the duration of amphetamine use.

F – Cocaine
- Only the effects on regional perfusion after an acute intake of cocaine have been reported to be dose-dependent.
- The effects on regional perfusion have been reported to be normalized about 40 minutes after cocaine intake.
- Different short-term effects of cocaine on cerebral perfusion have been reported in non-users versus habitual cocaine users.
- 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.
- Some studies reported an interaction between gender and chronic and abstinence effects of cocaine in their effect on regional perfusion.
- The maximum acute effects of cannabis 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.
- 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.
- 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.

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.

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

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