## DISCUSSION AND CONCLUSION

In this study, the cytotoxicity of substances released from polymerized commercial CA was investigated since this adhesive has been used by patients to repair broken acrylic dentures. Of concern was that toxic substances may be released that may be harmful to the mucosal tissue.

CA has been used as a tissue adhesive in surgery, for repairing wounds and to stop bleeding, but problems have been associated with CA derivatives due to the histotoxic effect on tissue. CA polymer has been shown to degrade to formaldehyde and cyanoacetate compounds which can accumulate in the treated area[13]. There is some evidence which shows that the formaldehyde released from CA is toxic to cells both in vitro and in vivo[14]. Also, with the higher release of isobutanol than formaldehyde as a consequence of in vitro degradation,of isobutyl CA[15], the degradation rate was decreased with increasing alkyl chain length from methyl-,ethyl-,isobutyl-, to isohexylcyanoacrylate particles[16]. Hence, there is a slower degradation process releasing fewer toxic byproducts per unit of time with the longer alkyl chain molecules compared with the faster rate with the shorter alkyl chain molecules.

In this study, filter paper was used as the vehicle for the adhesive to avoid direct cell contact with the adhesive, since, when CA sets, it produces heat which may be harmful to the cell culture. Testing the cytotoxicity of wax-coated filter paper was done to confirm that paper when floated above the cells did not harm the cell culture system, with the filter paper being cut smaller than the diameter of each well of the culture multiwell dish. As a model, this system can investigate substances released from adhesives with time more conveniently and reliably by using the MTT test and crystal violet staining for testing the viability of cells. The total number of cells remaining corresponds to that following exposure to substances released from polymerized CA that were toxic to the oral fibroblasts. Crystal violet staining is a simple, rapid method used to measure the cytotoxicity of CA adhesives incubated with the media for various periods of time.

The results showed that, even though their cytotoxicity were reduced considerably after incubation with the media for 24 hours, they still released substances that are cytotoxic for at least 2 weeks. This also corresponds with the oral fibroblasts that were subcultured in the dish which had the CA-coated filter paper attached, which developed an inhibitory zone around the CA-coated paper where there no cells appeared to survive, although the distance around the CA-coated filter paper was reduced somewhat with time. There was still reduced zone of inhibition at 2 weeks.

The standard CA that was used to compare cytotoxicity with the commercial CA adhesive is a mixture of ethyl and methyl CA ester, which was the short chain alkyl group of CA. The standard CA's degradation rate is fast and its cytotoxicity is not significantly different from the three commercial CAs, although the standard CA gave a lower percentage of optical density as the control compared to the commercial CAs in the crystal violet staining test.It can be concluded that if this adhesive is used for repair of broken dentures it wil release substances which are toxic to human oral fibroblast cells and these may persist for at least 2 weeks. However this study reflects only in vitro cytotoxicity testing using a cell culture system and suggested only that this commercial adhesive released cytotoxic substances for some time, however the harmful effects of this material on the human system are not conclusive.