



# Examination of Caries Severity Using The Canary System and Public Health Characteristics # 1280

Tellez M, Frantz A, Silvertown JD, Sivagurunathan KS, Abrams SH, Ismail AI.

Temple University Kornberg School of Dentistry, Philadelphia, USA and Quantum Dental Technologies Inc, Toronto, Ontario, CANADA.



## Introduction

- The Canary System (CS) is a technology for caries detection based on photo thermal radiometry (PTR), a modulated thermal infrared response of a medium, and modulated luminescence (LUM).
- CS collects data including Canary Numbers (CN) (which are indicative of the presence or absence of caries).
- The Canary Cloud is a HIPAA and PIPEDA compliant, secured, cloud based environment that stores de-identified scan data collected by the CS.
- Data generated by CS may have the potential to offer investigators the ability to assess caries trends across populations and develop an alternate surveillance system.

## Objectives

- This study aimed to 1) compare variations in CS data between geographic regions in the US, and 2) explore correlations between CS data as a proxy for caries and state level public health data related to income, health insurance and water fluoridation status.

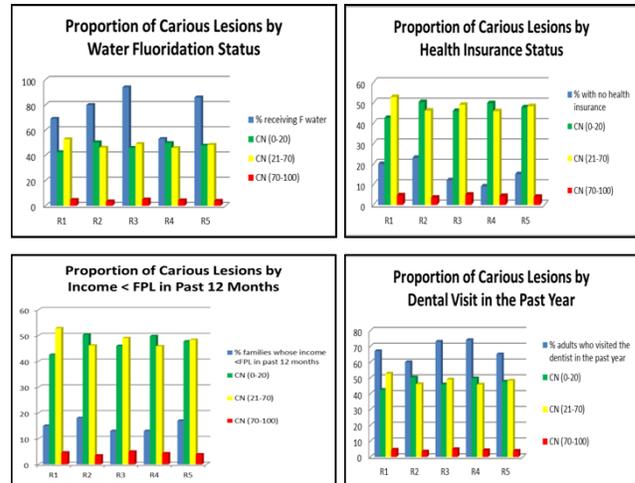
## Methods

- Data related to caries and demographics was extracted from the Canary Cloud between June 1, 2011 and Sept 1, 2015.
- De-identified data was accessed from 49 clinics in the US, who connected to the Canary Cloud representing over 75,896 scan observations from clinically meaningful scan sessions.
- State public health data was extracted from various sources including: a) the Centers for Disease Control and Prevention (CDC), and b) the US Census 2013 data files and included information related to the proportions of people served by community water systems receiving fluoridated water, with no health insurance, with income less than the federal poverty level, and who visited the dentist or a dental clinic in the past 12 months.
- Descriptive information was generated for all the different variables by five US regions (Region 1: CA, NV, Region 2: TX, Region 3: MN, WI, IL, MI, Region 4: NY, NJ, PA, MA and Region 5: NC, SC, FL).
- Differences in caries proportions as defined by the Canary Zones (CN 0-20: healthy, CN 21-70: early non-cavitated lesions; CN 71-100: cavitated lesions) among the five regions were explored using a Chi-Square Test.
- Linear correlations between CD and public health information were generated using Spearman Correlation Coefficients. Statistical significance was set at  $p < .05$ .
- Data were organized in an excel spreadsheet and analyzed using SAS 9.2.

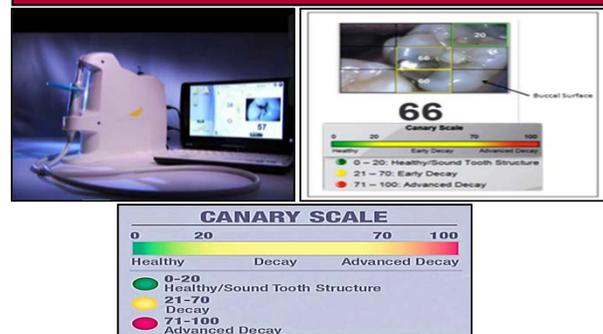


## Results

- When the CNs among all 5 regions were categorized in Canary Zones, 47.3% of the data corresponded to CNs from 0-20, 48.3% to CNs from 21 to 70 and 4.4% had CNs greater than 71 which is indicative of more severe lesions or less degree of mineralization.
- Significant differences in caries proportions were observed by US regions ( $p < .001$ ).
- Region 2 (TX) had the highest proportion of Canary scans indicating healthy teeth (CN <20), followed by Region 1 (CA, NV).
- Region 2 (TX) also had the lowest proportion of severe cavitated carious lesions (CN >71). While, region 3 (MN, WI, IL, MI) had the highest with the majority of the population receiving fluoridated water.
- Region 2 (CA, NV) had the highest proportion of Canary scans indicating early non cavitated lesions (CN 20-70), and people with no health insurance.
- Region 4 (NY, NJ, PA, MA) had the lowest proportion of people receiving fluoridated water and the second highest proportion of severe cavitated lesions (CN >71).
- Region 2 (TX) had the highest proportions of people whose income was less than the federal poverty level and had visited a dentist or dental clinic in the past 12 months. No trends in caries were observed by income and past dental visit.



## Canary System



## Conclusions

- There are significant variations in dental caries at varying disease stages (early lesions and severe cavitated lesions) as indicated by the CN between US regions.
- A higher number of regions should be compared to accurately explore the association between this caries proxy and public health data.
- Cloud computing capability of the CS may be valuable for public health planning and epidemiological surveillance.