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Impact of Immunological and Inflammatory Mediators In The Progression of Type II Diabetes: A Pilot Study From A Mexican American Population In The Rio Grande Valley

Peter Elvin
The University of Texas Rio Grande Valley, peter.elvin@utrgv.edu

Garrett Edwards
The University of Texas Rio Grande Valley, garrett.edwards01@utrgv.edu

Walid Fakhouri
University of Texas Health Science Center at Houston

Craig Hanis
University of Texas Health Science Center at Houston

Cláudia Cristina Biguetti
The University of Texas Rio Grande Valley

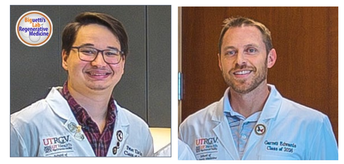
IMPACT OF IMMUNOLOGICAL AND INFLAMMATORY MEDIATORS IN THE PROGRESSION OF TYPE II DIABETES: A PILOT STUDY FROM A MEXICAN AMERICAN POPULATION IN THE RIO GRANDE VALLEY

Peter Elvin[1*], Garrett Edwards[1*], Walid Fakhouri[2],Craig Hanis[3], Claudia Biguetti[1]

1. Department of Surgery and Biomechanics, School of Podiatric Medicine, University of Texas Rio Grande Valley

2. Department of Diagnostic and Biomedical Sciences, School of Dentistry at Houston, The University of Texas Health Science Center

3. Department of Epidemiology, Human Genetics and Environmental Sciences, School of Public Health, The University of Texas Health Science Center at Houston



Regenerative Medicine Research Laboratory

INTRODUCTION/BACKGROUND

- 37 million adults have been diagnosed with diabetes in the US, 90-95% being Type 2 Diabetes (T2D) (1).
- 96 million American adults are considered pre-diabetic, with Hispanic or Latino population appearing at higher risk as compared to white non-Hispanic (1)

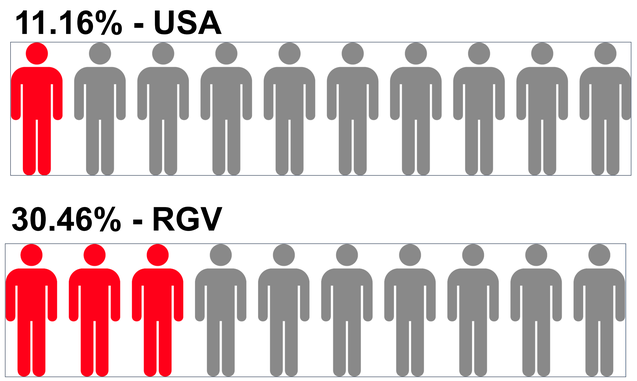


Figure 1. USA vs Rio Grande Valley Diabetes Incidence (2)

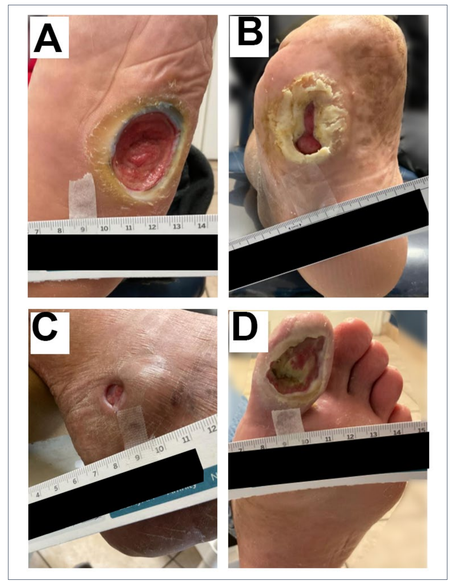


Figure 2. Chronic ulcers in different locations of diabetic foot. (*Photos Courtesy of Dr. Luis Venegas*)

- Diabetes involves a chronic pro-inflammatory state, altering host immune response and healing capacity
- About 15–25% of patients with diabetes may develop foot ulcer during their lifetime (3)
- "Of all the lower extremity amputations in persons with diabetes, 85% are preceded by a foot ulcer" (4)
- The relationship between T2D, host immunity imbalance and its association with lower extremities complications and/or delayed wound healing is still unknown.

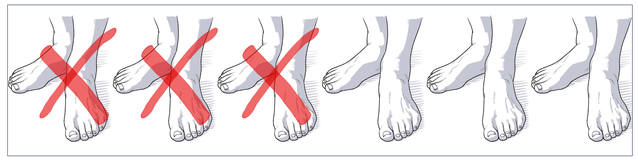


Figure 3. 5-Year Survival for Amputation is 50% (5)

HYPOTHESIS/OBJECTIVES

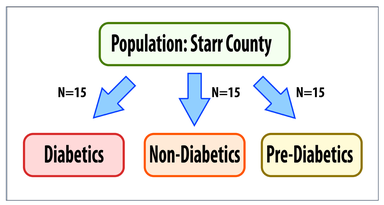
- **Hypothesis:** T2D progression is linked to an imbalance of key regulatory immunological markers in blood circulation, which can negatively impact glucose levels and consequently increase chances for impaired tissue healing and lower extremity complications.

- **Aim 1:** To assess the demographic, medical, and lower extremities health status of 1,200 Mexican American individuals from Starr County Study Site.
- **Aim 2:** To assess gene expression of immunological markers from blood samples of Mexican American population including 15 controls, 15 pre-diabetic individuals, and 15 diabetic individuals.

METHODOLOGY/PRELIMINARY RESULTS

INCLUSION CRITERIA

•Age ≥ 40 years, Mexican Americans, male and female



EXCLUSION CRITERIA

•Pregnancy

•Use of immunosuppressant drugs or antibiotics by the time of sample collection

•HIV and immunological disorders

STATISTICAL ANALYSIS

- Aim 1: Exploratory and descriptive analysis will be performed
- Pearson's chi-squared or Fisher's exact test for categorical variables of descriptive analysis.
- Aim 2: Analysis of variance (ANOVA) combined with the post hoc Fisher test for significance will be used for multiple comparisons in molecular data analysis.

INFLAMMATORY RESPONSE AND WOUND HEALING

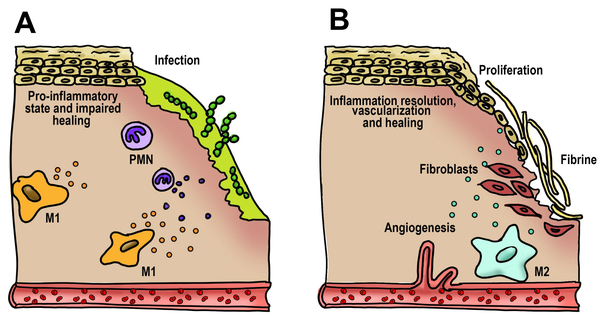


Figure 4. Proposed model for participation of immune cells and immunological markers on delayed wound healing in diabetes. A) a pro-inflammatory state in a diabetic chronic wound is represented. B) Inflammation resolution and tissue healing in an acute wound.

MARKERS TO BE ASSESSED

- 5-Lipoxygenase
- iNOS and TNF (M1 macrophages)
- Arg1, IL10 (M2 macrophages)

SAMPLE COLLECTION AND PCR ANALYSIS

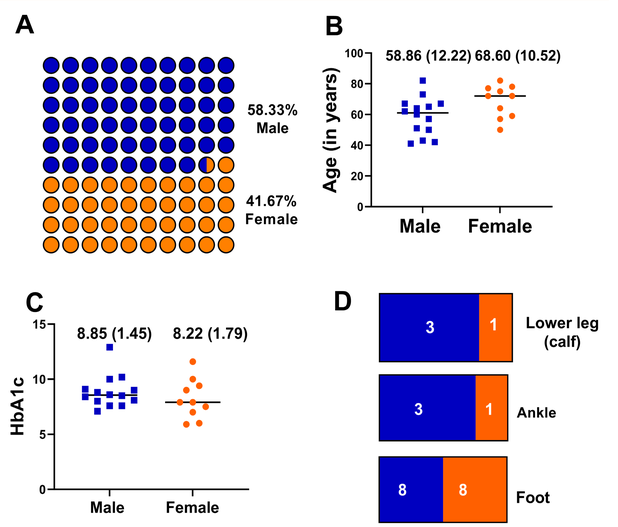


Figure 6. Descriptive analysis for a sample of 24 diabetic individuals that reported lower extremities complications from Aim 1. A) Distribution of male and female, B) Age of the participants by time of data collection; C) Hemoglobin A1C (HbA1c) test values collected by the time of data collection; D) Location of ulcers reported by the participants in a self-reported health status questionnaire. IRBs for this study HSC-SPH-06-225 and UTRGV-IRB22-0273

EXPECTED OUTCOMES/FUTURE WORK

- To validate our findings in a larger cohort of prediabetic and T2D patients for informative immunological biomarkers
- To investigate the role of key markers on systemic inflammation and diabetes complication
- To develop mechanistic studies testing new therapies for diabetic ulcer wound healing based on markers identified in this study.

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CONTACT INFORMATION

Advisor: claudia.biguetti@utrgv.edu

Students: peter.elvin01@utrgv.edu

garrett.edwards01@utrgv.edu