

# Function of Platelet-Activating Factor in Spermatozoa Motility and Fertility Potential



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## Mini Review

Platelet-activating factor (PAF) is a potent signaling phospholipid (alkyl acetyl glycerol phosphocholine) and has been found to have a variety of reproductive roles, including but not limited to sperm function, and early pre implantation development. PAF functions via a G-protein coupled receptor mediated pathway, which ultimately increases intracellular calcium levels. Since its discovery, PAF has been positively linked with fertility, i.e. reproductive outcomes. Roudebush et al. [1] found that boars with high fertility have a significantly more endogenous PAF in sperm than boars with low fertility [1]. Roudebush et al. reported that PAF levels in sperm were significantly higher during the breeding season of squirrel monkeys in comparison to the nonbreeding season [2]. Additionally, Sengoku et al. [2] demonstrated how a PAF antagonist (CV-3988) will decrease the fertilization ability of human sperm *in vitro* by both decreasing sperm penetration ability as well as its acrosome reaction [3].

Wild and Roudebush explored the effects of exogenous PAF on intrauterine insemination (IUI) outcomes [4]. The study involved collecting normal semen specimens from 60 men, preparing to undergo IUI. PAF was exposed to half of the samples collected, while the other half was not exposed. There was a 46.7% pregnancy rate among the group exposed to PAF, compared to the 16.7% pregnancy rate from the unexposed group [4]. However, a similar study by Stavroula et al. investigated the effects of sperm treatment with exogenous PAF on IUI in cases presenting with mild male factor infertility [5]. The study included 92 couples with mild male factor infertility, and each couple had 4 IUI cycles with or without exogenous PAF treatment. The results showed a comparable pregnancy rate of 12.24% vs. 11.11% between the cases with and without PAF treatment respectively [5]. It concluded that exogenous PAF does not improve clinical outcomes

in cases of mild male factor infertility [5]. Since the positive role of PAF is a receptor mediated event, suggests that this sub-population of infertile males have a defect in their respective PAF-receptors. This can be confirmed by the study of Levine et al. [6], which demonstrated that abnormal spermatozoa have a different pattern of PAF receptor locations, which differ from its usual localization to the midpiece and equatorial regions of normal motile spermatozoa.

Jarvi et al. [6] performed another study to illustrate the potential for PAF in conjunction with albumin could be used to improve sperm motility [7]. Human spermatozoa were incubated with PAF, lyso-PAF or lysophosphatidylcholine concentrations, and varying concentrations of albumin, from 0% to 1.2%. Motility was then evaluated at different time periods from 5 to 240 minutes by computer motion assisted analysis. The results of the study illustrated that 50 $\mu$ M of PAF and 100 $\mu$ M of lyso-PAF, when supplemented with 0.3% albumin increased sperm linear velocity by 41% and 44% respectively, and the curvilinear velocity by 17% and 21% respectively. However, in the absence of albumin, neither PAF nor lyso-PAF induced any increase in sperm motion, when compared to control [6]. Given these findings, the study poses a potential use for PAF and its metabolite in concert with albumin, as a potential treatment for asthenozoospermia [7].

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