Chapter 2
Thermal Diagnostics in Chronic Venous Disease

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ABSTRACT
The aim of the study was to determine the diagnostic usefulness of thermal imaging as tool to find quantitative parameters in lower-limb primary chronic venous diseases and insufficiency of superficial veins. There were significant differences obtained in thermal maps of lower extremities between patients and healthy. The correlations were obtained between temperature parameters counted from thermal imaging and duplex scanning. Such results also suggest that thermovision diagnostics may be useful as a complementary and first of all objective method that can be used in the diagnosis of chronic venous diseases in the lower extremities. It may suggest that thermovision may be used as a screening method or together with an ultrasound diagnosis in different superficial veins disorders.

INTRODUCTION
There are many different diseases that physicians may called civilization’s problems. One of them is undoubtedly chronic venous disease. There are factors that can cause serious vein diseases i.e. obesity, diabetes, lack of exercises and hypertension. When patients with chronic venous disease are considered it is often observed that few of these factors appear together. Risk factors of chronic venous disease include inheritance (genetic predisposition), age, sex, obesity (mainly in women), pregnancy, long-time standing or sitting, smoking and insufficient movement. The other important factors that can contribute to chronic venous disease (CVD) are the lack of fibre in food, congestion, peroral contraception or hormonal substitution treatment, wearing high heels, garters and higher body height. The occurrence of

DOI: 10.4018/978-1-5225-2072-6.ch002
chronic venous disease in the population is connected with the lifestyle of modern society. The etiology of CVD still remains unclear. The cause of chronic venous disease is multifactorial and represents a combination of internal and external influences (Švestková & Pospíšilová, 2008).

Some commonly mentioned conditions associated with venous ulcers include older age, obesity, hypertension, heart failure, diabetes, rheumatoid arthritis, nephrosis, and a history of venous thrombosis (Nelzen, Bergqvist, & Lindhagen, 1991; Scott, LaMorte, Gorin, & Menzoian, 1995).

Subjective symptoms on lower limbs are connected with chronic venous disease include pain in the limbs, feeling of heavy legs, feelings of intumescences, pressure or burning of the skin (Švestková & Pospíšilová, 2008).

**CHRONIC VENOUS DISEASE (CVD)**

Chronic venous disease ranks among civilization diseases and its occurrence increases in both sexes nearly linearly with age. However the probability of venous insufficiency occurring increases with number of pregnancies. The probability of lower-limb venous disease appearing is estimated at 40-50% for men and 50-55% for women, whereas visible varicose veins and chronic venous insufficiency are, respectively, present in 10-15% and 2-7% of the male population and 20-25% and 3-7% of the female population. Moreover it usually is observed for people beyond 50 years old however it can be seen also in younger people (Švestková & Pospíšilová, 2008; Chiesa, Marone, Limoni, Volonte, Schaefer, & Petrini, 2005). For example in the United States, an estimated 23% of adults have varicose veins, and 6% have more advanced chronic venous disease (CVD), including skin changes and venous ulcers (Sieroń, Cierpka, Rybak, & Stanek, 2009; Kaplan, Criqui, Denenberg, Bergan, & Fronek, 2003). Such symptoms may cause pain and discomfort, what lead to absence or disability of work, and a deterioration of a healthy quality of life (Van den Oever, Hepp, Debbaut & Simon, 1998; Kaplan, Criqui, Denenberg, Bergan, & Fronek, 2003). It is also observed that it usually afflicts industrial countries. Therefore chronic venous disease is considered as civilization problem (Van den Oever, Hepp, Debbaut, & Simon, 1998; Kaplan, Criqui, Denenberg, Bergan, & Fronek, 2003).

That is why the chronic venous disease (CVD) of the lower extremities is one of the most widespread diseases in the populations of Western European countries and the USA (Milic, 2011).

The most frequent symptoms of chronic venous disease are dilated cutaneous veins, such as telangiectases and reticular veins, or varicose veins. That is why it is also used the term chronic venous insufficiency (CVI) which describes more advanced problems of the venous system of the lower extremities including edema, skin changes, and even ulcerations. In turn, the term chronic venous disease (CVD) is used to represent the full spectrum of manifestations of chronic venous disease. Veins diseases have a significant meaning on healthcare resources. There was reported that millions of people seek medical help for their health as well as cosmetic appearance annually. However it should be noted that cosmetic consequences may adversely affect an individual’s quality of life and are associated with other symptoms. It should be underlined that serious consequences of chronic venous insufficiency i.e. venous ulcers have an estimated prevalence of about 0.3%, although active or healed ulcers occurred in 1% of the adult population. It has been reported that in United States about 2.5 million people have chronic venous insufficiency and 20% of that number develops in venous ulcers. The healing process of venous ulcers is different and can last long time – even few years is common for more than 50% of venous ulcers. Delayed healing and recurrent ulceration is common in patients with ulcers on lower extremities. Moreover the