

# 15 true and false



statements on dental anesthesia



Solutions for less anxiety and more efficiency

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## SUMMARY

PREFACE	4-5
A FEW PRELIMINARY DEFINITIONS	6
BIBLIOGRAPHY	7
THE WORKING PRINCIPLES OF ANESTHESIA	8-12
COMMON BELIEFS	12-13
FACTS	14-15



Olivier VILLETTE

### **A life without ID nerve blocks and intrapulpals!**

*Despite being 50 years old, I have never received an ID nerve block or intrapulpal anesthesia injection, and very few infiltrations. I have never had to endure the inconveniences of these techniques, because my dentist happened to be none other than my father. At that time, he already knew there was a better technique: intraosseous anesthesia. No pain, no lagtime, no collateral numbness and most importantly no failures!*

*To develop and facilitate the access to this technique, we decided to create the Dentalhitec company. It was in 1997 that the QuickSleeper system was born triggering the start of a great adventure!*

*Today, 5 generations of device later, more than 10 million intraosseous anesthetics are performed with QuickSleeper each year in more than 30 countries. This development has allowed us to forge links and work with many dental practitioners, faculties, distributors and initiate strong partnerships.*

*Drawing upon our successful international experience, we are taking a new step forward with the launch of the Dentalhitec Academy. Face-to-face or remote training, article production, bibliographical analysis & support for research projects are the main activities of this benchmark organization in the field of intraosseous anesthesia.*

*To carry out this mission, I have the pleasure of introducing you to the members of the Dentalhitec Academy. They are practitioners from different countries and backgrounds. Their practices and specialties cover many areas of expertise. All have solid experience to ensure quality work. If you wish to discover or improve your skills in intraosseous anesthesia, they are certainly the people to meet!*

**Olivier VILLETTE**  
**President of Dentalhitec**



Dr. Stéphane DIAZ

### Training in dental anesthesia

When talking about anesthesia, some practitioners are quick to say the famous line "I don't have any problems". It's true that we are on the right side of the syringe, but we should never forget that pain cannot be seen or measured. The only indicator we have are our patient's protests. Yet, we have to deal with it, knowing that there are wide ranging nociceptive and emotional variations between patients. We can still acknowledge that the sentence: "I didn't feel a thing!" is a reliable indicator. But what about the others? Even though this is an oversimplification, we all know that since dentistry practices first came into being, pain has been a major criterion for a patient's appraisal of how good their dental practitioner is. Today, pain management in the dental office is essential for patients and for us.

### Why take an anesthesia training course?

Even though taking part in a training course responds to a desire to acquire skills, it is also often motivated by coping with failure. Although it is often the catalyst needed to expand our skills, it is difficult to recognize the virtues of failure when it occurs. In fact, even if (being optimistic!): - 90% of our clinical procedures are "successful", when failure does occur, our patient experiences a failure rate of 100%. Being effective in anesthesia is a sine qua non of any surgical procedure. For example, for inferior dental nerve block anesthesia, literature reports 15 to 40% failures, depending on the study! Very few training courses on the subject of dental anesthesia are being offered. So is the literature pessimistic, or...?



### Where and how can you get training?

It is worth it to set aside some time to take a training course given the loss of time, credibility and clinical effectiveness associated with the challenges of anesthesia, and the side effects that are sometimes encountered. In order to make advances in our practices, it is essential to periodically review the anatomy, drug and usual techniques, as well as to acquire new techniques. Spending a bit of time training for a procedure that is used several times per day allows practitioners to save time, as well as to become more efficient and serene

in our practice. With the use of dedicated equipment, all practitioners can now have access to osteocentral anesthesia and, more broadly, intraosseous anesthesia. Theoretical and practical training modules, offered in small numbers by Dentalhitec Academy practitioner-trainers, enable these anesthesia techniques to be implemented with incomparable efficiency and safety.

**Dr. Stéphane DIAZ**  
Nantes (France)

### Vasoactive

Endogenous catecholamine used to stimulate or regulate cardiovascular functions. Adrenaline, used in dentistry for its peripheral vasoconstrictor action, is the most commonly used vasoactive agent.

### Volkman's canals

Avascular canals connecting with the Haversian canals. Volkman's canals connect the medulla with the periosteum.

### Intraosseous or diploic anesthesia

Involves placing the anesthetic directly into the diploe (cancellous bone of a spongy bone). Regroups osteocentral and transcortical anesthetics.

### Osteocentral anesthesia

Involves placing the anesthetic in the centre of the cancellous bone by passing through the top of the septum.

### Transcortical anesthesia

Involves placing the anesthetic in the diploe, after passing through the vestibular cortical bone (or palate in some cases). In edentulous areas, cortical perforation is delivered depending on the anatomy.

FOR FURTHER INFORMATION:

<https://www.dentalhitec.com/en/bibliography/>



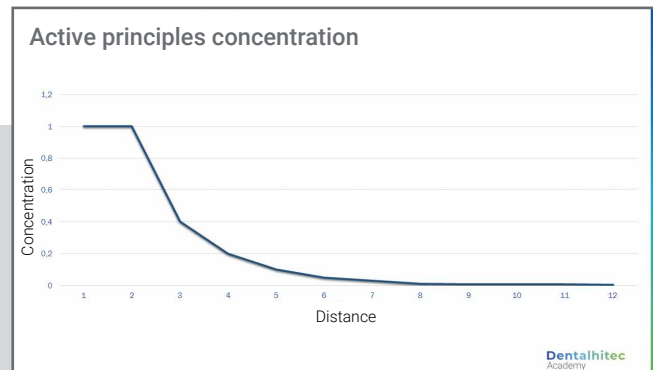
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## 1 The diffusion and dilution of the anesthetic have minimal impacts on the effect of the anesthesia.



The physicochemical concept of dilution is expressed by the dilution gradient [12].

An anesthetic solution is a solution with an acidic pH, which contains an anesthetic molecule, a preservative, an antioxidant and a vasoactive substance. This solution is injected in a tissue composed of biological, cellular, extracellular and vascular fluids with a neutral pH. All the elements in the solution become diluted and their concentration gradually decreases further away from the injection point. This dilution occurs in the three directions in space and its variation increases very rapidly (exponential function).



Consequently, the concentration of the active ingredient with an anesthetic effect, i.e. the power of the anesthesia, decreases very quickly moving away from the injection point.

The dilution of the anesthetic product concerns all injections and will depend on the "liquid content" in the tissue concerned. It is therefore recommended to inject as close to the apices as possible to minimize the dilution effect.

## 2 In the event of pulpitis, it is essential to use a vasoactive agent with a high concentration.



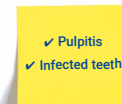
Inflammatory tissues are more difficult to anesthetize than healthy tissues [7,8]. This is because tissue acidosis makes the anesthetic solutions, which are acidic themselves, less effective. To obtain a more powerful anesthesia, it is necessary to increase, as much as possible, the concentration of the vasoactive agent (adrenaline) which, through its local vasoconstrictor action, makes it more effective and keeps the solution in place by slowing its diffusion into the general circulation.

It is essential to use a vasoactive agent with an adrenaline concentration of 1:100000 or 1:80000 in order to anaesthetize a tooth with pulpitis. However, it is necessary to choose an anesthesia technique that allows this concentration to be used without risk of necrosis.

### ANESTHETIC PRODUCTS, EFFECT AND DURATION

The effect of the anesthesia is immediate

- 1/200 000 (0,005 mg/ml)  
Extraction / Restorative treatment of **asymptomatic teeth**  
**Apport 30-45 minutes**
- 1/100 000 (0,01 mg/ml)  
Treatment of **symptomatic teeth with pathology**  
**Apport 45-60 minutes**
- 1/80 000 (0,0125 mg/ml)  
Endodontic treatment for **irreversible pulpitis**  
**Apport 60-75 minutes**



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## 3 All anesthetics have the same effectiveness and the same power.



The dilution principle proves the opposite.

The power of the anesthesia depends first and foremost on:

- the distance separating the injection point and the intended target (apex) [12].

Then:

- the tissue (more or less loaded with water) into which the injection is delivered.
- the addition of a vasoactive agent and its concentration.
- the quantity injected.

Generally, intraosseous anesthesia is the most effective and powerful because it can be used to place the most concentrated vasoactive solution near the apices, without the risk of necrosis [5].

## 4 It is enough to inject a larger quantity in order to increase the power of an anesthesia.



When a higher quantity is injected, this helps to increase the power. However, the further the injection point moves away from the “target” (the apices), the less this increase is efficient.

Even though the increase in quantity helps somewhat to increase the power of the anesthesia, the predominant factor is still how close the injection point is to the apices [13].



## 5 In order to successfully administer inferior alveolar nerve block anesthesia, it is recommended to add additional techniques.



Even when inferior alveolar nerve block anesthesia is administered perfectly, it will fail 15 to 40% of the time according to the studies [1, 7] due to inconstant afferent nerve activity coming from the cervical plexus, the mylohyoid nerve, the digastric nerve and the lingual nerve [1]. Given that we do not know the number or the exact location of these afferent systems, it is recommended to use multiple additional techniques, in different places, to obtain the expected result [6].

The multiple and inconsistent afferent mandibular nerve systems make it difficult to predict the result of the inferior alveolar nerve block!

## 6 To successfully anesthetize a tooth with pulpitis, it is always necessary to combine different techniques.



One century ago, Nogué observed that it was difficult or even at times impossible to anesthetize inflammatory tissues (teeth with pulpitis) [8]. This observation led to the search for additional techniques including, as a last resort, intrapulpal anesthesia. This technique has given our profession a bad image and has led a large number of patients into avoiding coming to our offices; that is at least, until the next episode of pulpitis brings them back to us, even though they fear the same scenario! Understanding the dilution gradient [12] allows us to understand why an anesthesia works, why it does not work and how to increase its power. Osteocentral anesthesia (radiograph) is used to place the anesthetic near the tooth's apex in order to obtain the maximum concentration of the

active ingredient. Given that the anesthetic is placed in the centre of the bone, all nociceptive stimuli from external afferent systems (particularly in the mandible) are blocked. Therefore, it is possible to obtain the maximum power of the anesthetic at the apex with a single osteocentral injection and to overcome all anatomical variations.



Osteocentral anesthesia is used to immediately anesthetize a tooth with pulpitis for at least one hour without having to resort to the use of additional techniques, especially intrapulpal anesthesia.

**Objective:** deliver the injection close to the apices

## 7 A lingual or palatal complementary injection is not necessary, even for an extraction.



Self-biting in children or adults is due to an unnecessary side-effect of the anesthesia. Supraperiosteal infiltration, generates unnecessary anesthesia of the cheeks and lips. Inferior dental nerve block injections generate unnecessary anesthesia of the lips and tongue. The same is partially true for intraosseous anesthesia: when the anesthetic solution is placed directly into the cancellous bone, it will diffuse and pass through the cortical bone from the inside towards the outside, through Volkmann's canals. These techniques enable to anesthetize the periosteum and attached gingival tissues without a palatal complement.

A complementary palatal injection is essential with buccal supraperiosteal anesthesia but unnecessary in intraosseous anesthesia.

Conversely, if a flap is made beyond the mucogingival junction, an additional infiltration should be delivered into the soft tissues.



## THE WORKING PRINCIPLES OF ANESTHESIA

### 8 Self-biting in children and adults can be avoided.



Self-biting in children or adults is an unnecessary side effect of the anesthesia. For a suprapariosteal infiltration, it's the unnecessary anesthesia of the cheeks and lips. For a mandibular nerve block injection, it is the unnecessary anesthesia of the lips and tongue. This can be avoided either by injecting phentolamine [13], which inhibits the action of the vasoactive agent after the clinical procedure, or by replacing the suprapariosteal infiltration and/or inferior alveolar nerve block anesthesia with by intraosseous anesthesia which does not generate unnecessary anesthesia.



## COMMON BELIEFS

### 9 Gingival necrosis is caused by pressure.

Necrosis primarily involves the palatal and attached gingival tissues, which are dense, poorly irrigated and non-extendable tissues. During the injection, the biological fluids are flushed away and replaced by a non-biological liquid with an acidic pH, containing a vasoactive agent with a local vasoconstrictor activity. The following factors are involved in the appearance of necrosis:

- the quantity injected, which can cause a "mechanical" vasoconstriction.
- the pH of the solution, which is always acidic, between 3 and 5.5.
- the more or less powerful chemical vasoconstriction.

The injection pressure required for the anesthetic fluid to penetrate into dense tissues can be high; it does not cause any residual pressure likely to create necrosis. Otherwise, the injected liquid would come back out after the injection. Necrosis is caused by the pH and quantity of the anesthetic solution and type of tissues the product is injected into.

## COMMON BELIEFS

### 10 When performing transcortical or osteocentral anesthesia, it is possible to perforate the roots.



It would be necessary to spend a long time, while pressing hard on the needle, to penetrate the root of a tooth. Clinically, this is impossible because it would involve ignoring the patient's reaction. In the event of a wrong angulation, passing through the ligament and the heating of the area **would be painful and reported by the patient**, whereas passing through the cortical bone and the various bone trabeculations is completely painless.

### 11 A tooth with acute pulpitis is more difficult to anesthetize than a tooth with chronic pulpitis.



Acute pulpitis has a reputation of being difficult, if not impossible to anesthetize. This is more particularly true for mandibular molars with pulpitis where according to some publications [6], complete anesthesia is only possible by cumulating several techniques (inferior dental nerve block + intraligamentary + intrapulpal). Dentalhitec Academy has shown, with a clinical study on 110 cases [12], that contrary to popular belief, it may be more difficult to anesthetize a tooth with chronic pulpitis than to anesthetize a tooth with acute pulpitis.

For organizational reasons (time available in emergency consultations, clinics (sometimes significant pulp bleeding), the emergency treatment indicated in the event of pulpitis is often pulpotomy, followed by root canal treatment several days later. In the vast majority of cases, it is possible to perform a completely painless pulpotomy after an intraosseous injection of a ½ cartridge of anesthesia with a concentration of 1:100000.

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## 12 Intraosseous anesthesia can replace an inferior dental nerve block anesthesia.



Intraosseous anesthesia can be used to immediately anesthetize 2 to 8 teeth, for at least one hour, depending on the quantity and the product injected [5]. Depending on the injection point and the proximity to the alveolar nerve, if the injection is delivered between the lower 1st and 2nd molars, this anesthesia can result in 80% of cases in a moderate/superficial anesthesia of the lower lip (Vincent's sign) for one to two hours. This Vincent's sign never affects motor nerve fibres, unlike the inferior dental nerve block anesthesia.

Therefore, intraosseous anesthesia is a better alternative to inferior alveolar nerve block, due to the higher efficiency and by excluding anesthesia of the motor nerve fibres.

## 13 The choice of needle plays an important role in the performance and result of anesthesia.

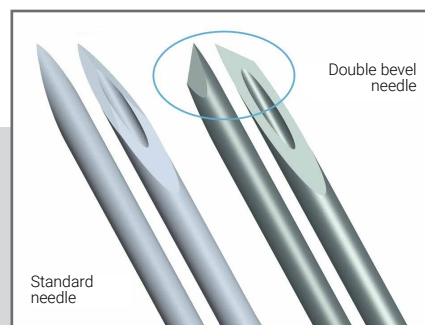


Depending on what it is used for, the needle plays a role in whether or not the injection is painful and in the success of the anesthesia. For all of the injections made, the practitioner is first confronted with the pain caused by the needle insertion.

Regular needles (triple bevel) penetrate the tissues by tearing them apart and thereby create tension that generates pain. The latest generations of needles (double bevel) cut the tissue like a scalpel. They release tension and are therefore less painful. However, these needles must be used correctly [9]:

- the double bevel, which gives the needle its blade shape (fig.), makes it possible to penetrate deeper into the ligament to solve the problem of the leaks systematically encountered when using the intraligamentary technique.
- the double bevel, when rotated, gives the needle a better perforation capacity thereby making it easier to deliver intraosseous anesthetics.
- the double bevel, combined with the increased thickness of the needle, eliminates needle deflection, the first cause of failure with inferior dental nerve blocks.

Each anesthetic technique uses a specific needle which decreases the pain during penetration and improves results.

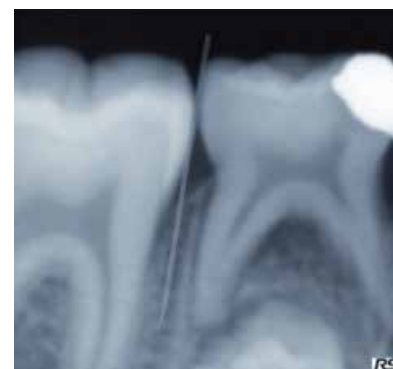


Comparison between a standard needle and a double bevel needle with a flat and cutting edge.

## 14 Intraosseous anesthesia can be performed in children.



Children, with mixed or temporary (milk) teeth, have exactly the same clinical characteristics as adults (healthy or inflammatory tissues, inter-dental spaces). The technique used in children will be exactly the same as in adults (intraosseous anesthesia and use of vasoactive agents). The only differences between adults and children are the length of the roots and the bone volume.



Intraosseous anesthetics are performed in children with 30G (30/100) needles - 9 mm long, and injecting roughly one quarter of a cartridge. The anesthesia is powerful, immediate, painless and there is no risk of self-biting [10, 11].

A 9 mm needle used in children to place the anesthetic near the apices

## 15 Patients prefer intraosseous anesthetics to inferior dental nerve blocks or infiltrations.



This is what was found in a split mouth design study performed in Spain at the University of Valencia in 2008 [2]: 67.9% of patients preferred transcortical anesthesia, because of the effectiveness and the comfort it provided (no collateral numbness or self-biting), compared to 10.7% for conventional anesthetics).

In addition to the benefits for the dental practitioner, this study shows that, when patients are given the choice, they prefer intraosseous anesthesia.

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