

# CO EXPOSURE: IMPACT ON THE BRAIN

Dr Steven White

IF CO EXPOSURE DOESN'T KILL YOU, YOU'LL BE ALRIGHT WON'T YOU?

- It is well recognized that CO can rapidly kill you.
- However, a common assumption amongst both the general public and healthcare professionals is that if you survive, then you will recover – fairly quickly – back to your normal self.
- Unfortunately, this is not necessarily the case.

## CO EXPOSURE: IMPACT ON THE BRAIN

*“The long-term adverse effects of carbon monoxide on the brain have historically been underestimated. Carbon monoxide poisoning is common, often is unrecognized and may result in permanent brain injury.”*

Kesler SR, Hopkins RO, Weaver LK et al. Verbal memory deficits associated with fornix atrophy in carbon monoxide poisoning. *Journal of the International Neuropsychological Society* 2001 7: 640-646

## CO EXPOSURE: IMPACT ON THE BRAIN

- Experimental exposure to CO
- Individual cases of accidental CO exposure
- Larger scale exposure of many individuals eg: Storm Klaus

## CO EXPOSURE: IMPACT ON THE BRAIN

**“It's been months now - am I still sick from carbon monoxide poisoning?”**

Husband and wife - with long-term neurological and neurobehavioural sequelae, following exposure to carbon monoxide in their hotel room over a period of several days.

*Dr Alex Jobrack & Dr Rose Goldman, Harvard School of Public Health Grand Rounds, March 2022*

## CO EXPOSURE: IMPACT ON THE BRAIN

### **Storm Klaus – SW France 2014** [Pages et al, 2014 *BMC Neurology*]

- 1.7 million households without power
- >100 people attended hospital acutely with CO poisoning over a period of three days
- Evaluated around seven weeks after the event
- Significantly poorer performance than matched controls on cognitive tests involving several domains  
– also elevated depression scores
- Significant negative correlation between cognitive performance and the initial acute COHb level

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“Low-level, chronic exposure can lead to neurological and cognitive deficits that do not resolve after removal from the CO source, suggesting neurological damage even at low levels of COHb and environmental CO.”

*Carbon Monoxide Poisoning: Pathogenesis, Management, and Future Directions of Therapy.* Jason J Rose et al, American Journal of Respiratory and Critical Care Medicine 2017 195:596-606

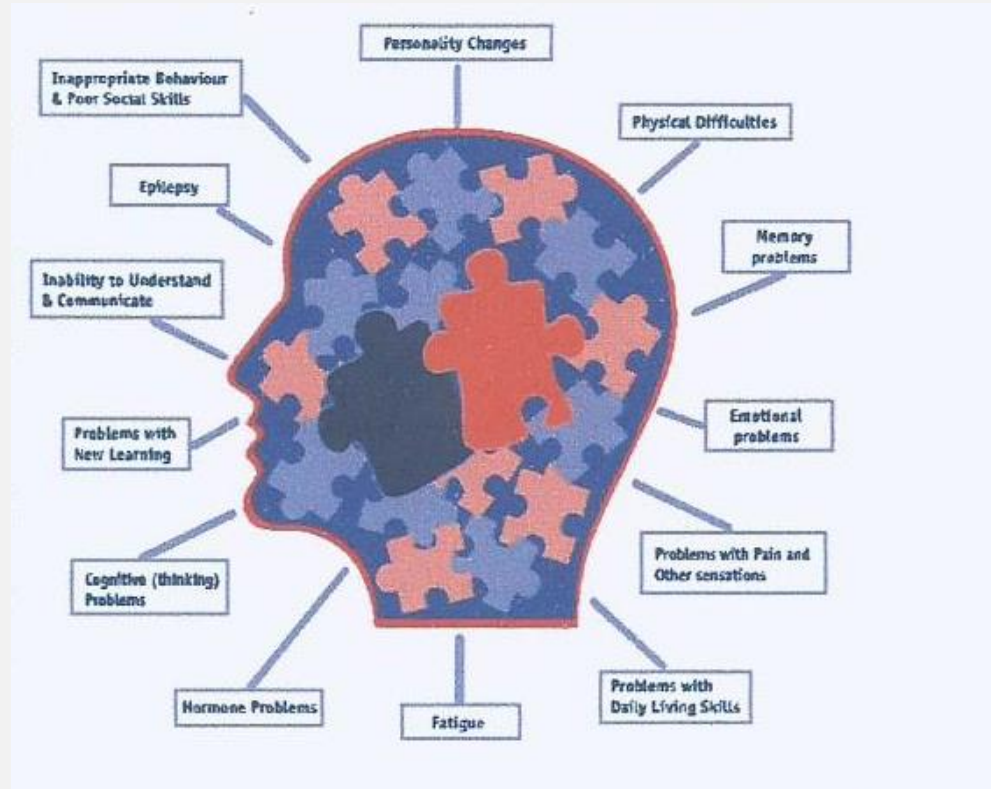
## CO EXPOSURE: IMPACT ON THE BRAIN

- Significant CO exposure may produce an acquired brain injury, which needs to be considered in exactly the same way as other types of ABI – such as traumatic brain injury or encephalitis.
- The problems which people describe after CO exposure very much overlap with those experienced following other kinds of ABI.



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[ENCEPHALITIS SOCIETY INFORMATION SHEET]

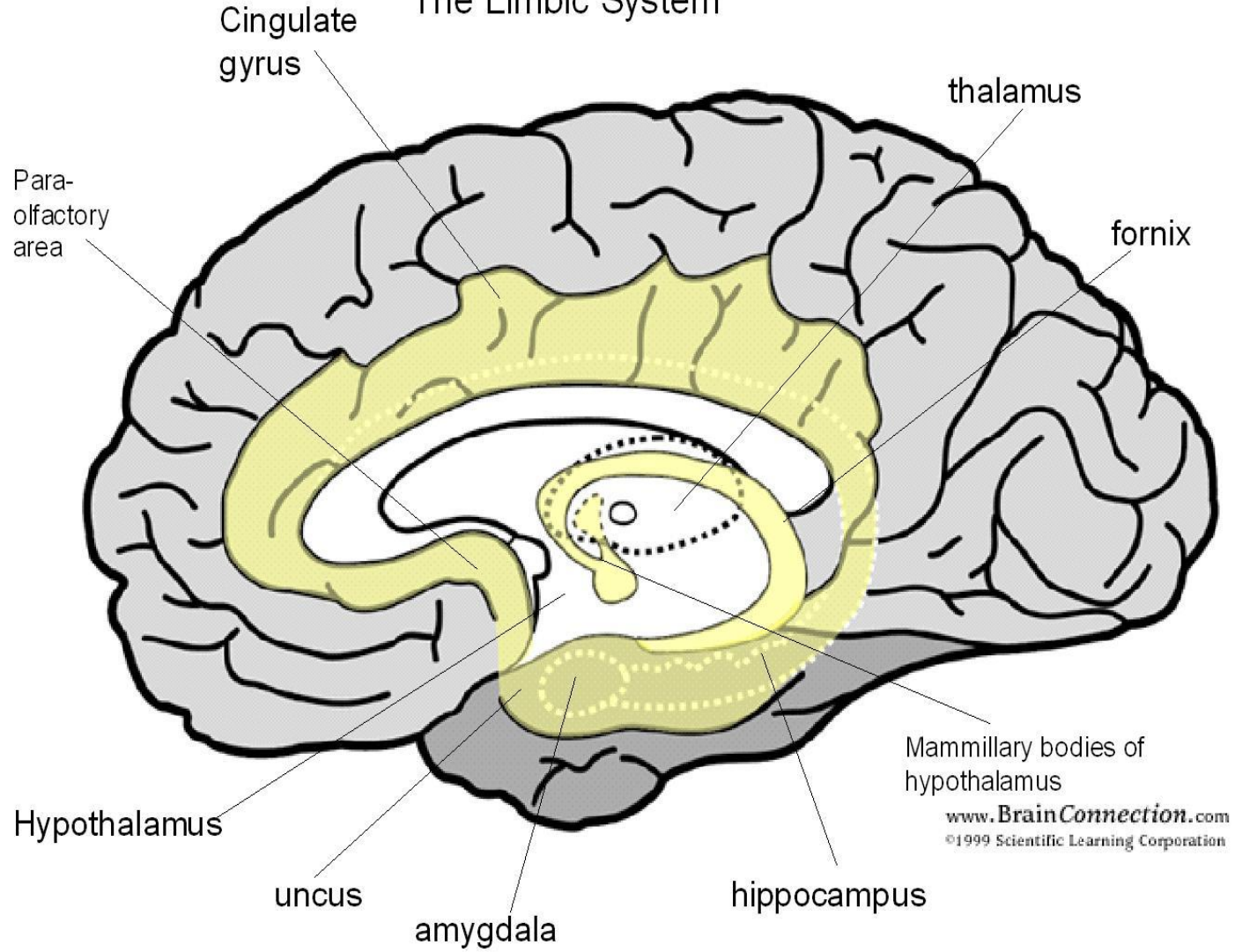


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Individual case histories can give a good insight into the problems which people may experience after CO exposure. Although there is no specific pattern of neuropsychological impairment, the majority of studies describe problems with:

- Memory
- Visuo-spatial function
- Executive function (frontal lobe impairment)
- Speech, language, reading and writing
- Attention and cognitive processing speed
- Co-ordination and fine motor control
- Fatiguability

# The Limbic System



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## CO EXPOSURE: IMPACT ON THE BRAIN

Neuropsychiatric changes are also common, including:

- Depression
- Anxiety
- Irritability
- Lability of mood
- Personality change
- Loss of social skills

## CO EXPOSURE: IMPACT ON THE BRAIN

**“Everyone I meet tells me that I look so well and that is the most frustrating thing, because they cannot see how I am inside my head. I may seem like a swan gliding in water, but they cannot see me paddling furiously below the surface.”**

*Connect Professional*, Edition 2 : Winter 2018, p14 [Encephalitis Society]

CO EXPOSURE: IMPACT ON THE BRAIN  
WHAT IS NEEDED NOW?

A specialist referral clinic is desperately needed to support people with persisting mild-moderate cognitive and neurobehavioral problems following confirmed CO exposure.

cf: TBI Clinics at St Mary's and the National Hospital for Neurology & Neurosurgery

MDT

CO nurse specialist

