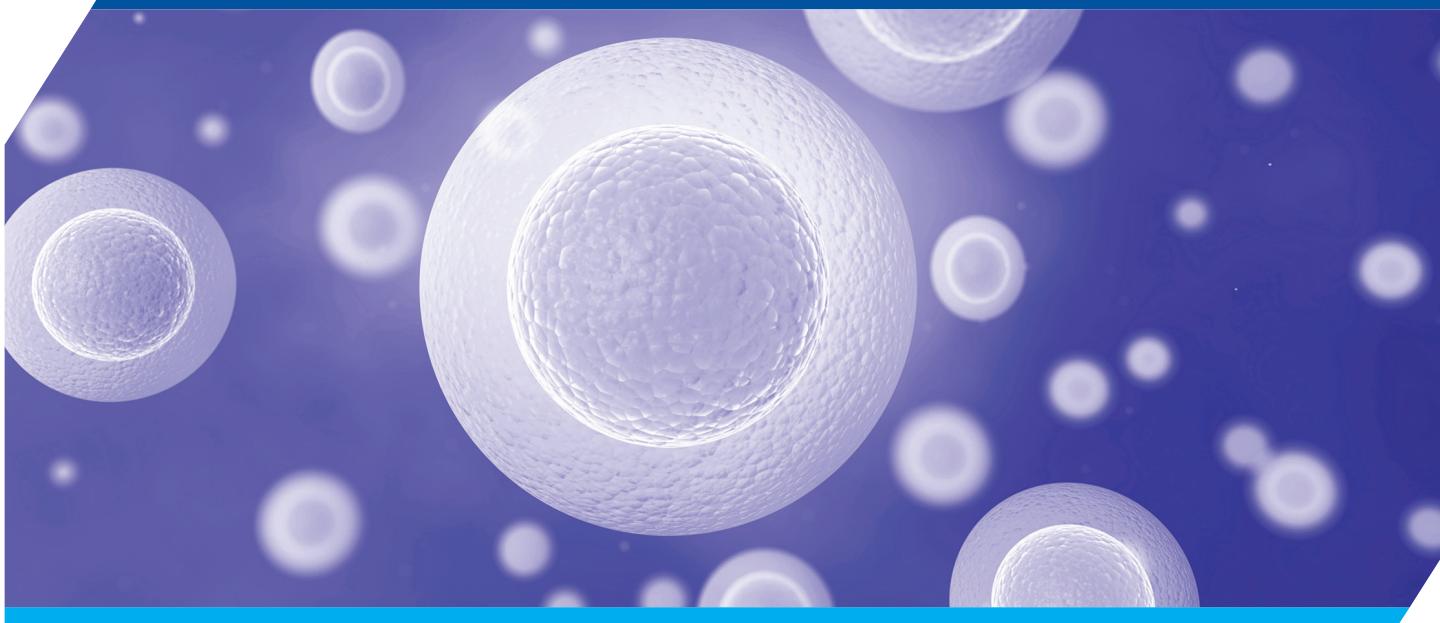




The  
Fertility Society  
of Australia

## Pre-Conception Health Special Interest Group



### Effects of caffeine, alcohol and smoking on fertility and reproductive outcomes

There is increasing evidence that health behaviours affect fertility and reproductive outcomes. As most health behaviours are potentially modifiable, providing advice and support to help people make healthy changes can improve fertility. The evidence relating to the effects on fertility of caffeine, alcohol consumption and smoking is reviewed here.



# Effects of caffeine, alcohol and smoking on fertility and reproductive outcomes

## Evidence review

### Caffeine

Caffeine is widely consumed as it is present in coffee, tea, some soft drinks, and chocolate. Some evidence suggests that the consumption of caffeine, with a possible dose-response effect, may prolong the time to pregnancy and affect the health of a developing foetus [1-3]. While the authors of a meta-analysis found little evidence for an association between caffeine intake and fecundity, they showed that the risk of miscarriage increases with daily caffeine intake of 300 mg or more [4].

A review of studies on the impact of caffeine on male fertility concluded that caffeine intake, possibly through sperm DNA damage, may negatively affect male reproductive function. However, the authors noted that evidence from epidemiological studies on the effects of caffeine on semen parameters and fertility is inconsistent and inconclusive [5].

### Alcohol

Alcohol has been shown to affect male and female fertility, but the level of consumption associated with risk is unclear. Although an adverse effect on fertility of any amount of alcohol consumption is highly plausible, studies are limited, as they generally rely on recall of levels and timing of alcohol consumption [1].

A systematic review and meta-analysis indicated that female alcohol consumption is associated with reduced fecundability. The dose-response meta-analysis showed a linear association between decreased fecundability and every 12.5 g/d increase in alcohol consumption [6]. The mechanisms by which alcohol could impair fertility are unclear, but in men it can cause impotence, reduce libido and affect sperm quality [7]. High levels of maternal alcohol consumption are known to be dangerous to the unborn child [8], but the effects at lower levels are less certain.

While most studies have focused on general populations, a systematic review showed that alcohol use, even in moderate quantities, negatively affects the outcomes of assisted reproductive technology (ART) treatments [9].

### Smoking

There is good evidence that female smoking is associated with impaired fecundity and increased risks of miscarriage and ectopic pregnancy. Furthermore, maternal smoking increases the risk of low birth weight and birth defects and women who smoke reach menopause earlier than non-smokers. There is also some evidence that sperm quality is lower in smokers than in non-smokers, but smoking has not yet been conclusively shown to reduce male fertility. However, heavy smoking ( $\geq 20$  cigarettes per day) by fathers at the time of conception increases the child's risk of childhood leukaemia and shortens the reproductive lifespan of daughters [10-12].

There is good evidence that smoking is negatively associated with ART outcomes; smokers require nearly twice as many IVF attempts to conceive as non-smokers [10].

The adverse effects of passive smoking are now established, and the reproductive consequences for non-smokers who have high exposure to tobacco smoke may be as great as those observed in smokers [10].

## Summary

Caffeine and alcohol consumption adversely affect fertility, most likely in a dose-dependent way. Both active and passive smoking reduce male and female fertility and are harmful for the growing baby. In ART populations male and female smoking significantly reduce conception and live birth rates and increase the risk of miscarriage.

## Recommendations

Based on existing evidence, it is recommended that women trying to conceive limit their caffeine intake to the equivalent of 1-2 cups of coffee per day. It is also recommended that alcohol is avoided when trying to conceive and during pregnancy. Men and women should not smoke cigarettes in the peri-conception period or during pregnancy. For couples where one or both partners smoke, factual information about the risks of smoking and active support to stop smoking should be offered by health professionals, as pregnancy is a time when smoking cessation advice has been found to be most effective [14].

## For more information about pre-conception health visit



[www.yourfertility.org.au](http://www.yourfertility.org.au)

Written by Gill Homan in 2015 and updated by Karin Hammarberg in 2021 on behalf of PCHSIG [karin.hammarberg@monash.edu](mailto:karin.hammarberg@monash.edu)



# Effects of caffeine, alcohol and smoking on fertility and reproductive outcomes

## References

1. Homan G, Davies M, et al. The impact of lifestyle factors on reproductive performance in the general population and those undergoing infertility treatment: a review. *Hum Reprod Update* 2007;13:209-223.
2. Anderson K, Norman R J, et al. Preconception lifestyle advice for people with subfertility. *Cochrane database of systematic reviews*. 2010; CD008189.
3. James JE. Maternal caffeine consumption and pregnancy outcomes: a narrative review with implications for advice to mothers and mothers-to-be. *BMJ Evidence-Based Medicine* 2020, doi:10.1136/bmjebm-2020-111432.
4. Lyngsø J, Ramlau-Hansen CH, et al. Association between coffee or caffeine consumption and fecundity and fertility: a systematic review and dose-response meta-analysis. *Clin Epidemiol*. 2017;15:699-719.
5. Ricci , Viganò, P, et al. Coffee and caffeine intake and male infertility: a systematic review. *Nutrition Journal* 2017;16:37.
6. Fan D, Liu L, et al. Female alcohol consumption and fecundability: a systematic review and dose-response meta-analysis. *Scientific Reports*. 2017; doi:10.1038/s41598-017-14261-8.
7. Sansone A, Di Dato C, et al. Smoke, alcohol and drug addiction and male fertility. *Reprod Biol and Endocrinol*. 2018; doi:10.1186/s12958-018-0320-7.
8. Mukherjee R, Hollins S, Turk, J. Fetal alcohol spectrum disorder: an overview. *J Royal Soc Med*, 2006;99(6):298-302.
9. van Heertum K, Rossi B. Alcohol and fertility: how much is too much? *Fertility Research and Practice*. 2017; doi:10.1186/s40738-017-0037-x.
10. ASRM Practice Committee of the American Society for Reproductive Medicine, Smoking and infertility: a committee opinion, *Fertil Steril*. 2018;110:611–618.
11. Milne E, Greenop KR, et al. Parental prenatal smoking and risk of childhood acute lymphoblastic leukemia. *Am J Epidemiol*. 2012;175:43-53.
12. Fakuda M, Fakuda K, et al. Paternal smoking habits affect the reproductive life span of daughters. *Fertil Steril*. 2011;95:2542-2544.
13. NHMRC. Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Canberra, Australia: National Health and Medical Research Council (NHMRC). 2020, <https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-reduce-health-risks-drinking-alcohol>
14. Australian Government, Department of Health, Pregnancy care guidelines, Tobacco smoking, 2020, <https://www.health.gov.au/resources/pregnancy-care-guidelines/part-c-lifestyle-considerations/tobacco-smoking#123-interventions-to-assist-women-to-stop-smoking>