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Short Communication

A Series of Multiple Spontaneous Pregnancy Losses in Thrombophilia can be Interrupted by Infrared Diagnosis of Hypoxia

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It is no secret that women with thrombophilia in pregnancy develop hypercoagulation of the blood plasma, which can cause blockage of the placental blood vessels and its premature detachment, which can cause intrauterine fetal death. Therefore, heparin and its derivatives are universally used to interrupt a series of premature miscarriages in such women. However, effective miscarriage prophylaxis with direct-acting anticoagulants has not yet been definitively developed. Therefore, very many women with thrombophilia remain childless worldwide.

At the same time, a few years ago a discovery was made in Russia that dramatically changed the prognosis of pregnancy in women with thrombophilia. This discovery was made using infrared monitoring of local temperature dynamics of the fingertips of hands (and feet) in humans during acute limb ischemia (cuff occlusion test), as well as during different types of hypoxia: apnea, posthemorrhagic anemia, massive blood loss (hemorrhagic shock). It turned out that infrared thermography reveals cooling of the fingertips, which develops normally in 12 - 15 seconds after the onset of acute ischemia and/or hypoxia. Based on these data, it was initially concluded that local hypothermia in the fingertips displayed a complex early adaptive response of the body of healthy men and women to acute hypoxia (limb ischemia). Later it was shown that exactly the same local hypothermia of limb fingertips develops in pregnant women during pregnancy pathology complicated by hypoxia of their fetus. A characteristic feature of the above diagnostic symptom is that, the specified local cooling develops in all fingers and toes of the mother simultaneously (Figure 1). Moreover, a concomitant ultrasound examination of the fetal fingers during maternal voluntary respiratory arrest (apnea) revealed changes in ultrasound echogenicity in the fetal finger pads when the fetus's adaptive reserves for intrauterine hypoxia are exhausted. In turn, elimination of ischemia and hypoxia in adults and fetuses immediately began to restore local temperature and ultrasonic echogenicity (respectively) in their finger pads. Additional studies then showed that the change in ultrasound echogenicity of the soft tissues of the fingertips of adults and fetuses in utero is due to a change in the ratio of oxyhemoglobin and carboglobin in them [1].

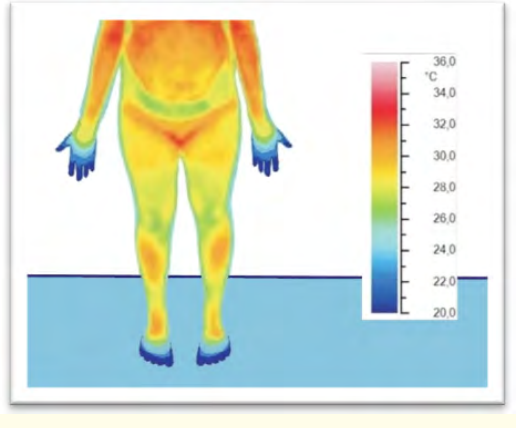

Figure 1: Infrared imaging of a pregnant woman with thrombophilia in intrauterine fetal hypoxia due to an insufficient course dose of heparin and/or its derivatives.

We proposed a new theory for the pathogenesis of intrauterine fetal death and miscarriage in pregnant women with thrombophilia to interpret local limb hypothermia. This theory is based on the fact that the true cause of intrauterine fetal death is intrauterine hypoxia rather than hypercoagulation of blood plasma in the pregnant woman. In this case, the pregnant woman's body senses and responds to intrauterine fetal hypoxia and the degree of hypoxic damage in the fetus in the same way as it does to hypoxia and the degree of hypoxic damage in its own body. In particular, the absence of intrauterine hypoxia in the mother and her fetus maintains the natural local surface temperature (skin) of all parts of a woman's body, including the fingertips of her limbs. In turn, the occurrence of intrauterine hypoxia in the fetus "turns on" in its mother's body a universal adaptive response to hypoxia. This protective reaction manifests itself as local hypothermia in the fingers and toes and is well diagnosed using thermal imaging. There is no doubt that it is a consequence of reflexively developing spasm of blood vessels in the fingers and reducing the delivery of warm arterial blood to them, which has long been described and known as acrocyanosis.

In conclusion, it should be pointed out that the magnitude of the area of local hypothermia and the degree of cooling of the fingers is the greater, the more severe is the degree of hypoxia in the fetus (RU Patent No. 2422090. 27.06.2011) and the more pronounced is blood plasma hypercoagulation in the pregnant woman [2].

Thus, inadequate treatment with heparin and/or its derivatives in pregnant women with thrombophilia may be complicated by fetal hypoxia and exhaustion of its reserves for adaptation to hypoxia. In turn, the exhaustion of fetal reserves of resistance to hypoxia includes a universal compensatory mechanism of protection against hypoxic damage in the body of a pregnant woman, manifested by cooling of her fingers in all limbs, which is easily detected by infrared imaging. Therefore, infrared navigation of course heparin therapy can individualize the treatment of pregnant women and preserve pregnancy in women with thrombophilia.

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