Family planning professor **John Guillebaud** brings an update on the options available for contraception and the scientific facts on how and when they actually do their work

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When do contraceptives work?

KEY POINTS

The status of the human embryo remains controversial within CMF, but a significant number of Christian doctors believe that human life should be shown the utmost respect from the time of fertilisation and so are unwilling to prescribe or recommend 'contraceptives' that may act after this event. Because most non-Christian colleagues do not share these concerns, and because there is no reliable biochemical marker for fertilisation as opposed to implantation, the facts on which to base such prescribing decisions can be difficult to obtain. This article reviews the available scientific evidence and divides contraceptives into those that act before and those that act after fertilisation.

Most Christian doctors have reached a personal opinion on when life starts and are unwilling to prescribe a drug or device that acts at or after that point. It's also an important issue for many couples when deciding on a contraceptive. It's important that we are armed with the facts.

When do you consider life to start? Is it at fertilisation? Does it start later: before, during or even after implantation? This debate is ongoing in CMF and will not be considered here. Most Christian doctors have a personal opinion; though this varies, they are united in being unwilling to prescribe a contraceptive drug or device that acts at or after that point. It's also an important issue for many couples when deciding on their own method. We need to be armed with the facts. Yet, partly because non-Christian colleagues often do not share our concerns, accurate scientific information can be hard to obtain.

Two research review articles are worth considering.[1,2] The take-home message is that human chorionic gonadotrophin (hCG) is first measurable in the maternal circulation *shortly after the time of implantation*.[3] Hence, research showing no hCG or other known embryo-specific substances in the maternal blood during contraceptive use, only tells us that it does not operate after implantation. At least on some occasions, it might operate after fertilisation, by prevention of implantation or direct destruction of the blastocyst. Clearly, any method linked with the presence of serum hCG would be off-limits to someone requiring a contraceptive that only operated before fertilisation.

Intrauterine contraceptive devices (IUCDs)

The following table summarises the interesting results of a study.[4]

Population	Sample size	Percentage of sample with hCG increase
Control (sexually active without contraception)	22	32
Inert IUCDs	40	20
Copper IUCDs	41	4
Levonorgestrel-IUS (Mirena)	19	0

On this evidence, both copper and inert devices sometimes operate well after fertilisation. The findings regarding the *Levonorgestrel-intrauterine system (levonorgestrel-IUS)* are compatible with absent fertilisation, either through the levonorgestrel effect on cervico-uterine mucus blocking sperm migration or anovulation in a proportion of cycles. Yet unfavourable cervical mucus is not always observed and we know that ovulation still occurs in most cycles.[5] Is the levonorgestrel effect on sperm migration within the uterine fluid always enough to stop the sperm reaching any egg in the tubes? Although there are no direct data, the very rare cases of ectopic pregnancy in women using this method provide indirect evidence that fertilisation can occur.

Several studies have demonstrated that hCG is not the earliest signal of pregnancy. Although not testable in clinical laboratories, Early Pregnancy Factor (EPF) is part of the materno-embryonic immunomodulatory interaction. It appears two to six days earlier than hCG and can occur two to seven days after ovulation in women who have conceived.[6] In fact, EPF is

detectable in maternal serum in some cases within 24-48 hours of fertilisation.[7] However, the vast majority of research using EPF has been for detecting very early pregnancy in subfertile women, not for aiding our understanding of the exact modes of action of various contraceptives. More research is needed in this area. So, as there is no routinely testable biological marker of the time between fertilisation and implantation, we must remain unsure that the *Levonorgestrel-IUS* absolutely never operates post-fertilisation.

Systemically applied hormonal methods

With the notable exception of *Cerazette*, the progestogen-only pill (POP) sometimes acts post-fertilisation.[8] It permits ovulation in many cycles. Reduced sperm-penetrability of cervico-uterine mucus is unlikely to explain all the failures to conceive in the presence of ovulation. As with IUCDs, the occurrence of ectopic pregnancies provides further evidence, though not proof, of this.

However, the conscientiously taken low dose combined oral contraceptive pill (COCP), *Cerazette* (a particular POP), the *Depo-Provera* injection and implant *Implanon* are all such effective anovulants (preventing ovulation and therefore fertilisation) that it is scientifically justifiable to conclude that they operate prior to fertilisation. *The fact that they are capable of blocking implantation does not mean that they ever have to use this back-up mechanism.*

Obviously a *forgetful* COCP user, particularly if taking *Loestrin 20*, *Mercilon* or *Femodette* (the lowest dose UK products), might run the risk of ovulation. It is the lengthening of the pill-free interval that causes pill-failure pregnancies and 'near-misses'. Without lengthening of the pill-free time beyond seven days through non-compliance, fertile ovulation is very rare.[9] Even if ovulation did occur without subsequent pregnancy, it does not follow that the COCP acted post-fertilisation: the sperm may have been blocked by COCP's well-known effect on the mucus. Most experts believe that if sufficient pills were missed to cause the mucus mechanism to fail as well, there still wouldn't be any interference beyond fertilisation; the anti-implantation effect (being the COCP's weakest contraceptive effect) would fail also, leading to conception. Of course, one couldn't be certain of this over many years of forgetful pill-taking. Still, we are talking about a *forgetful* pill-taker taking one of the *weakest* available pills.

If a couple hold the view that blocking implantation is a form of abortion and are worried about their own pill-taking compliance, one could recommend that they shorten their pill-free intervals and/or use the tricycle regimen (see below).

Depo-Provera (D-P) is a brilliantly effective anovulant if injected accurately every 12 weeks. For someone with concerns regarding its modes of action, there is the option of having the injection every ten weeks. This gives added confidence that ovulation is always blocked with the unacceptable back-up mechanism never being utilised.

Summary

Assuming perfect compliance, I feel one could be confident that, even after say 20 years' perfect use of the COCP, *Cerazette*, *Implanon* or *Depo-Provera*, there would not have been a single occasion when a post-fertilisation mechanism would have been utilised. *Moreover, having done everything possible in the light of the best available scientific data, might not a believer legitimately ask her omnipotent Lord to ensure that this would be so for her?*

After prayerful consideration, my own personal view is that implantation is the biological event that separates family planning from abortion.[10] Still, I conclude by listing methods that are entirely secure for those who hold the absolutist ethical position that blocking implantation is a form of abortion.

- **Male and female sterilisation.**
- **The combined oral contraceptive pill (COCP)**, provided the pill-free interval (PFI) is never lengthened. For added security, the PFI could be shortened to 4 days on a regular basis; or there is the option of a tricycle regimen. - in which the PFI is eliminated usually for four, three or sometimes (for better bleeding control) two *monophasic* pill cycles and then also shortened after each run of packets.[11]
- ***Cerazette*** is a new continuously-taken POP that is as effective as the COCP at blocking ovulation plus blocks sperm by the mucus effect. Moreover, it is taken 365 days a year and so does not have the COCP's weakness of regular 7-day breaks from its actions.
- ***Implanon*** is a subdermal implant whose hormone content and actions are very similar to *Cerazette*. It should be replaced no later than the licensed three years.
- ***Depo-Provera*** is another anovulant method. If the 12 week injection interval is never exceeded, it is not thought that *Depo-Provera* would ever use a post-fertilisation mechanism. Someone wanting even greater confidence on that point could be offered injections every 10 weeks.
- **Full breast-feeding combined with the POP or *Depo-Provera*.** With the old-type POP, there would only be a slight risk of breakthrough ovulation (and hence the back-up anti-implantation mechanism being used) during weaning. As soon as the baby was not obtaining 100 percent of its nutrition from breast-feeding, the woman should change to *Cerazette*, a *COCP*, *Depo-Provera* or use additional barrier contraception effectively.
- **Male and female barrier methods** and all **spermicides**, though the latter have a high failure rate.
- **All fertility awareness methods**.
- **Coitus interruptus**.

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