

The complications of local analgesia

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Complications and untoward reactions of local analgesia

General complications

- toxic reactions /overdosage/
- Side effect of adrenaline
- allergic /anaphylactic/ reactions

Local complications

- haematoma formation
- nerve injury
- trismus /limited mouth opening/
- facial paralysis
- injury of soft tissues

The aetiology of complications of local analgesia

General complications:

due to the anaesthetic solution

Local complications:

due to the technique

General complications

Toxic reactions /overdosage/

Side effect of adrenaline

Allergic /anaphylactic/ reactions

Local anaesthetic solution =

1. anaesthetic agent

2. vasoconstrictor

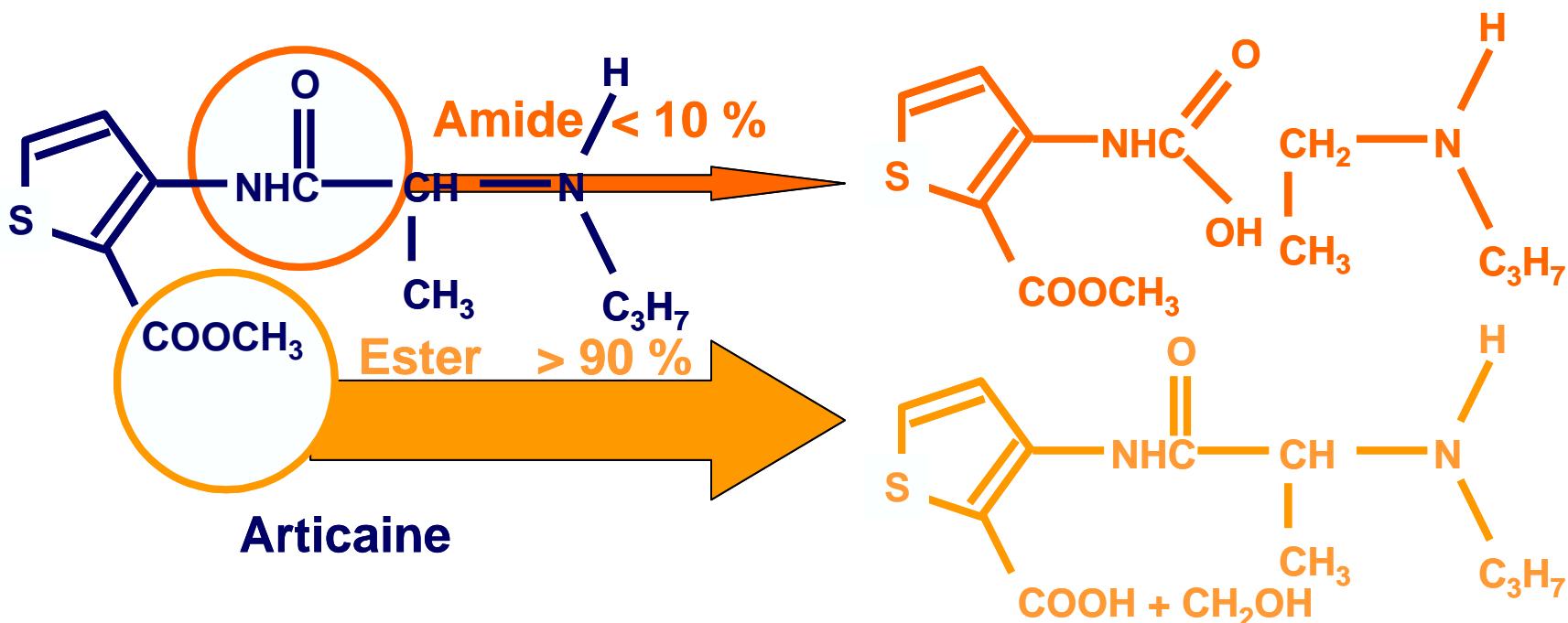
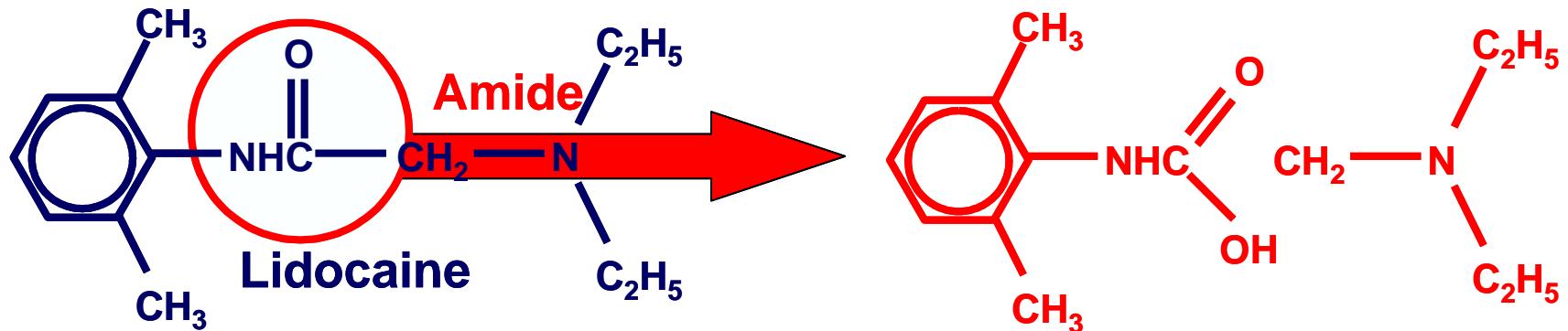
3. preservative

The pharmacological properties of local anaesthetics

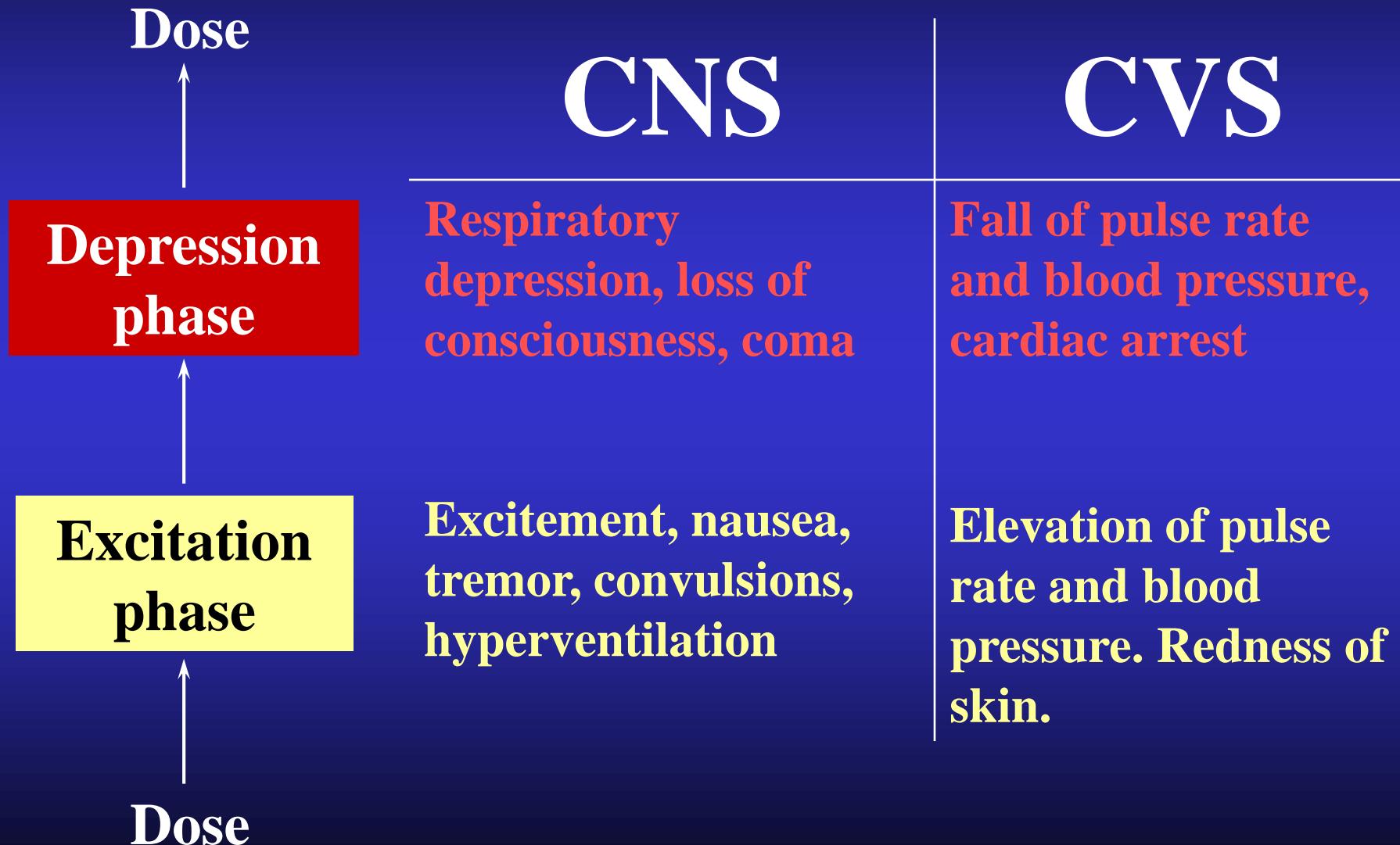
Toxicity

- Therapeutical ratio = $\frac{\text{LD}_{50}}{\text{ED}_{50}}$
$$\frac{\text{lethal dosage}}{\text{effective dosage}}$$
- Depends on the metabolism
of the local anaesthetic agent

The metabolism of Lidocaine and Articaine



The symptoms of overdosage of local anaesthetic agents



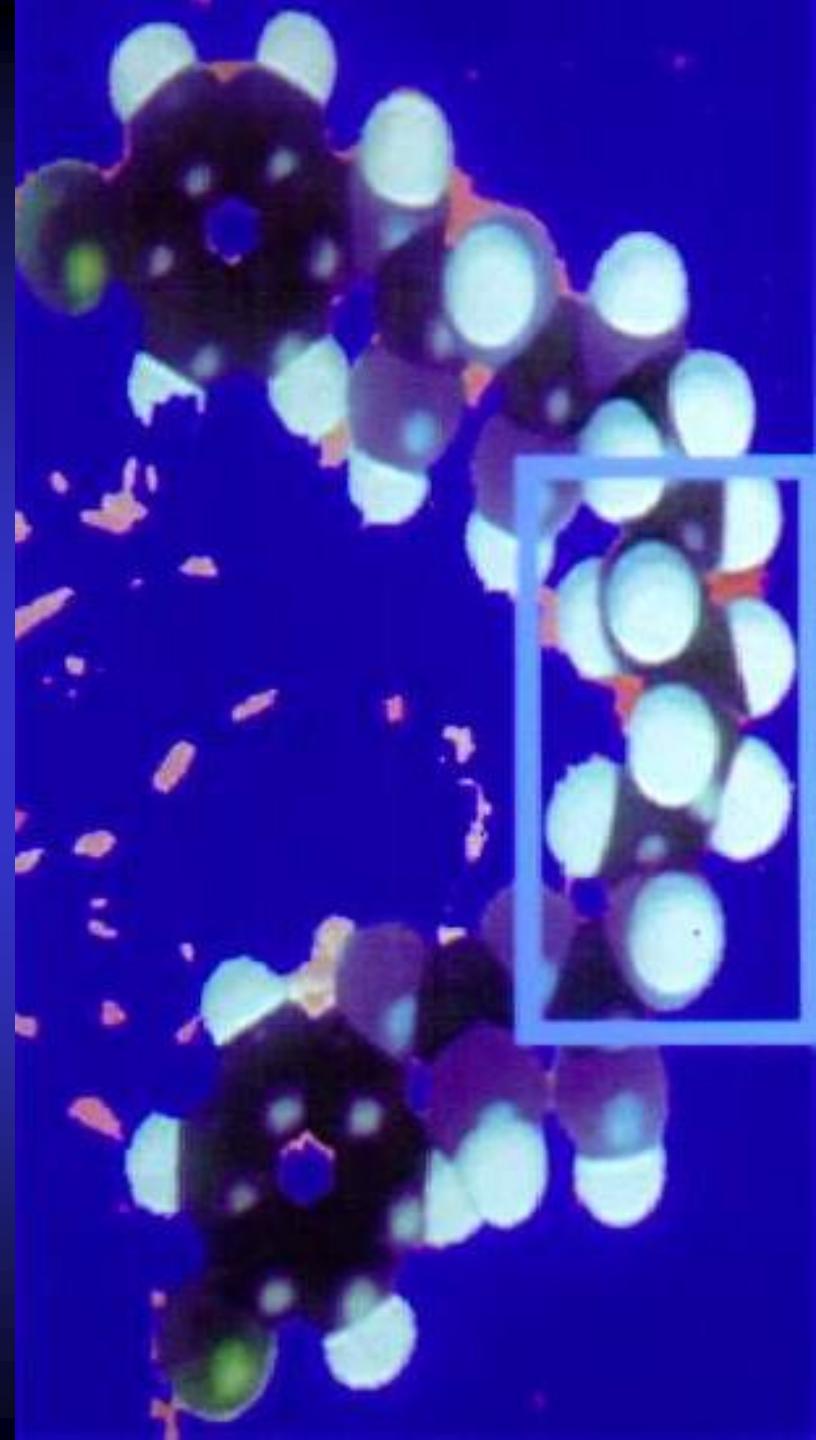
The comparison of local anaesthetics

	Articaine	Lidocaine	Bupivacaine
Relative toxicity /procaine = 1/	1,5	2	8
Therapeutical ratio	3,3	2	2
Plasma half time	20 min	96 min	162 min
Recommended maximum dosage /70 kg/ with Adrenaline	500 mg	300-500 mg	90 mg

PROTEIN-BINDING OF LOCAL ANAESTHETICS

(%)

LIDOCAINE	64
ARTICAINE	95
BUPIVACAINE	96



The advantages of high protein-binding of local anaesthetics

- In pregnancy, less anaesthetic enters into the foetal circulation
- Less CVS and CNS risks

Lidocaine 2% c. Adr.

/local anaesthetic solution/

Anaesthetic agent: lidocainum hydrochloricum 20 mg/ ml

Maximum dose: 7 mg/ kg ~ 500 mg

20 ml ~ 10 Ampulla

Vasoconstrictor: epinephrinum /adrenaline/ 1 : 100000
0,01 mg/ ml

Maximum dose: 0,20 mg

Ultracaine 4% DS forte

/local anaesthetic solution/

Anaesthetic agent: articainum hydrochloricum 40 mg/ ml

Maximum dose: 7 mg/ kg ~ 500 mg

12,5 ml ~ 6 Ampulla

Vasoconstrictor: epinephrinum /adrenaline/ 1 : 100000
0,01 mg/ ml

Maximum dose: 0,20 mg

General complications

Toxic reactions /overdosage/

Side effect of adrenaline

Allergic /anaphylactic/ reactions

Receptor stimulation of adrenaline

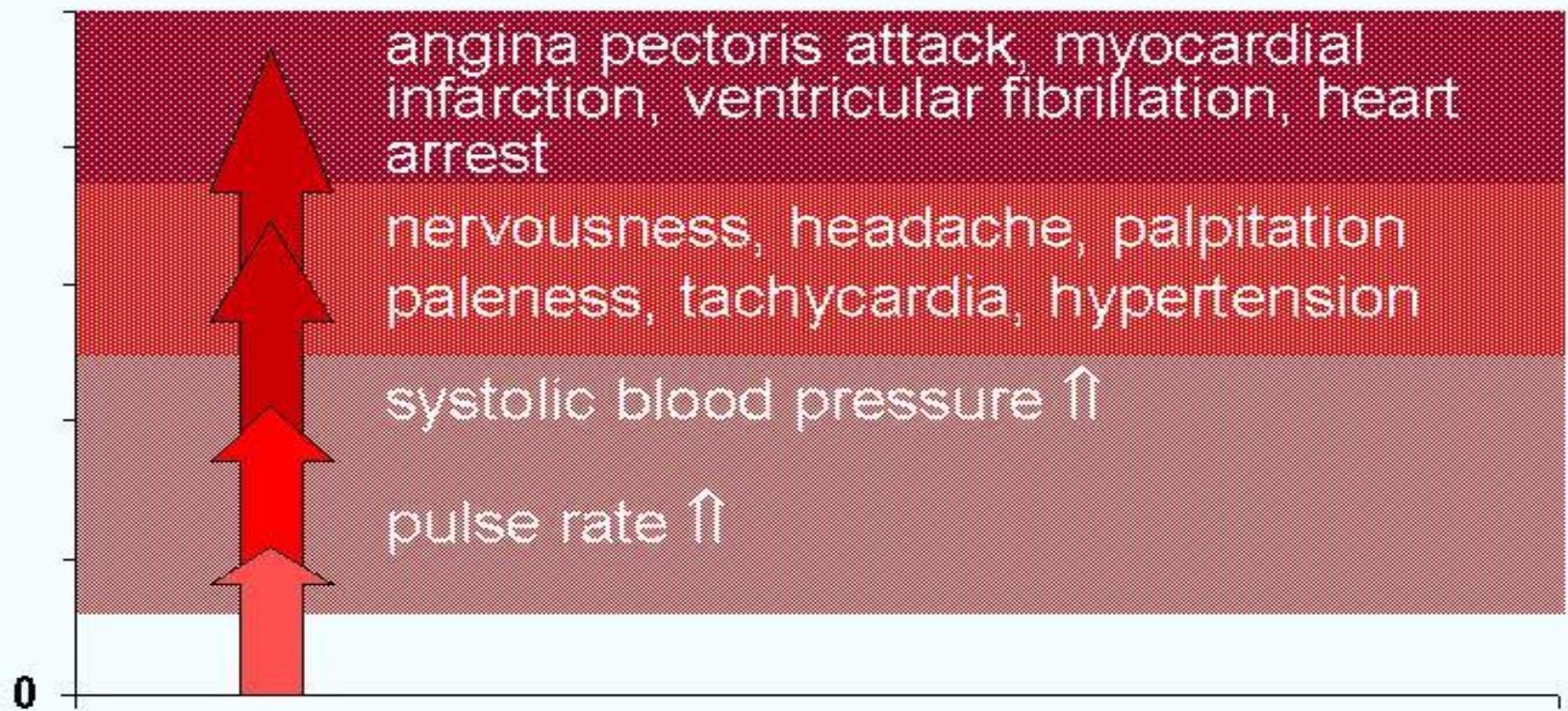
(i.v. application)

1-2	μg / min	Beta-1 and Beta-2-stimulation
2-10	μg / min	Alpha, Beta stimulation
10-20	μg / min	Alpha stimulation

Maximum dose: 0.20-0.25 mg/s.c./

The symptoms of overdosage of adrenaline

Dose



The concentration of Adrenaline in local anaesthetics

1 : 50.000

1 : 80.000

1 : 100.000

1 : 200.000

The maximum doses of Adrenaline in local anaesthetic solutions/0.2mg/

ADRENALINE		MAXIMUM DOSE		
CONCENTRATION	mg/ml	mg	ml	Cartridge/1.7ml/
1 : 50,000	0.02	0.2	10	5½
1 : 100,000	0.01	0.2	20	11
1 : 200,000	0.005	0.2	40	22

Lidocaine containing local anaesthetic solutions in Europe */not complete/*

Manufacturer	Proprietary name	Anaesthetic concentration	Vasoconstrictor concentration (Adrenaline)
Astra Chemicals GmbH	Xylocain 2% Adrenaline	2%	1:100 000
	Xylocain 2% Spezial Adrenaline	2%	1: 50 000
ESPE GmbH	Xylestesin-A	2%	1: 80 000
	Xylestesin cento	2%	1:100 000
	Xylestesin-S „special”	2%	1: 50 000

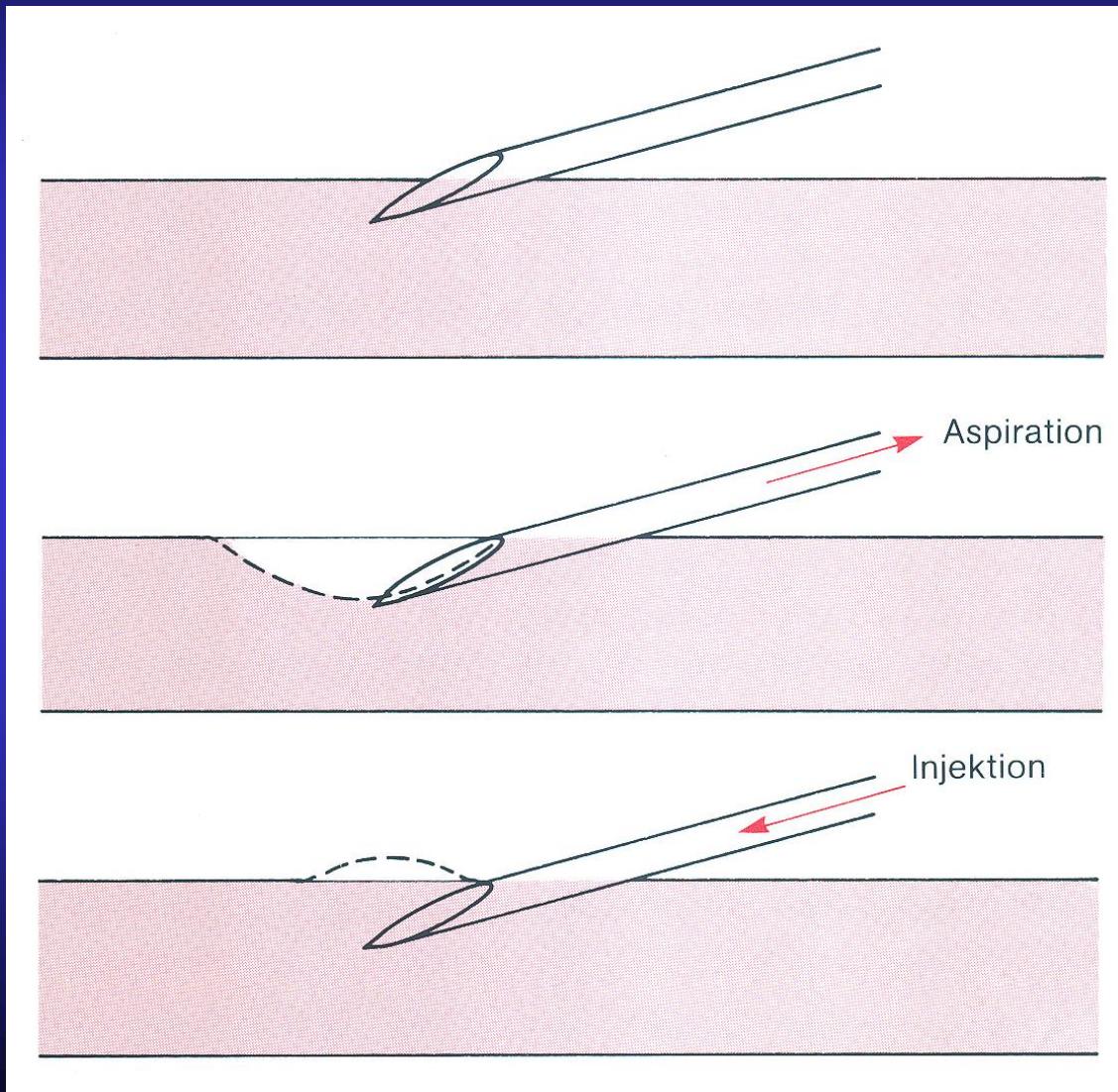
Articaine containing local anaesthetic solutions in Europe

Manufacturer	Proprietary name	Anaesthetic concentration	Vasoconstrictor concentration (Adrenaline)
ESPE GmbH	Ubistesin	4%	1:200 000
	Ubistesin forte	4%	1:100 000
Hoechst AG	Ultracain D-S	4%	1:200 000
	Ultracain D-S forte	4%	1:100 000

Aspirating syringe equipment



The possible cause of intravasal injection at negative aspiration-test



General complications

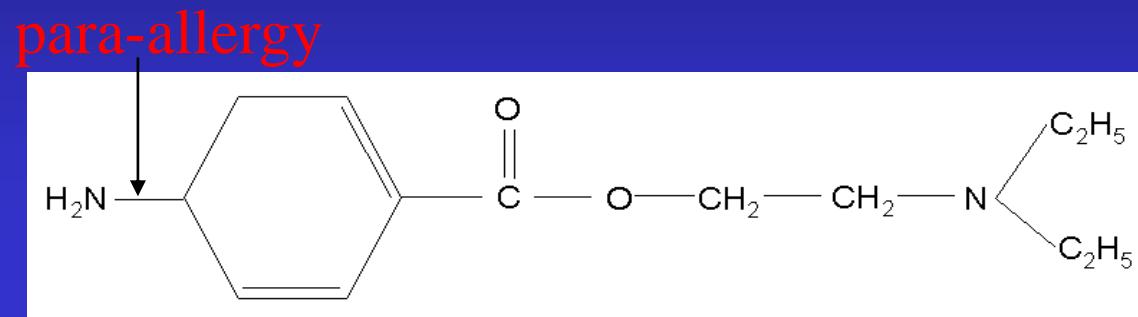
Toxic reactions /overdosage/

Untoward reactions of adrenaline

Allergic /anaphylactic/ reactions

The incidence of allergic responses to local anaesthetic agents

Procaine



Articaine – Lidocaine

Bupivacaine

Local anaesthetic solution =

1. anaesthetic agent

2. vasoconstrictor

3. preservative

Preservative agents in the local anaesthetic solutions

- Methylparaben: antimicrobial effect – allergic reactions
- Sodium metabisulfite: reducing agent – protects the stability of adrenaline – allergic reactions at asthmatic patients

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- hyperthyroidism
- hepatic insufficiency
- polyallergy
- pregnancy
- anxiety from the dental treatment

„Risk-patients” regarding to local analgesia

- **cardiovascular diseases**
- Acute myocardial infarction
- Cardial decompensation

The advantages of high protein-binding of local anaesthetics

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- Less CVS and CNS risks

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- **hyperthyroidism**

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- hyperthyroidism
- **hepatic insufficiency**

Hepatic insufficiency: reduced metabolism of amid type of local anaesthetics

- Hypoproteinaemia: alcoholic disease, malnutrition, malabsorption, nephrosis-syndrome, enteropathia

Repeated doses are to avoid!

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- hyperthyroidism
- diabetes
- hepatic insufficiency
- **polyallergy**

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- hyperthyroidism
- diabetes
- hepatic insufficiency
- polyallergy
- **pregnancy**

„Risk-patients” regarding to local analgesia

- cardiovascular diseases
- hyperthyroidism
- diabetes
- hepatic insufficiency
- polyallergy
- pregnancy
- **anxiety from the dental treatment**

The comparison of the amounts of adrenaline given at dental treatment, and the catecholamines secreting in the adrenal medulla:

Dental treatment:

4 ml Lidocaine c. Adr. = 0,04 mg

„Stress” situation; pain, anxiety:

Adrenal medulla = cca. 0,30 mg/min.

Local complications

Haematoma formation

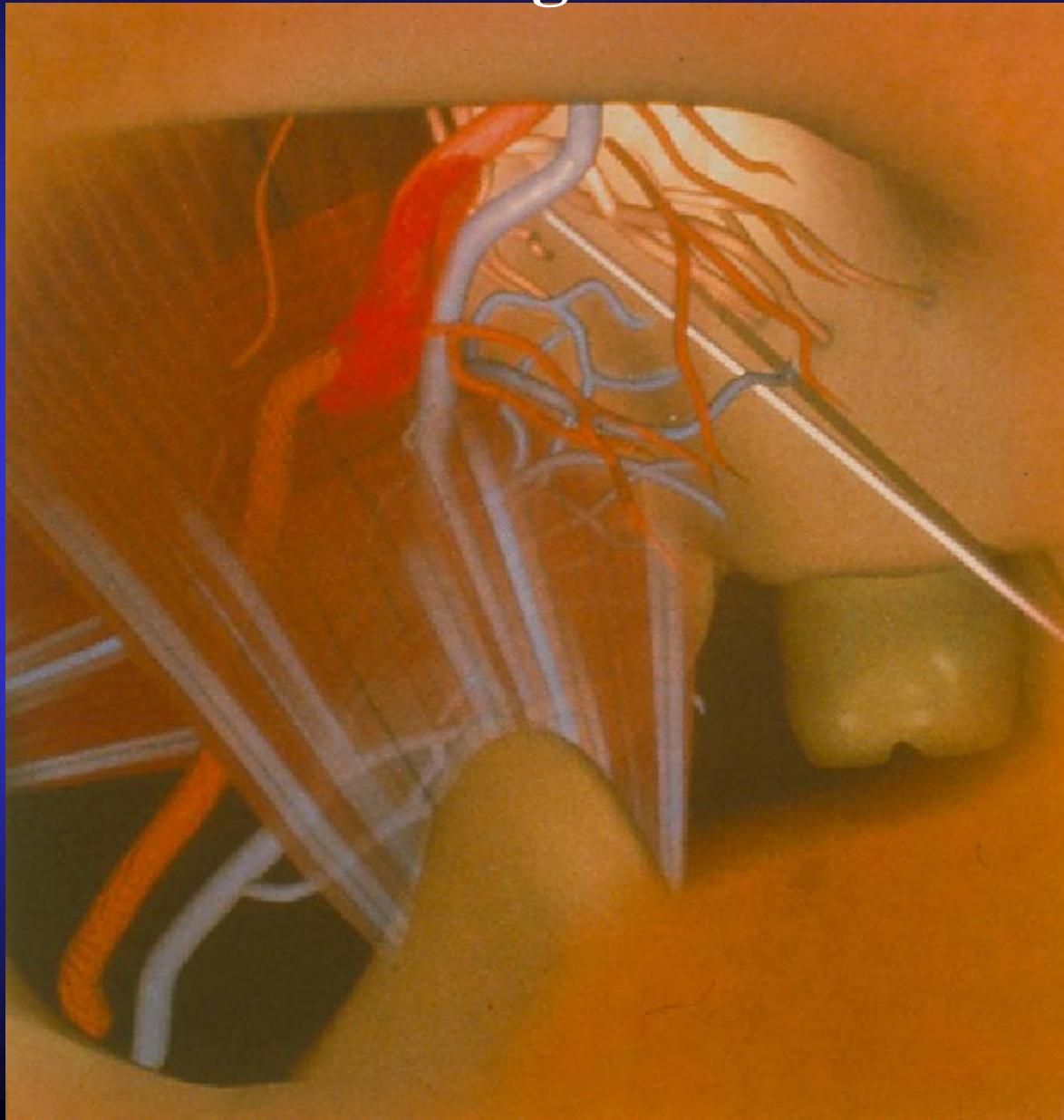
Nerve injury

Trismus /limited mouth opening/

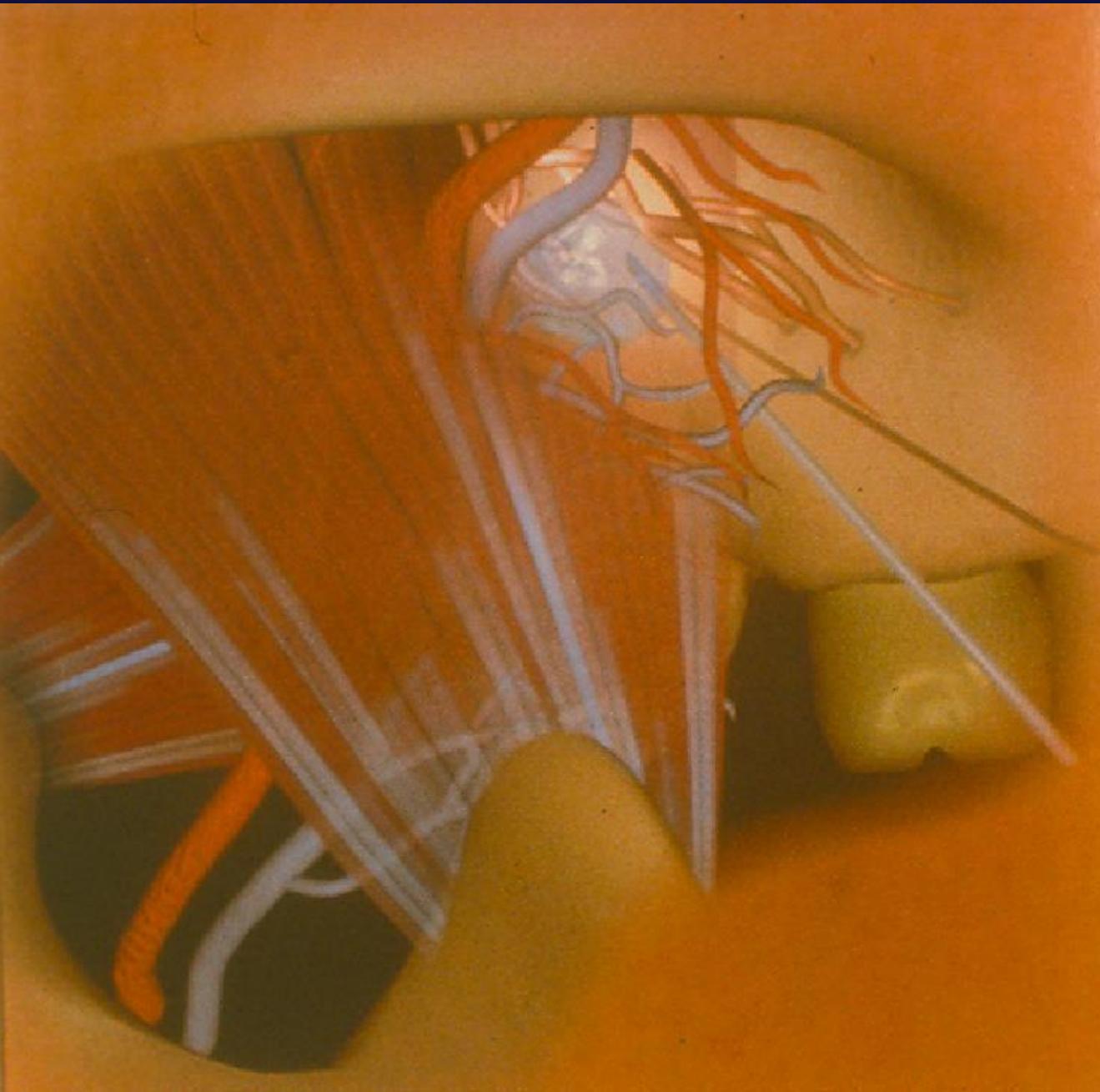
Facial paralysis

Injury of soft tissues

The position of needle and blood vessels at tuberal analgesia



Haematoma formation at tuberal analgesia



Local complications

Haematoma formation

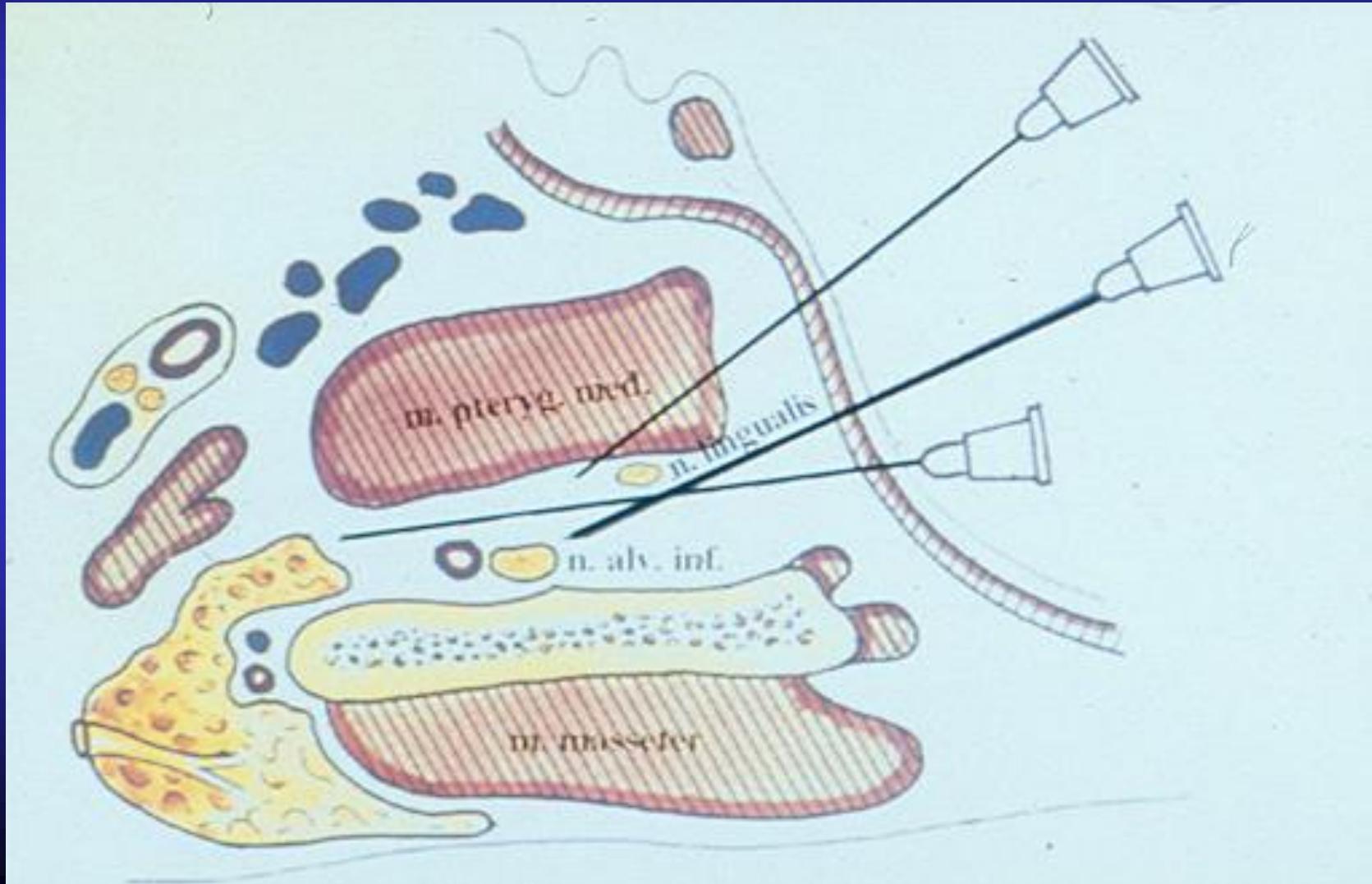
Nerve injury

Trismus /limited mouth opening/

Facial paralysis

Injury of soft tissues

THE DIFFERENT POSITIONS OF THE NEEDLE AT THE NERVE BLOCK ANALGESIA OF THE INFERIOR ALVEOLAR NERVE



Local complications

Haematoma formation

Nerve injury

Trismus /limited mouth opening/

Facial paralysis

Injury of soft tissues

**Transitory facial
palsy on the left side
after mandibular
nerve-block
analgesia**



Local complications

Haematoma formation

Nerve injury

Trismus /limited mouth opening/

Facial paralysis

Injury of soft tissues

TRAUMATIC ULCERATION DUE TO LOCAL ANALGESIA



Necrosis on the hard palate after infiltration analgesia



Thank you for your attention!