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Toxicity of Acrylic Reline Resins submitted to Salivary Esterase

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INTRODUCTION

Acrylic reline resins are usually use to readapt removable dentures to the underlying tissues. As they show a low conversion monomer-polymer, residual monomers can be leached to the oral cavity causing toxicological effects. It is suggested that salivary esterases can readily cleave the methacrylate-based monomers, since they have ester groups, and promote the formation of methacrylic acid, a potential toxic by-product.

OBJECTIVES

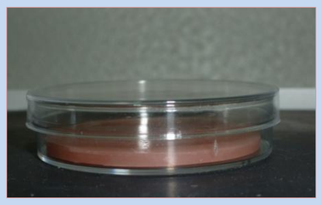
In vitro evaluation of the effect of salivary acetylcholinesterase (AChE) on the toxicity of acrylic reline resins through a cellular viability assay and quantification of potential toxic leachable compounds.

MATERIALS AND METHODS

Preparation of the eluates

Resin disk-shaped specimens
50 x2 mm

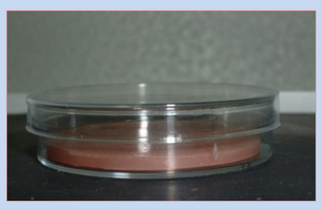
Control Group *n*=3



Imersion on 5 mL of Dulbecco´s Modified Eagle´s Medium (DMEM)

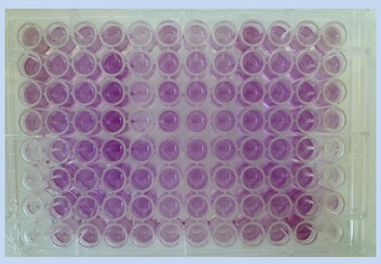
37ºC, 72 h

Experimental Group *n*=3

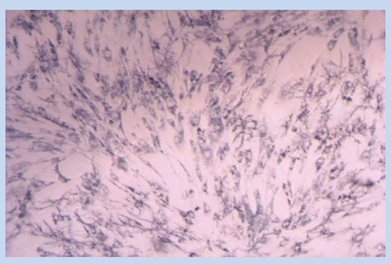


Imersion on 5 mL DMEM + [AChE] 5 U/mL

Cellular Viability Assay (MTT) of the eluates



3-(4,5-dimethyltiazol-2-yl)-2,5-diphenyl-*2H*-tetrazolium bromide (MTT) in Human Adult Dermal Fibroblast Cells (Zen-Bio. Inc)



Quantification of leached compounds on eluates using HPLC High-Performance Liquid Chromatography (24, 48, 72 h)

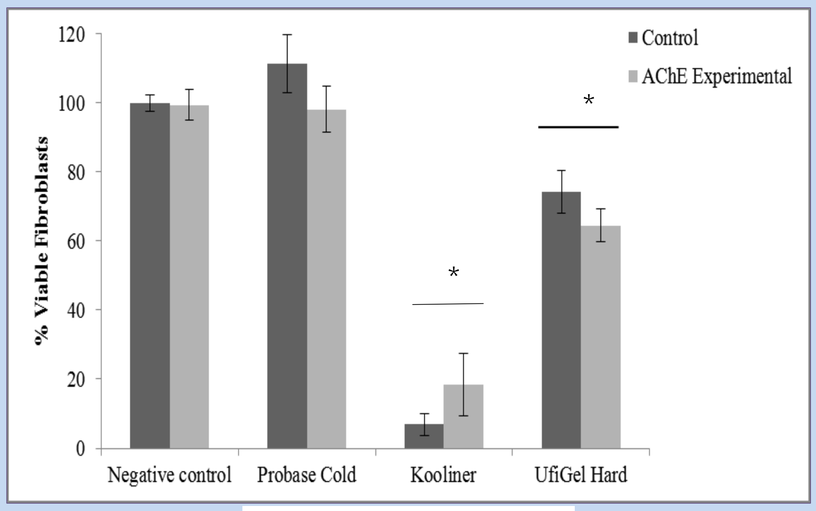
Materials eluates	Residual monomers	Degradation by-product
Probase Cold (Ivoclar Vivadent)	Methylmethacrylate **MMA**	Methacrylic Acid **MA**
Kooliner (GC Corporation)	Isobutylmethacrylate **IBMA**	Methacrylic Acid **MA**
Ufi Gel Hard (Voco GmbH)	1,6-Hexanedioldimethacrylate **HDMA**	Methacrylic Acid **MA**

RESULTS

MTT

Control group
- Probase Cold: non-cytotoxic (no reduction of the cellular viability).
- Kooliner: severely cytotoxic (reduction of 90% of cellular viability).
- Ufi Gel Hard: slightly cytotoxic (reduction of almost 30% of cellular viability).

Experimental group
- Probase Cold: no differences compared to control group.
- Kooliner and Ufi Gel Hard: minor differences compared to control group.



* Mann-Whitney test; $p<0.05$

HPLC quantification

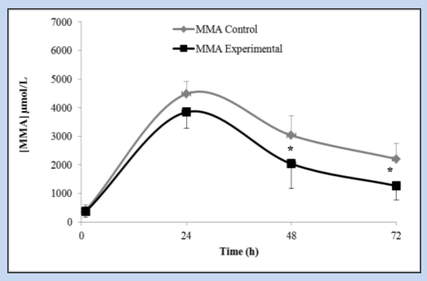
Probase Cold
- MMA: lower release in experimental group.
- MA: higher release in experimental group.

Kooliner
- IBMA: no differences between groups.
- MA: **not detected** in control group but present in experimental group.

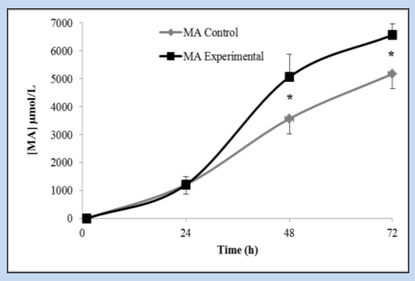
Ufi Gel Hard
- HDMA: no differences between groups.
- MA: higher release in experimental group.

Probase Cold

MMA

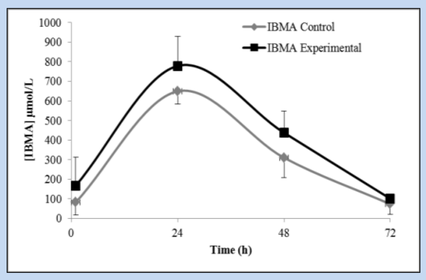


MA

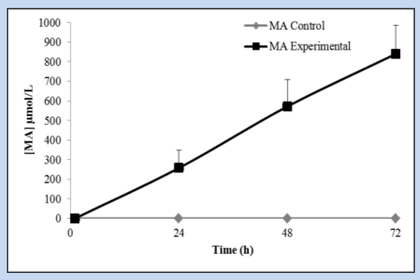


Kooliner

IBMA

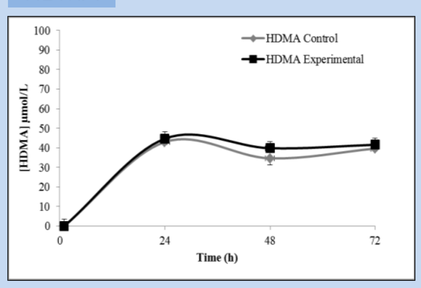


MA

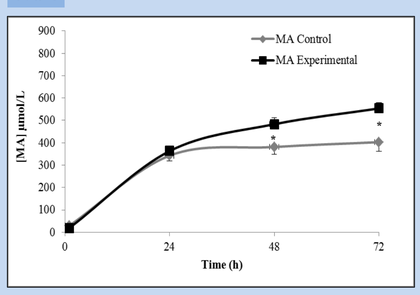


Ufi Gel Hard

HDMA



MA



CONCLUSIONS

- No effect was detected on the viability study since AChE didn´t change the level of cytotoxicity of the materials.
- AChE effect on the hydrolysis of residual monomers depended on their chemical composition.
- The level of cytotoxicity of each material can not be influenced only by the concentration of the compounds quantified.

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