



Fibrous Protein: A Case Study of Regeneration of Damaged Thumb Nail

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KEYWORDS :

Introduction:

Fibrous proteins also called sclero-proteins can be sub-divided into three main groups: Collagen, Elastin and Keratin. Finger or toe nails as well as hair and skin are classified as Keratins, whose main functions include formation of structural units for various living tissue (1,2,3,4,5,6).

The keratins are the typical intermediate filament proteins of epithelia, showing an outstanding degree of molecular diversity. As part of the epithelial cytoskeleton, keratins are important for the mechanical stability and integrity of epithelial cells and tissues (7,8)

This paper describes a case study of a thumb nail that was damaged by an accident involving a car door and the subjects' thumb in the month of June, 2015. A subsequent follow up study on the regeneration of the damaged Keratin tissue was carried out for the months of July to October, 2015.

Materials and Methods:

The subject was a 58 year old adult male of good health from Western Kenya. He accidentally hurt his left thumb nail by banging the car door in June 2015. It was initially very painful, but with time the pain subsided. The damage became evident a few days afterwards, characterized by a dark (black) spot that may have emanated from a blood clot at the base (root) of the thumb nail. The subject did not seek medical treatment. Nothing was done to try and remove the blood clot because of its precarious position below the thumb nail. Since no further pain was being experienced, only subsequent monitoring of the thumb nail was carried out. Cell phone pictures of the progress were taken on a monthly basis (June to October, 2015) to show the progress. No measurements were done.

Progress was monitored until the clot was eventually eliminated naturally at the top of the thumb nail following regular cutting and manicure of the nail in the month of October, 2015.

Results:

Pictures of the blood clot and general appearance of the thumb nail are shown in figure 1. Subsequent monitoring showed gradual movement upwards of the clot as the thumb nail, which is keratinous, grew (Figures 2, 3). On performance of daily chores such as cleaning followed by washing of the hands, part of the damaged thumb nail on the upper epithelial part peeled off leading to almost complete replacement of the thumb nail with a new one. (Figures 4, 5).

The final stages showed a totally replaced new thumb nail with no trace of the clot left behind. (Figure 6).

Discussion:

Progress in the regeneration of keratin as exhibited by the thumb nail confirmed the expected pattern of growth of Keratins as fibrous proteins. The period of study was about 5 months for complete replacement of the damaged tissue. This study agrees with similar observations carried out locally and internationally (7, 9). Details on general behavior of keratins under different experimental conditions has been given elsewhere (7). One of the discoveries was the finding of the spontaneous self-assembly and polymerization of keratin filaments from denatured, soluble keratin proteins by dialysis in vitro

The observation confirms that keratin can undergo regeneration unlike Elastin (4,5) whose maximum growth occurs between the ages of

12 to 13 years, beyond which no more is produced. Damage to Elastin would therefore be permanent.

It should be noted that this observation involved damage to the thumb nail involving a blood clot beneath the nail, unlike a similar observation that may be due to nail varnish that may also show progress of nail growth but does not show progress of damaged tissue below the finger nail.

Figure 1. June, 2015



Figure 2 June, 2015



Figure 3 July, 2015



Figure 4, August 2015



Figure 5, September, 2015



Figure 6, October, 2015



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