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TECHNICAL BULLETIN

CLEANING PERFORMANCE OF ICX RESTORE™ DENTAL UNIT WATERLINE SHOCK TREATMENT

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BACKGROUND

Due to impurities in water supplied to dental units and environmental contaminants, deposits naturally develop and adhere on surfaces within dental unit waterline (DUWL) systems. Narrow dental waterline tubing diameters, relatively low flow rates, periods of no flow (such as overnight, weekends, and operatory downtime periods during the workday), and long lengths of the tubing all create conditions that promote this buildup over time if left uncleaned. Buildup of inorganic and organic impurities, proteins, lipids, polysaccharides, and other macromolecules can slow flow or produce a blockage in water delivery as well as create sites for further aggregation of contaminants. Additionally, contamination buildup that is not cleaned may hinder the effectiveness of daily waterline treatment products like A-dec's ICX tablets and lead to inconsistent dental unit water quality.

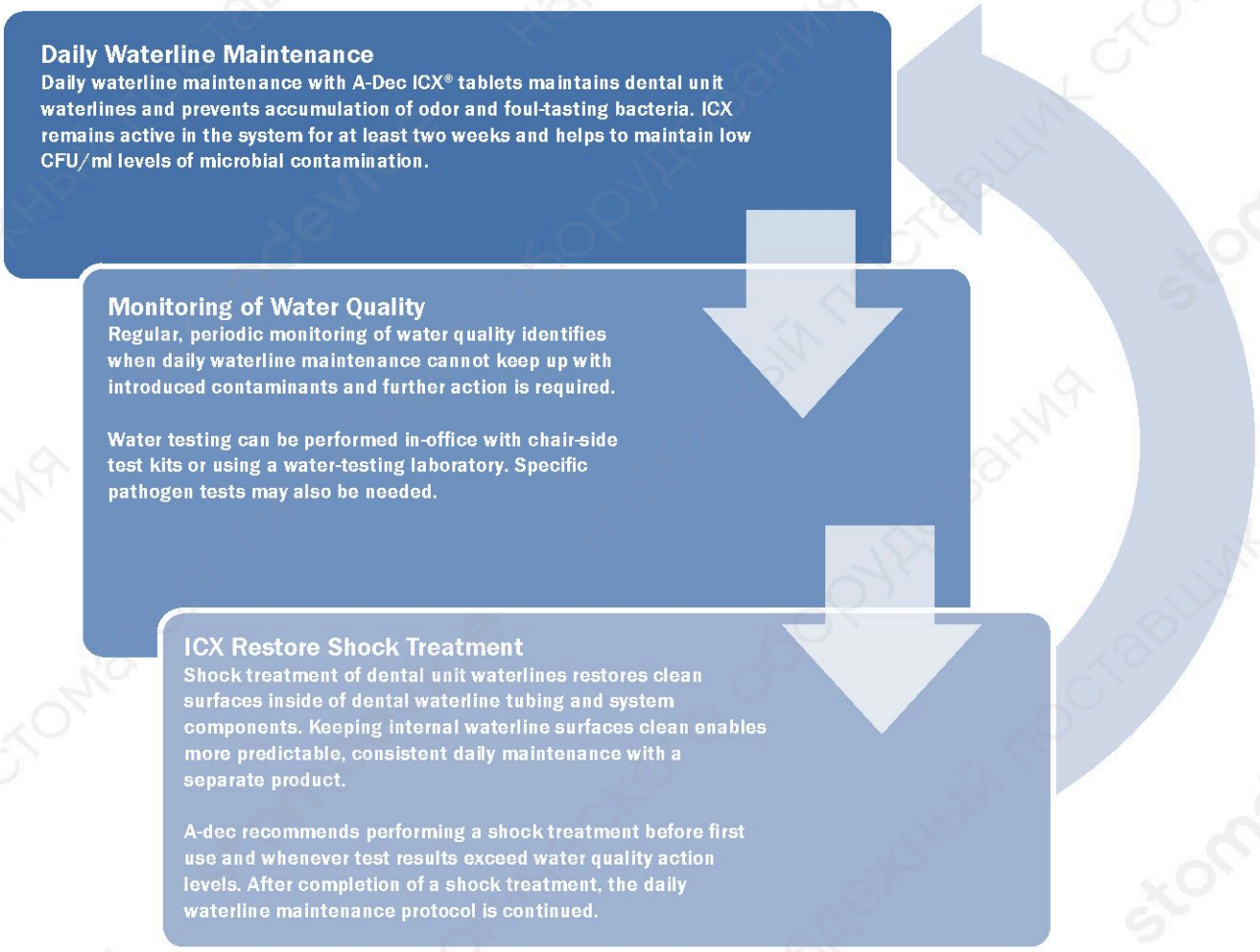
ICX Restore™ is a solution A-dec developed to clean dental unit waterlines. It is a custom formulated DUWL shock treatment that removes buildup of contamination and deposits from dental unit waterline surfaces. ICX Restore consists of a non-toxic two-part liquid solution, which is mixed at the point of use and applied to the entire waterline system. ICX Restore is designed to be used as part of a comprehensive protocol for managing dental unit waterlines.

WATERLINE MAINTENANCE PROTOCOL

A waterline maintenance protocol that includes daily waterline treatment, periodic water quality monitoring, and shock treatment to clear deposits of contamination ensures the delivery of the highest quality of water during dental procedures.

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Studies show cleaning effectiveness of ICX Restore within dental waterlines where accumulated contaminates are removed, and regular water flow is restored with 1-3 applications depending upon the level of buildup. Regular water quality testing will determine when shock treatment is required.

CLEANING PERFORMANCE

Mode of Action

The combination of surfactants and hydrogen peroxide in ICX Restore all contribute to cleaning surfaces. Both non-ionic and anionic surfactants under neutral to alkaline conditions solubilize organic contaminants by forming micelles around them, thereby facilitating removal from waterline systems. ICX Restore was formulated with both non-ionic surfactant and sodium lauryl sulfates (SLS) at a neutral to moderately alkaline pH for the removal of a wide range of contaminants. Hydrogen peroxide oxidizes natural organic matter and increases hydrophilicity by addition of oxygen containing phenolic and carboxyl functional groups. Oxygenated surface materials are disrupted and have increased affinity for denaturants and improved solubilization and dispersion in water that promotes effective cleaning. [1].

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TEST RESULTS

Studies simulating conditions within DUWL systems show that ICX Restore removes contamination and buildup to leave surfaces free or nearly free of adhered materials that originate from water or environmental sources.

Representative A-dec 532/533 delivery systems (**Figure 1**) were tested with ICX Restore to evaluate cleaning performance. Contaminants were allowed to build up in the dental unit water lines over a period of three months under simulated end-use conditions.



Figure 1. A-dec 532/533 Delivery System

Three applications of ICX Restore were applied to the DUWL, each allowing to stand overnight in accordance with the Instructions for Use. Waterlines were rinsed after each application. Waterline tubing was sampled before and after cleaning to show the uncleaned tubing and cleaned surface to evaluate cleaning performance. Tubing was cross-sectioned, dried to preserve surface soils, and analyzed with a Scanning Electron Microscope (SEM). **Figure 2** (A and B) shows dental tubing surfaces before and after cleaning.

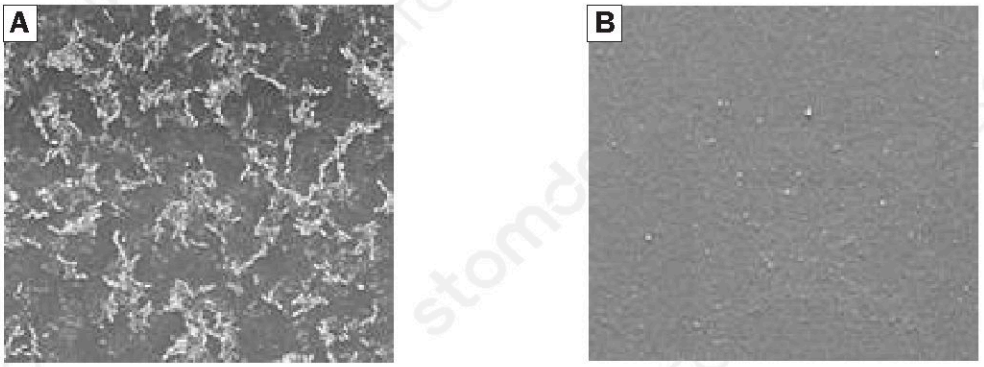


Figure 2. **A**) SEM image at 4,000x of sectioned internal surfaces of dental waterline tubing showing buildup of organic and inorganic soils after simulated use. **B**) SEM image at 4,000x of sectioned internal tubing surfaces after cleaning with ICX Restore.

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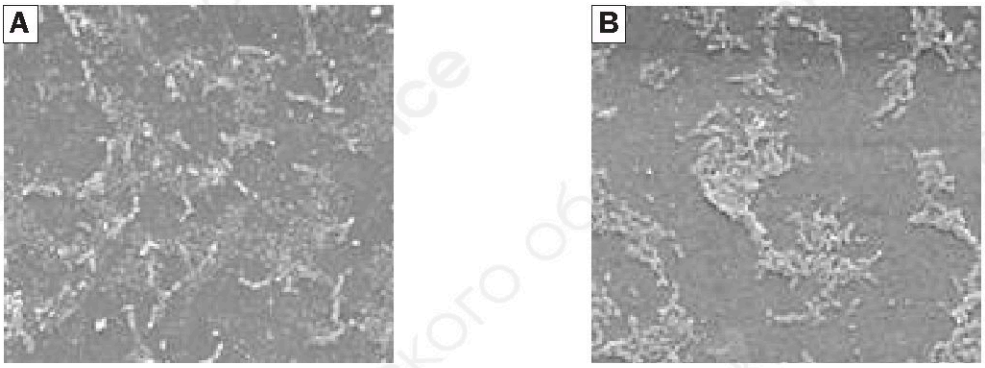


Figure 3. **A**) SEM image at 4000x of sectioned internal surfaces of dental waterline tubing showing buildup of organic and inorganic soils after simulated use. **B**) SEM image at 4000x of sectioned internal tubing surfaces after cleaning with a leading shock product.

CONCLUSIONS

ICX Restore demonstrates strong cleaning performance by clearing deposits and contamination within dental unit waterlines and returns the waterlines to regular operation and daily maintenance.

REFERENCES

[1] Mallevialle, J., Odendaal, P.E., Foundation, A.R., Wiesner, L.d. eaux-Dumez, M.R., 1996, S.A.W.R. Commission, Water Treatment Membrane Processes, McGraw-Hill, New York, NY.

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