Local anaesthetics are unique drugs in many respects: for example, they are administered directly at the part of the body where nerve block is desired. Therefore, lower therapeutic ratios are needed than with most other drugs. Usually containing the local anaesthetic agent, a vasoconstrictor and several additives, the local anaesthetic solution has an impact on the peripheral nerve and prevents pain signals from reaching the brain. However, despite a local application of the drugs, they can be absorbed systemically so that other organs, especially the central nervous system and the cardiovascular system, may be affected as well. In young and healthy patients, this usually does not trigger any adverse effects; their incidence is in general very low with local anaesthetics. There is an ongoing discussion, however, that the risk of disturbances after local anaesthetic administration is higher in medically compromised patients.

Aging population
Since the population age distribution is shifting towards older ages in many Western countries, it is expected that the number of patients with underlying medical diseases often associated with cardiovascular and cerebrovascular difficulties will increase. In addition, the desire to maintain their own teeth and receive high-quality dental treatment – including more invasive dental procedures such as the placement of implants – is growing in this age group. A decrease of the number of edentulous patients and an increase of treatments performed under local anaesthesia in this group is the result. Therefore, it becomes more and more important to search for safe approaches of effective anaesthetization of medically compromised patients.

Clinical study
Therefore, research was conducted to find out if local anaesthetics with a reduced vasoconstrictor concentration (e.g. 3M ESPE Ubistesin that is now available in Australia) might be suited for the anaesthetization of medically compromised patients. In a retrospective, longitudinal, randomized, double blinded, controlled clinical study\(^1\) with 50 patients, the cardiovascular effect of two different types of local anaesthetics – an articaine solution with a reduced adrenaline concentration (1:200,000) and lidocaine with 1:100,000 adrenaline – was investigated. The patients enrolled in the study suffered from a number of cardiovascular diseases, including balanced hypertensions, balanced ischemic heart diseases and balanced congestive heart failure.

The aim of the study was to compare the analgesic potency of articaine 4% with an adrenaline concentration of 1:200,000 to that of 2% lidocaine with adrenaline 1:100,000. In addition, it was expected that the shorter elimination half life of articaine with the reduced vasoconstrictor concentration would lead to a lower risk for systemic intoxication in cardiovascular patients.

Pain control in medically compromised patients

By Prof. Eliezer Kaufman, DMD
The patients were randomly divided into two groups and by use of a computerized system the following data was collected as well as evaluated: electrocardiography (ECG), oxygen saturation in the blood, blood pressure and heart rate. Furthermore, the pain level was scored by patients and dentists. Afterwards, the results of the two groups were compared to each other.

**Results**

The most important result was that significant adverse effects did not occur and it was shown that articaine was as safe as lidocaine in this study. However, some episodes of ischemic changes were found in the ECG of three patients, one from the lidocaine group (a T-wave inversion occurred) and two from the articaine group, who developed an ST segment deviation. Interestingly, the T-wave inversion appeared in the patient of the lidocaine group after the administration of the local anaesthetic, while the two patients treated with articaine had already shown ischemic changes prior to the injection. Thus, the ST segment deviation was – in both cases – a chronic disease not related to the local anaesthetic. The occurrence of the T-wave inversion in the patient treated with lidocaine indicated that lidocaine can trigger some ischemic changes. However, the differences were not statistically significant and further investigations are needed. What can be concluded is that articaine is a safe alternative to lidocaine.

**Discussion**

In the context of dental treatments, effective anaesthetization of patients is a decisive task, which is especially challenging when it comes to medically compromised patients. The study described here has shown that for high risk patients, articaine with a reduced vasoconstrictor concentration is superior to lidocaine with the standard concentration of adrenaline, since lower adrenaline concentrations lead to less potential risk of adverse effects. It can be concluded that with articaine 1:200,000, a local anaesthetic is available that is safe and well-tolerated by medically compromised patients and thus recommended for healthy patients as well.

**References**


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