

**THE EFFECT OF DIFFERENT CURING  
TIME ON CYTOTOXICITY AND  
SOLUBILITY OF RESIN MODIFIED  
CALCIUM CONTAINING PULP CAPING  
MATERIAL**

Thesis submitted to Operative Dentistry Department, Faculty of  
Dentistry, Ain shams University, in partial fulfillment of the  
requirements of the Master degree in Operative Dentistry

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## ***DEDICATION***

*This thesis was dedicated to:*

*My husband, my parents, my brothers and my sisters for  
their endless love, help, support and encouragement.*

*My lovely sons*

## ***ACKNOWLEDGEMENT***

*First of all, I thank **Allah** for his great support in accomplishing this work.*

*I would like to express my thanks to **Prof. Dr. Moktar Nagy Ibrahim**, professor of operative Dentistry, Faculty of dentistry Ain Shams University, for his guidance, kind supervision, and valuable advice, and continuous encouragement.*

*I would like to express my thanks to **Pro. Dr. Omima Hassan Ghallab** professor of operative Dentistry, Faculty of dentistry Ain Shams University, for her support and guidance*

*I would also like to express my thanks to **Dr. Zainab Mohammed Diao Eldin** Lecturer of Operative Dentistry faculty of Dentistry Ain Shams University for her valuable guidance.*

*I would like to express my thanks to **Dr. Laila Rashed** biochemistry department, Cairo University, for her work in cytotoxicity testing.*

*Finally, thanks to all staff members of Operative department, Faculty of dentistry, Ain Shams University.*

# ***CONTENTS***



List of Tables.....	ii
List of Figures.....	iii
Introduction.....	1
Review of literature.....	3
Aim of study.....	31
Materials and Methods.....	32
Results.....	44
Discussion.....	53
Summary and Conclusions.....	62
References.....	65
Arabic Summary.....	

## LIST OF TABLES

<b>Table No.</b>	<b>Titles</b>	<b>Page</b>
<b>1</b>	<i>Materials, composition, manufacture and lot number:</i>	<b>32</b>
<b>2</b>	<i>Cytotoxicity test.</i>	<b>33</b>
<b>3</b>	<i>Solubility test.</i>	<b>34</b>
<b>4</b>	<i>Mean and standard deviation (SD) values of solubility of light cured resin modified calcium silicate specimens at different curing times.</i>	<b>45</b>
<b>5</b>	<i>Mean and standard deviation (SD) values of water sorption of light cured resin modified calcium silicate specimens at different curing times.</i>	<b>46</b>
<b>6</b>	<i>Mean and standard deviation (SD) values of viability of light cured resin modified calcium silicate specimens at different curing times:</i>	<b>48</b>
<b>7</b>	<i>Person 's correlation between solubility, water sorption ,and viability of theracal cured at different curing times.</i>	<b>50</b>

## LIST OF FIGURES

<b>Figure No.</b>	<b>Titles</b>	<b>Page</b>
<b>1</b>	<i>TheraCal (light cured resin modified calcium silicate)</i>	<b>35</b>
<b>2</b>	<i>Teflon mold with dimension of (8x1)mm</i>	<b>35</b>
<b>3</b>	<i>The mold was filled with Theracal. (light cured resin modified calcium silicate)</i>	<b>35</b>
<b>4</b>	<i>Light curing of the specimen</i>	<b>35</b>
<b>5</b>	<i>The elute of light cured resin modified calcium silicate material (Theracal) in a sterile tube</i>	<b>37</b>
<b>6</b>	<i>Air filtered Laminar Flow safety cabinet</i>	<b>40</b>
<b>7</b>	<i>Electrical balance with 4 digits for weighing the specimens</i>	<b>42</b>
<b>8</b>	<i>Desiccator with anhydrous self-indicating silica gel</i>	<b>42</b>
<b>9</b>	<i>Bar chart showing solubility mean values of light cured resin modified calcium silicate at different curing times.</i>	<b>45</b>
<b>10</b>	<i>Bar chart showing water sorption mean values of light cured resin modified calcium silicate at different curing times.</i>	<b>47</b>
<b>11</b>	<i>Bar chart showing Viability mean values of light cured resin modified calcium silicate at different curing times.</i>	<b>48</b>

<b>Figure No.</b>	<b>Titles</b>	<b>Page</b>
<b>12</b>	<i>An inverted microscope photomicrograph of Human dental pulp stem cells (HDPSCs) showing normal cells have not exposed to material elutes.</i>	<b>51</b>
<b>13</b>	<i>An inverted microscope photomicrograph of HDPSCs were exposed to elutes of light cured resin modified calcium silicate that cured at 20 seconds.</i>	<b>51</b>
<b>14</b>	<i>An inverted microscope photomicrograph of HDPSCs were exposed to elutes of light cured resin modified calcium silicate that were cured at 15 seconds.</i>	<b>52</b>
<b>15</b>	<i>An inverted microscope photomicrograph of HDPSCs were exposed to elutes of light cured resin modified calcium silicate that were cured at 10 second.</i>	<b>52</b>

# ***INTRODUCTION***

The main purpose of restorative dentistry is to restore and maintain tooth health, and preserve pulp vitality by adequate restorative treatment. Vital pulp tissue supports the long-term function of a tooth by contributing to the production of secondary dentin, peritubular dentin, and reparative dentin when biologic and pathologic stimuli are introduced<sup>(69)</sup>. Pulp capping involves the application of specific biomaterial between the pulp and restorative material in order to maintain pulp vitality, promote pulp healing and formation of reparative dentin <sup>(71)</sup>.

Calcium silicate-based materials were introduced by Dr. Torabinejad in 1995 <sup>(41)</sup> as gray ProRoot MTA. They are hydrophilic materials which form calcium-silicate-hydrate gel and calcium hydroxide. These materials have high rate of ion release which depended on material hydration resulting apatite formation, and dentin bridge formation with lesser pulpal necrosis, and lesser inflammation. Due to these properties, the material was used as pulp capping material.

Unfortunately, the materials have a prolonged setting time <sup>(16)</sup>. And the solubility of these water-based materials depends on water-to-liquid ratio <sup>(41)</sup>. Soluble pulp capping material could leave a space, which will prevent the permanent seal leading to bacterial leakage and finally pulp death.

TheraCal (light cured resin modified calcium silicate) is MTA based that creates a new category of resin modified calcium silicates which

designed to release calcium ions to promote dentin bridge formation, with advantages of: good sealing, moisture tolerance so less solubility, controlled curing time, and easy application <sup>(43)</sup>.

Water sorption of Theracal mainly depends on the monomer formulation, the hydrophilic monomers in TheraCal allows uptake of water, that involved for the hydration reaction of the calcium silicate in Theracal to form calcium hydroxide and calcium silicate hydrogel <sup>(50)</sup>.

Resin based materials are characterized by a degree of cytotoxicity due to their resin content, the cytotoxic behavior is of prime importance because there materials are placed in direct contact with pulp cells <sup>(73)</sup>. The setting reaction of these resin materials depends on polymerization process, and the curing time will affect the polymerization reactions and the amount of residual monomer, which will affect the cytotoxic behavior and the solubility and water sorption of the material. So this study was aimed to evaluate the effect of different curing times on the solubility and cytotoxicity of resin based calcium containing material.