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JOURNAL ARTICLE

Activation of coagulation factor X in human semen

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Tissue factor (TF) is an essential cofactor for factor VII (fVII) in initiating blood coagulation. Recently, TF was shown to be present in human semen and to be associated with prostasomes that originate from prostatic secretions. In the blood coagulation cascade, the complex of TF and activated factor VII (fVIIa) can activate both factor X and factor IX, by limited proteolysis. In the present study, we investigated the ability of semen to activate factor X. We also determined that factor X was activated predominantly by TF-fVIIa and that most of the TF was present in the seminal plasma, consistent with prostatic localization. No endogenous factor X was detected in semen, but activation of added factor X occurred in the absence of added fVIIa. Subsequent experiments showed that seminal plasma contains endogenous fVII-like activity, but the addition of more fVIIa increased factor X activation. Thus, while seminal plasma contains significant amounts of TF, its potential to activate factor X is limited by fVII availability and by the absence of endogenous factor X. Evaluation of semen specimens from infertility patients revealed a 16-fold variation in TF-fVII activity. No relationship between TF and number of days of abstinence, specimen pH, sperm count, or sperm motility was evident. Additional factor X-activating potential, independent of further TF activity, was generated in seminal plasma after treatment of semen with calcium and ionophore A23187. Production of this additional activity was blocked by the addition of anti-TF antibody during the activation. Since there is no factor X endogenous to semen, the additional activity stimulated by A23187 appears to be due to an endogenous, non-factor X substrate for TF-fVII in semen. This endogenous substrate may be either factor IX or a novel new substrate for TF-fVIIa. Future experiments will test these hypotheses.

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