Dental medicine was fundamentally changed unlike any other medical discipline. Local anaesthesia is the most frequently used form of pain relief in dental medicine.

Since the discovery of the first tolerable local anaesthetic, injection methods and syringe systems were developed. Now injection systems are available for every type of application for performing dental and dental-surgical procedures. Modern production facilities and quality assurance systems ensure reliability, availability and consistently high quality (Figs. 1, 2).

### History

The substance called Procaine, the first effective and tolerable local anaesthetic, was synthesized in 1905. One year earlier, adrenaline, which is added to local anaesthetics as a vasoconstrictor, was first successfully synthesized. By adding such vasoconstrictors, removal of the local anaesthetic is delayed, whereby the duration of local anaesthesia such as in the case of Lidocaine, for example, may be doubled.

Local Anaesthetics in Dental Medicine

The requirements imposed on a clinically usable local anaesthetic include water solubility, sterility, availability and tissue compatibility. In order to prevent toxic effects, a local anaesthetic should be inactivated as rapidly as possible after absorption.

Today, the local anaesthetics used clinically are divided into esters and acid amides based on their chemical structure. Because of their higher risk of hyperactivity, the local anaesthetics of the ester group should be generally avoided. In this group, tetracaine and benzocaine have an area of indication as topical anaesthetics.

Only certain local anaesthetics are approved for intraneural use in dentistry. These include Lidocaine, Mepivacaine and Articaine, for example. These substances belong to the amide preparations. They exhibit very low allergenic potential. The occasionally observed intolerance reactions are caused by the added preservatives (such as methylparaben) and/or excipients (e.g., sulphites) (Table 1).

Lidocaine is the most widely used worldwide, and is quite appropriate for spatially expanded treatments. It is used as a 2% solution for infiltration and nerve block anaesthesia. (e.g., Lignospan Special, Septodont). It can also be used in topical anaesthesia (Xylofor Spray, Septodont) for the mucosa.

Because of its very low vasodilatory activity, Mepivacaine can be used also without a vasoconstrictor. This local anaesthetic should be considered in patients with contraindications for the use of adrenaline or sodium nitrite. It is also suitable for inter alia for special at-risk patients such as asthmatics, persons with allergies or cardiovascular-labile patients. Because of the relatively short therapeutic utility time, the 5% solution should be used (e.g., Sandozdet 5% Plain, Septodont) (Fig. 3).

Articaine is characterised by pronounced local anaesthetic activity with low toxicity. Absorption of the local anaesthetic is delayed, whereas nerve block anaesthesia the reverse effect must be expected. By virtue of the vasoconstrictor, the elimination of the local anaesthetic is slowed and consequently there is a lengthening of the therapeutic utility time and a potentiating of the intensity of action. Another effect is the reduction of local perfusion, which can be an advantage in surgical procedures.

The majority of dental local anaesthetics contain the adjuvant adrenaline in concentrations of 1:80,000, 1:100,000 and 1:200,000. Sulphite is added as an antioxidant in order to stabilise the oxygen-sensitive adrenaline. Here, the corresponding risk of sulphite allergy must be considered. In the majority of cases, the lower adrenaline concentration of 1:200,000 is adequate. Nevertheless, a higher adrenaline concentration is of interest if, in dental-surgical procedures, greater vasoconstriction is desired for a better intraoperative overview.

However, it must be noted that depending on the method of administration, different type effects must be expected by virtue of the vasoconstrictor activity. In the case of infiltration anaesthesia, the duration and intensity of the local anaesthesia increases dose-dependently with increasing adrenaline addition, whereas in nerve block anaesthesia the reverse effect must be expected.

### Complications

**Adminstration & Injection Methods**

In the majority of cases, local anaesthetics in dental medicine are administered in the form of topical, infiltration or nerve block anaesthesia. Special local techniques include intraligamental, intrasusal, intraspinal and intrapulpal anaesthesia. In general, dental cartridges together with dental syringes are used for infiltration and nerve block anaesthesia. These make aspiration of the local anaesthetic possible before injection, and thus increase the safety of administration.

In addition, easy-break ampoules and, in cases of high use, multi-dose bottles are used.

Multi-dose dispensing bottles must, however, contain preservatives, which represent an allergy risk.

Injection should be done slowly (circa 1 ml/60 sec.). In the case of intraligamentary injection, an even slower injection is required. Here, special injection syringes are available, making uniform and reduced pressure injection possible. Recently, electronically controlled injection systems (Anaject, Wand), have become available.

Today, thin disposable needles with a precision scale are the rule. Needles with a precision scale are preferred for infiltration and nerve block anaesthesia. These make aspiration of the local anaesthetic possible before injection, and thus increase the safety of administration. In addition, easy-break ampoules and, in cases of high use, multi-dose bottles are used.

### Literature


### References


### Table 1: Articaine, Lidojane and Mepivacaine

<table>
<thead>
<tr>
<th>Articaine</th>
<th>Lidojane</th>
<th>Mepivacaine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative toxicity (reference = Procaine = 1)</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>Half-life (minutes)</td>
<td>20 min.</td>
<td>60 min.</td>
</tr>
<tr>
<td>Maximum Dose (adult)</td>
<td>500 mg</td>
<td>500-500 mg</td>
</tr>
<tr>
<td>Average Duration of Action</td>
<td>40-40 min.</td>
<td>40-60 min.</td>
</tr>
</tbody>
</table>