Frequently Asked Questions

1. What is the Arteriograph for?
The Arteriograph is a new Hungarian world patent that can be a turning point in the early diagnosis of the atherosclerosis. It is capable of measuring Central Blood Pressure, Small and Large Arterial Function in a convenient 3 minutes test. By using this revolutionary system doctors can make cardiovascular risk assessments significantly more accurate even on a population level, having the potential of saving thousands of lives.

2. What does Arteriograph measure? What is „Arterial stiffness”?
The Arteriograph examines the "age of the artery" that is the stiffness of the arteries growing from strength to strength together with aging. The state when the flexibility of the arteries is decreasing and they are becoming stiffer and stiffer progressively is expressed in the professional literature uniformly as "arterial stiffness".

3. What advantages does the Arteriograph provide?
Arterial function measurement was only available in clinical environment, by using quite difficult methods, which needed skilled and well-trained users. With its entirely new, oscillometric method, Arteriograph provides an easy, fast, reliable and user-independent method for measuring several arterial function parameters, as well as central blood pressure values.

EASY, as an oscillometric blood pressure measurement
FAST, as it takes only 3 minutes (including patient data input)
USER INDEPENDENT, as it is fully automatic; the users only have to launch the measurement.
RELIABLE, as its reproducibility and variance were shown to be superior to other available methods.

4. What is the new measuring method that makes the subject of the patent?
The newly discovered measuring method used in the Arteriograph is based on the fact that Dr. Illyés, Miklós and Mr. Béres, József have found out the information content of the signs appearing in the brachial artery during the oscillometric measurement, carrying information regarding to atherosclerosis. Not only is diagnose valid for the brachial artery, but for the whole arterial system.

5. Hoe does the Arteriograph measure the arterial function parameters?
With use of a simple upper-arm cuff, the device is capable of recording hemodynamic changes, which closely reflect central aortic behaviour. For calculating arterial function parameters the recorded blood pressure waveform is analyzed. First and reflected wave peaks and dictrotic notch are defined, among others.The site of wave reflection is in the vicinity of the bifuciration, i.e. the distance travelled by the pulse wave is the true aortic length. The true aortic length is estimated by the Jugulum symphysis distance, by which the calculation of PWVao is enabled.

6. What does the „Pulse Wave Velocity (PWV)" and the „Augmentation index (Aix)" mean?
At present, the aortic pulse wave velocity (PWV) and the so-called augmentation index (Aix) are used mostly for the non-invasive examination of the arterial stiffness.
In clinical practice, the pulse wave velocity (further on the PWV) is generally understood as the PWV of the aorta, because this is where the reduction of the flexibility of the vessel wall caused by the atherosclerosis is present first of all. The aortic PWV can be determined on the basis of the time difference of the pulse waves appearing on the art. carotis and on the art. femoralis, as well as on the basis of the velocity measured by the determination of the distance between these two points, on the basis of the formula v=s/t.
The augmentation index, given in percents, (further on the Aix), is defined as the pressure difference between the first (P1), the early, (induced by the heart systole) and the second (P2), the late (appearing because of the reflection of the first pulse wave) systolic peaks, divided by the pulse pressure.
Aix (%) = (P2 - P1) / PP × 100

7. How do these parameters relate to the condition of the vascular system?
The stiffer the wall of the aorta (atherosclerosis), the higher the PWV value is. Value above 12 m/s is unambiguously accepted as pathologic, because it has been proved that the survival rate with patients having PWV value above this limit will significantly grow worse. The Aix, first of all, gives information on the resistance of the arterioles. The higher the percentage value of the Aix is, the stronger the resistance of the arterioles (resistance vessels). Peripheral resistance of the arterioles is essentially influenced by the endothelium. In case of endothel dysfunction, the volume of the nitrogen monoxide (NO) output in the endothelium will decrease, this is the reason of its vasotonic effect, the peripheral resistance will grow (further on TPR = Total Peripheral Resistance).

8. What stage of the vascular and circulatory disturbances can these parameters be connected to?
The atherosclerosis can already be demonstrated with the Arteriograph in its earliest stage when the endothelin dysfunction is being developed, because increased Aix values will be measured. The Arteriograph can also be used to measure the later, macrovascular stage of the atherosclerosis. In this case the increase of the aortic PWV value can be observed Attention! Increased aortic PWV value can also be caused by the increase of the cardiac output!

9. What kinds of other methods can be used to determine these parameters?
Besides invasive methods, the PWV and Aix values can also be measured with the so-called applanation tonometry. These devices can mutually be characterized with the facts that

their practical application is complicated, time consuming and needs specially educated professionals. These devices are applied mostly in special cardiological research laboratories.
It can be said of the Arteriograph that it is a methodological turning point, because with its simplicity and quickness, it offers a method for a practicing physician to apply as a routine screening.

10. How did the validation of the Arteriograph take place?
On the one hand, the validation of the Arteriograph was made against an invasive method at the Clinic of Cardiology of the Pécs Medical University, where the pulse wave given by a cannula inserted into the art. brachialis, and the wave given by the Arteriograph were compared. It was demonstrated that the results gained by the Arteriograph were totally the same as the intraarterial pulse waves gained with the invasive method.
The PWV and the Aix values measured by the Arteriograph were also validated to other, non-invasive measurement methods (Complior, SphygmoCor). Both parameters show very close correlation (P = 0,8) with the results measured with the above mentioned methods.

11. How is an examination taking place? What kind of qualification is necessary to perform the examination?
The examination is fully automated and computerized. The task of the operator is only to put the measuring cuff properly and to print out the findings. Measuring with the Arteriograph will not necessitate any special medical knowledge.
In the same time, it must be emphasized that the evaluation of the findings and their proper interpreting in conjunction with the whole clinical condition is unambiguously the task of the physician!

12. What do the findings of the examination contain?
The Arteriograph, necessitating only a 3 minutes' duration of measuring, will provide with the following parameters:

Systolic blood pressure	(SBP)
Diastolic blood pressure	(DBP)
Mean arterial pressure	(MAP)
Pulse pressure	(PP)
Augmentation index	(Aix)
Pulse wave velocity on the aorta	(PWV)
Length of cardiac cycle in m/sec	(Period)
Systolic area index	(SAI)*
Diastolic area index	(DAI)*

*The last two parameters give information on the perfusion pressure state of the coronaries.

The measured Aix and PWV values are automatically evaluated by the device according as they fall within the optimum, normal, elevated or pathologic range of values.

13. What is to be done with patients showing elevated or pathologic values?
In case of patients showing elevated or pathologic values, a thorough survey of all the other risk factors is indicated even if these examinations showed negative results in the recent past.
Attention! It can lead to false negative results if the patient is under strong effect of vasoactive medication (first of all under the effect of nitrates, ACE-inhibitors).

14. On what operational system can TensioWin and Arteriograph software run?
TensioWin and Arteriograph software are capable of running under the following operation systems:
Windows XP/Vista/7

Please contact us with any further questions conserning TensioMed softwares.

15. What are the possibilities of education and consultation for users?
Taking into consideration that with the application of the Arteriograph, quick information can be obtained on the basic physiological and pathophysiological processes of the regularities of the arterial circulation, one day of postgraduate professional course is held monthly, and at the end of the course, the participants will receive a diploma certifying their skills in the field of the application of the Arteriograph.
Besides this, the findings can also be sent to the following e-mail address for the purpose of consultation: **info@tensiomed.com**

16. On what fields of specialization can the Arteriograph be applied with successes?
The Arteriograph can provide powerful help for the representatives of the following specializations during their preventive, diagnostic interventions as well as when monitoring the effects of therapy:

- Professionals working in occupational health (check-ups for atherosclerosis)
- General Practitioners (primary check-up for atherosclerosis, and follow-up of the treatment)
- Cardiologists (non-invasive hemodynamical monitoring, research work)
- Nephrologists (in case of accelerating atherosclerosis is in connection with some renal problems)
- Diabetologists (diabetes will accelerate process of aging of the vessels)
- Obstetricians and gynaecologists (the preeclampsia is an endothelial disease, the menopause is a basic risk factor of atherosclerosis)
- Paediatric cardiologists (the atherosclerosis is often detectable already in young age)
- Scientific researchers (in the fields of physiology and pathophysiology)
- Experts in pharmacodynamics at pharmaceutical factories (effect of the given medicament to the TPR, the PWV or to the atherosclerosis)

17. What references are available on this subject?
Literature available on arterial stiffness nowadays is so large that it can fill a library. Recommended choice of literature is available for all who are interested.

18. Which companies are the official distributors of the products?
To become a distributor in a foreign country please contact TensioMed Ldt.: **info@tensiomed.com**

19. To whom is it worth to buy the device?
It worths to buy to anybody working in the professions listed earlier. According to our experiences, accomplishing checking up exams performed by the Arteriograph for patients is highly recommended.

20. What kind of aid can be given by the manufacturer and the distributor for the users in the form of warranty and over the period of warranty?
Both the manufacturer and the distributors are present in the international market having ISO qualification working in the system of quality insurance. Both companies have brand services of their own. They provide warranty period of 2 years for the basic instrument of

the Arteriograph. This can be done because the valves and pumps built in the device comply with the highest requirements. Repair under warranty generally means to replace the device.

21. Are there any other possibilities to get some more information?
For further help, continuously updated information is provided for our customers and those who are interested on the website **www.tensiomed.com**. The new information data come from the uninterruptedly growing number of customers and as results of the ever-developing clinical research, which we are pleased to share with you. Should you have any questions or requests, do not hesitate to contact TensioMed Ltd. at **info@tensiomed.com**