



## Testing for exposure to CO from smoking or other sources

**Inform the woman** *Why the test is important, what the procedure is for taking the test and that you will provide solutions to reducing her exposure to CO, if levels are higher than expected*

**Ask the woman** *Approximately what time did you leave home?  
Are you lactose intolerant? (if not already known)*

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## Woman breathes into analyser

### Reading above 5 ppm

Tell the woman her reading is higher than 5 ppm and she is exposed to sources of CO

### Reading is 5 ppm

Tell the woman her reading is 5 ppm and she could be exposed to sources of CO

### Reading below 5 ppm

Tell the woman her reading is less than 5 ppm and she is unlikely to be exposed to smoke or other sources of CO

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## Compare the reading with previous readings (If none available, go to box 4)

### Reading is higher or the same as previous readings

The woman may not be compliant with her smoking cessation programme  
**OR**  
She could be exposed to other sources of CO, especially if the reading has stabilised at a level over 5 ppm

### Reading is lower than previous readings

The woman is compliant with her smoking cessation programme  
**OR**  
A previously identified environmental exposure has ceased

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**You are suspicious:** Could this be a case of CO poisoning?

## Ask the woman:

*Have you smoked or been exposed to smoke in the last 12 hours?*

**No**

### You are confident:

- the woman is not exposed to other environmental sources of CO
- if the woman is an active smoker refer her to NHS stop smoking services
- if the woman's partner is an active smoker discuss ways to reduce her exposure and advice on quitting for her partner

**Yes**

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## Could this be a case of environmental CO poisoning? (Positive responses raise suspicion)

### Ask the woman:

*Does your work involve possible exposure to smoke, fumes or motor vehicle exhaust?*

*Do you have gas, oil or solid fuel appliances in your home?*

*Do you ever use your gas stove or oven for heating purposes as well as cooking?*

*Has there been any change in ventilation in your home recently (eg fitting double glazing)?*

*Do you or any other occupants in your home suffer from headache, flu-like symptoms, drowsiness, nausea?*

*Is your home detached, semi-detached, terraced, flat, bedsit, hostel or mobile home?*

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**You are suspicious:** Could this be a case of CO poisoning?

## Recommend that the woman:

- does not use any appliance she identifies as being a possible source of CO
- contacts an appropriately registered engineer to check all household gas, oil or solid fuel appliances
- contacts her GP or attends a hospital emergency department, especially if she also has young children
- installs a CO alarm (BS EN 50291 compliant) or asks her landlord to install a CO alarm in the case of rented properties with solid fuel appliances

**You should** notify your local PHE centre

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See over for notes on boxes 1–6

## Carbon monoxide, smoking and pregnancy

CO is produced when tobacco products are burnt. It is found in inhaled, exhaled and sidestream smoke. CO levels in the exhaled breath of smokers and people exposed to sidestream smoke will be higher than those in non-smokers. Analysis of exhaled breath is a useful indicator of exposure to CO and to tobacco smoke.

CO can also be emitted from malfunctioning or poorly ventilated fossil or wood fuel heating and cooking appliances. Ruling out alternative sources of exposure is important – it could save the fetus and woman's life.

### Box 1 Taking the test

Helping pregnant women to quit smoking is important. Some pregnant women find it difficult to say that they smoke. For pregnant women who do not smoke, they should be made aware of other sources of CO.

CO levels in blood decline with a half-life of about 6 hours. Asking the woman what time she left home might provide an indication as to whether domestic exposure to CO is likely to be identified. A lactose-intolerant woman can produce a higher reading than a non-smoker.

### Box 2 Informing the woman of the breath test result and what this might mean

#### CO reading

**>5 ppm** If she is not a smoker, is the reading high enough to raise suspicion? Go to box 5 to ensure the woman is not being exposed to levels of CO from other sources.

**5 ppm** The woman is exposed to CO. You need to establish the source of CO exposure.

**<5 ppm** The woman is unlikely to be exposed to smoke or other sources of CO.

**Note:** For smoking cessation purposes, stabilisation below 5 ppm shows compliance with the programme. For women who stabilise at 5 ppm, it is recommended that the questions in box 5 are asked as a precautionary measure to eliminate the possibility of exposure to other sources of CO.

### Box 3 Carbon monoxide reading not decreasing as expected

Compare each reading with readings taken on any previous visits to the clinic. Establish why expected decreases in CO levels are not occurring. Is the woman complying with the smoking cessation programme? Is the woman exposed to other sources of CO?

### Box 4 Exposure to tobacco smoke

Encourage the woman to quit smoking if she is an active smoker. Encouraging other members of the household to quit is important for the woman, and her fetus and its future health.

### Box 5 Sources of carbon monoxide

The source of CO may be found in the home, car or workplace. Gas, oil, coal and wood heating appliances are the most common sources in the home other than tobacco smoke. More than one appliance may be causing the problem. Inappropriate appliance use and inappropriate use of generators and BBQs indoors can lead to a build up of potentially fatal CO.

It is also worth asking: *Has an appliance been newly installed? or Have you recently started to re-use heating appliances/boilers after the summer break or during an unexpected cold spell?*

Recent fitting of double glazing or blocking vents will suddenly reduce ventilation. If there is a problem appliance, CO will build up in the property.

CO is a mimic, simulating other more common conditions including flu-like illnesses, food poisoning, headache and depression. Headache is the most common symptom.

CO poisoning can occur in all income groups and types of housing.

CO can leak into a semi-detached or terraced house or flat from neighbouring premises.

### Box 6 Stopping further exposure is essential

Preventing further exposure is the most important thing you can do. Advise the woman on returning home to turn off all fossil fuelled appliances, open windows, make sure other occupants are safe and contact an appropriately registered engineer to check appliances. Any occupant experiencing any of the symptoms listed in box 5 should seek medical attention immediately.

Recommend the purchase of an audible CO alarm for installation in the home, but stress that an alarm is not a substitute for regular maintenance of appliances by an appropriately registered engineer. For rented homes, advise that landlords are required by law to install CO alarms in every room with solid fuel appliances.

*It is essential that you contact your local PHE centre to notify PHE of your suspicions. The centre will be able to coordinate services to help protect the woman if necessary.*

### Useful contact numbers

999 Ambulance/police	0800 111 999 National gas emergency service	0800 408 5500 Gas Safe Register	0800 300 363 HSE (gas safety for GB)
111 NHS 111	0845 634 5626 HETAS (solid fuel)	0845 658 5080 OFTEC (oil and biofuel)	0344 892 0555 PHE 24-hour chemicals hotline