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**AAO Foundation Final Report Form
(a/o 5/31/2016)**

Please prepare a report that addresses the following:

Type of Award, e.g., **Orthodontic Faculty Development Fellowship Award**

Name(s) of Principal Investigator(s)

Riyad A. Al-Qawasmi

Title of Project

Heritability of Smile Esthetics in Siblings without Orthodontic Treatment

Period of AAOF Support: 07-2014 to 07-2016

Amount of Funding

\$15,000.00

Summary/Abstract (250 word maximum)

Objective: This study quantified the relative contributions of genetic and environmental influences to the various smile esthetics measurements in siblings before any orthodontic treatment in the graduate orthodontic clinic at the University of Detroit Mercy School of Dentistry

Materials and Methods: 125 subjects who applied for orthodontic treatment and their siblings were selected in 57 families (mean age 12.8 ± 2.2 years, 66 females and 59 males, 73.6 Caucasians, 20.8% African Americans, and 5.6 Asians). A Camcorder was used to capture and video clip of siblings while smiling and posing. A video-editing software program was used to analyze 2 frames from the video that represent the smiling and the rest position of each sibling. Generalized linear models were used to quantify within and among families variances while controlling for sex, age, race and area way dimensions as covariates

Results: there was in general a greater among-to-within family variances for the rest lip positions than that to the smiling lip positions meaning that there are substantive genetic factors involved in rest lip position while more environmental factors are involved in smiling lip positions ($h^2 = 62\%$ for rest lip positions and 33% for smiling lip positions). Upper lip length at rest showed the highest heritability estimates of 91% which indicates a very high genetic control.

Conclusions: genetic factors effect was more evident on the rest lip positions than that of the lips while smiling.

Response to the following questions:

1. Were the original, specific aims of the proposal realized?
All clinical goals were completely achieved: all my 6 finished clinical cases was submitted to Midwest Angle Society and accepted for the purpose of the membership. The Teaching and educational Goal was mostly achieved: my skills in critical thinking and evidence base practice were so advanced to the point I felt confident to present an In-Service lecture about the subject to the whole school of dentistry. I also added that lecture to one of my graduate courses. This research goal was completely achieved: right now I have several research projects going on in the field of population genetics and I am looking forward to share some of the results with my peers soon.
2. Were the results published?
Partial results were published as abstract in AAO 2015 meeting. AAOF was acknowledged
 - a. If so, cite reference/s for publication/s including titles, dates, author or co-authors, journal, issue and page numbers
 - b. Was AAOF support acknowledged?
 - c. If not, are there plans to publish? If not, why not?
3. Have the results of this proposal been presented? **NO**
 - a. If so, list titles, author or co-authors of these presentation/s, year and locations
 - b. Was AAOF support acknowledged?
 - c. If not, are there plans to do so? If not, why not?
4. To what extent have you used, or how do you intend to use, AAOF funding to further your career?
The current findings will be used for my further grant applications for other institutes.

Heritability of the Smile Esthetics in Siblings without Orthodontic Treatment

By Riyadh Al-Qawasmi BDS MSD PhD

Abstract:

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Genetics of teeth angulation and inclination in patients with overt malocclusion

K Hunter Boss; Riyad A Al-Qawasmi BDS, MSD, PhD; Richard Kulbersh, DMD, MS

Purpose: To use 3-D cone beam computed tomography (CBCT) images obtained on patients before treatment with dental malocclusion to calculate the heritability estimates of full-tooth angulation and inclination. Heritability estimate is a number between zero and one indicating the percentage of genetics involved in determining the phenotype observed.

Method: CBCT scans of 61 siblings (a total of 30 sib-ships) was analyzed to measure tooth angulation and inclination using the Anatomage Invivo5 software. The long axis of each tooth was defined and traced as the cusp tip of the most mesio-buccal cusp to 6mm coronal to the apex of the mesio-buccal root. SPSS statistical software will be used to analyze the data and calculate the heritability estimates for each tooth and for the individual

Results: Our result showed that h^2 estimates for tooth inclination were as follow: from 60%-100% for maxillary teeth and from 24%-100 for mandibular teeth, while h^2 estimates tooth angulation were as follow: from 0%-6% for maxillary teeth and from 0%-18% for mandibular teeth

Conclusion: genetic effect was more evident on tooth inclination than tooth angulation, on anterior teeth more than posterior teeth, and on maxillary teeth more than mandibular teeth,