LIONS VISIONGIFT

Evaluation of an eye donor diabetes mellitus (DM) rating scale for prediction of DMEK preparation failure

EBAA Scientific Session
June 6, 2015

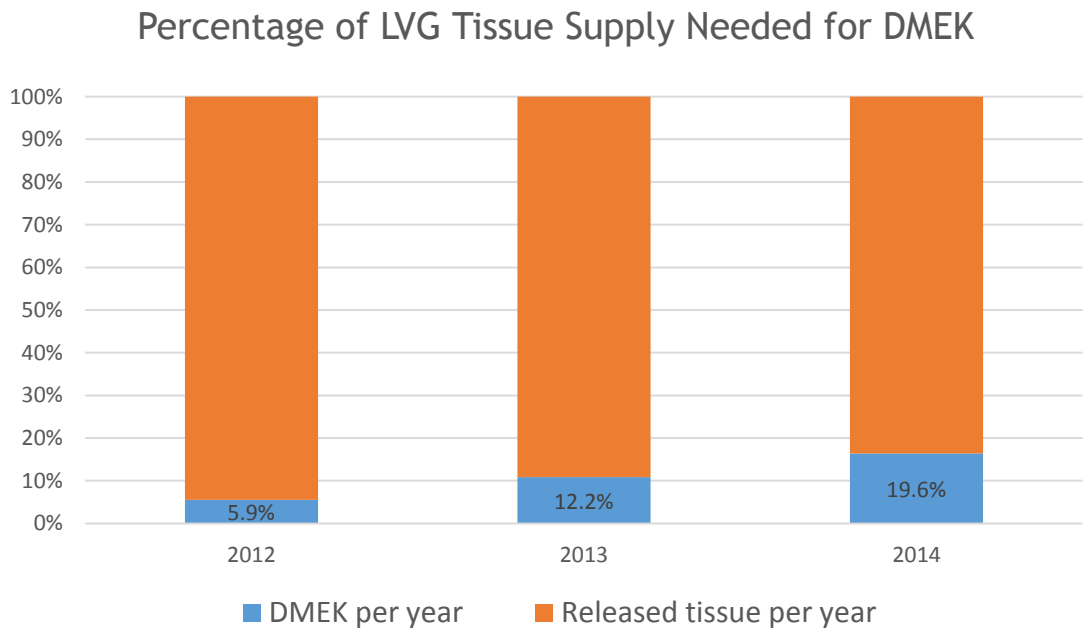
Ryan S. Williams, CEBT, Christopher G. Stoeger, MBA, CEBT, Zachary Mayko, MS, Michael D. Straiko, MD, Ryan Clay, MD

Financial Disclosures

Relevant to this talk: None

Original Problem

- Increased DMEK demand and unique tissue criteria has made it difficult to fill all surgeries with current supply of tissue.



LIONS VISIONGIFT

DM – Risk to Peel

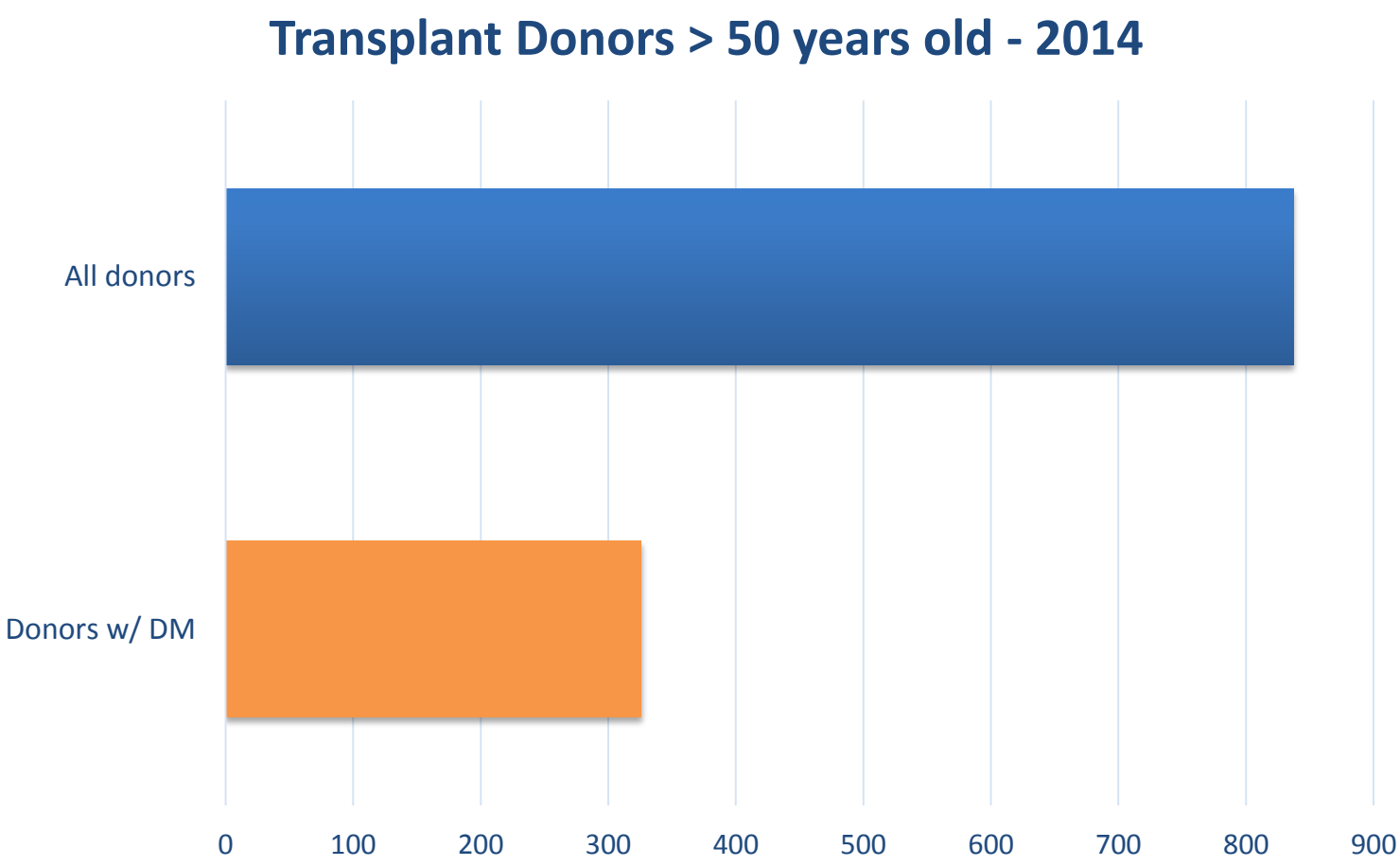
TABLE 3. DMEK Graft Preparation Outcomes in Diabetic Versus Nondiabetic Tissues

	Diabetes	No Diabetes	*P*
Graft preparation failure			
Successful preparations, n (%)	99 (86.84)	241 (98.37)	—
Failed preparations, n (%)	15 (13.16)	4 (1.63)	—
Site-adjusted preparation failure rate, % (95% CI)	15.3 (9.0–25.0)	1.9 (0.8–4.8)	0.001
Graft preparation difficulty			
Mean processing time, min (SEM)	25:36 (0:48)	22:42 (0:36)	0.009

Greiner MA, Rixen JJ, Wagoner MD, et al (Cornea 2014;33:1129-1133)

- DMEK donor pool was shrinking as we try to only peel tissue that we predict will be successful
- DM in donor history shown to increase risk of preparation failure by 7x

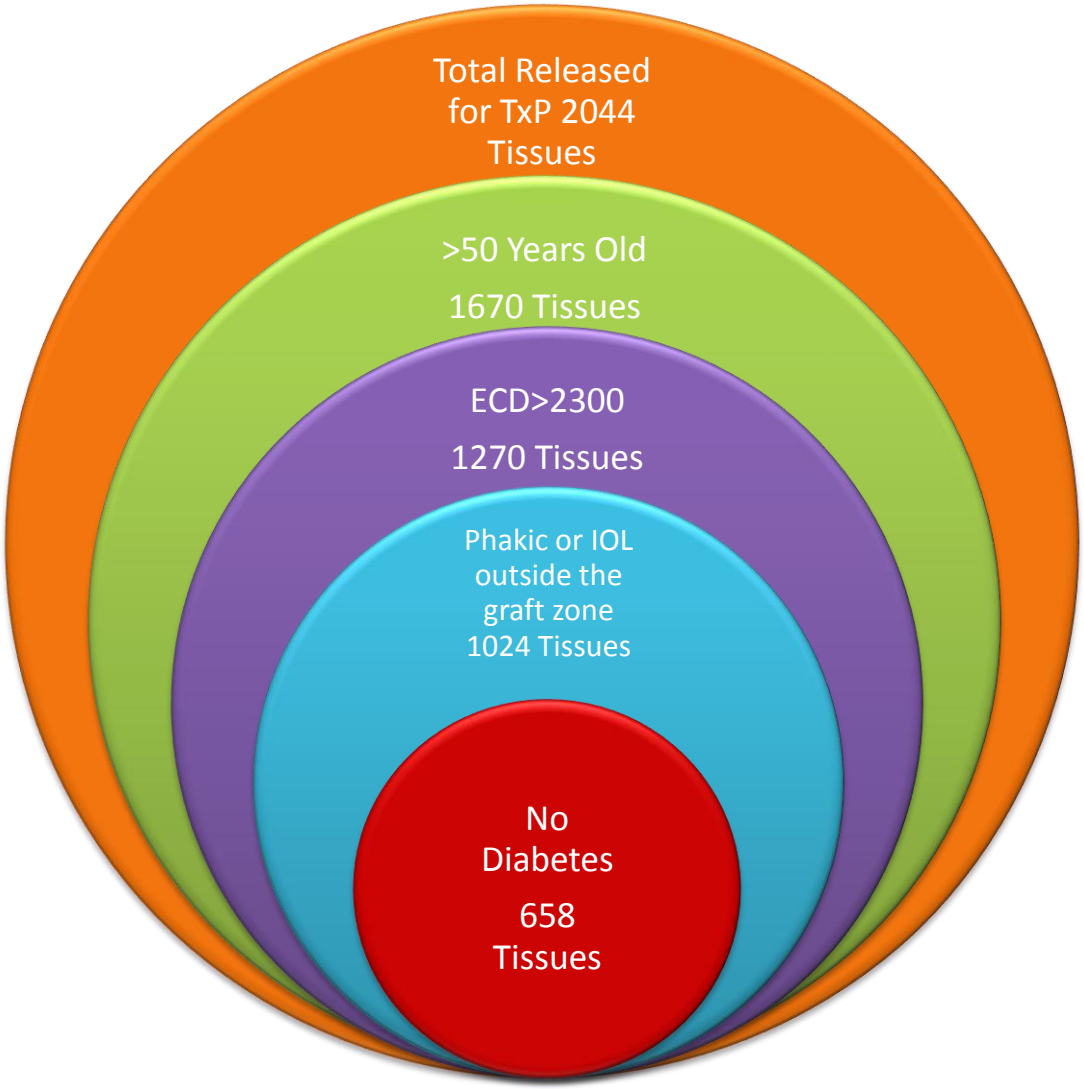
Impact on Tissue Pool



39%

LIONS VISIONGIFT

LVG DMEK Tissue Pool 2014



32% of total available tissue

LIONS VISIONGIFT

Basis of Rating System

TABLE 1. Past Medical History and Past Ocular History among Descemet Membrane Endothelial Keratoplasty Donor Preparation Failure and Success Groups

Outcome Group	Diabetes	Diabetes Duration (y)	Hypertension	Hyperlipidemia, Obesity, or Both	Tobacco	Cancer	Alcohol	Intraocular Surgery	Superficial Surgery	Other Ocular Disorders
Failure (n = 26)	18 (69)	13.9 ± 15.5	22 (85)	22 (85)	5 (19)	11 (42)	3 (12)	1 (4)	1 (4)	2 (8)
Success (n = 462)	110 (24)	6.5 ± 8.4	287 (62)	224 (48)	46 (10)	181 (39)	75 (16)	24 (5)	28 (6)	43 (9)
P value	.000028	.023	.021	.0004	.175	.84	.78	1.00	1.00	1.00

SD = standard deviation.

Data are no. (%) or mean ± standard deviation, unless otherwise indicated.

Vianna LM, et al, Am J Opthalmol 2015

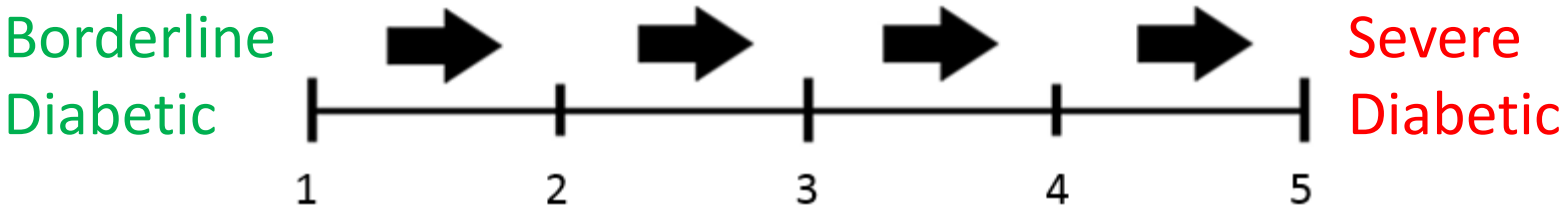
- DM, DM duration, HLD/BMI>30, and related comorbidities (e.g. neuropathy, nephropathy, retinopathy) all were thought to contribute to increased failure rate.

Creating a System

- The system needed to be:
  - simple
  - generated from available medical information without adding unreasonable burden
  - A clear communication tool between departments reviewing records, and choosing tissue to offer for DMEK preparation

Methods of the System

- A system was created to categorize the severity of diabetes from 1-5, five indicating the most severe case, and 0 indicating the absence of any DM in the donor history
- This rating would be displayed on our main tissue board where both departments would have access



Example of Rating System I

COD: Myocardial Infarction

Current Hx: Pt presented to hospital w/ weakness increasing over last 2 months. Admitted for observation & testing after all preliminary tests negative. Labs suggest non-Q wave MI. Heart cath. revealed diffuse cardiac Dz. Pt. declined Sx (CABG) Pt. not able to care ADL's & noncompliant. Pt. requests no Tx. & moved to comfort care.

PMH: NIDDM Type II, COPD, HTN, A-fib, L. systolic heart failure. S/P: CVA, MI (2002)

DM Duration: 3-4 yrs, was on Metformin

BMI: 24.6

DM Severity Rating = 2

Example of Rating System II

COD: Respiratory Failure 2/2 Obesity Hypoventilation Syndrome

Current Hx: Admitted w acute on chronic resp failure w hypercapnia and hypoxia. Course complicated by BiPAP dependence, UTI, on abx, possible PE that was unable to be evaluated d/t body habitus motion and inability to lie flat. Decision was made to de-escalate care for comfort measures. BiPAP was withdrawn and pt expired.

PMH: CAD, HTN, HLD, CHF, morbid obesity w obesity hypoventilation syndrome, on home O2 2L NC, OSA, DM2, PVD, CKD stage 3, anemia, OA, spinal stenosis, IBS, gastric ulcer, former smoker (1 ppd x 30 yrs). SurgHx: tonsillectomy, tubal ligation, CABG, abdominal wall sx, elbow sx.

DM Duration: >10 yrs, treated w insulin

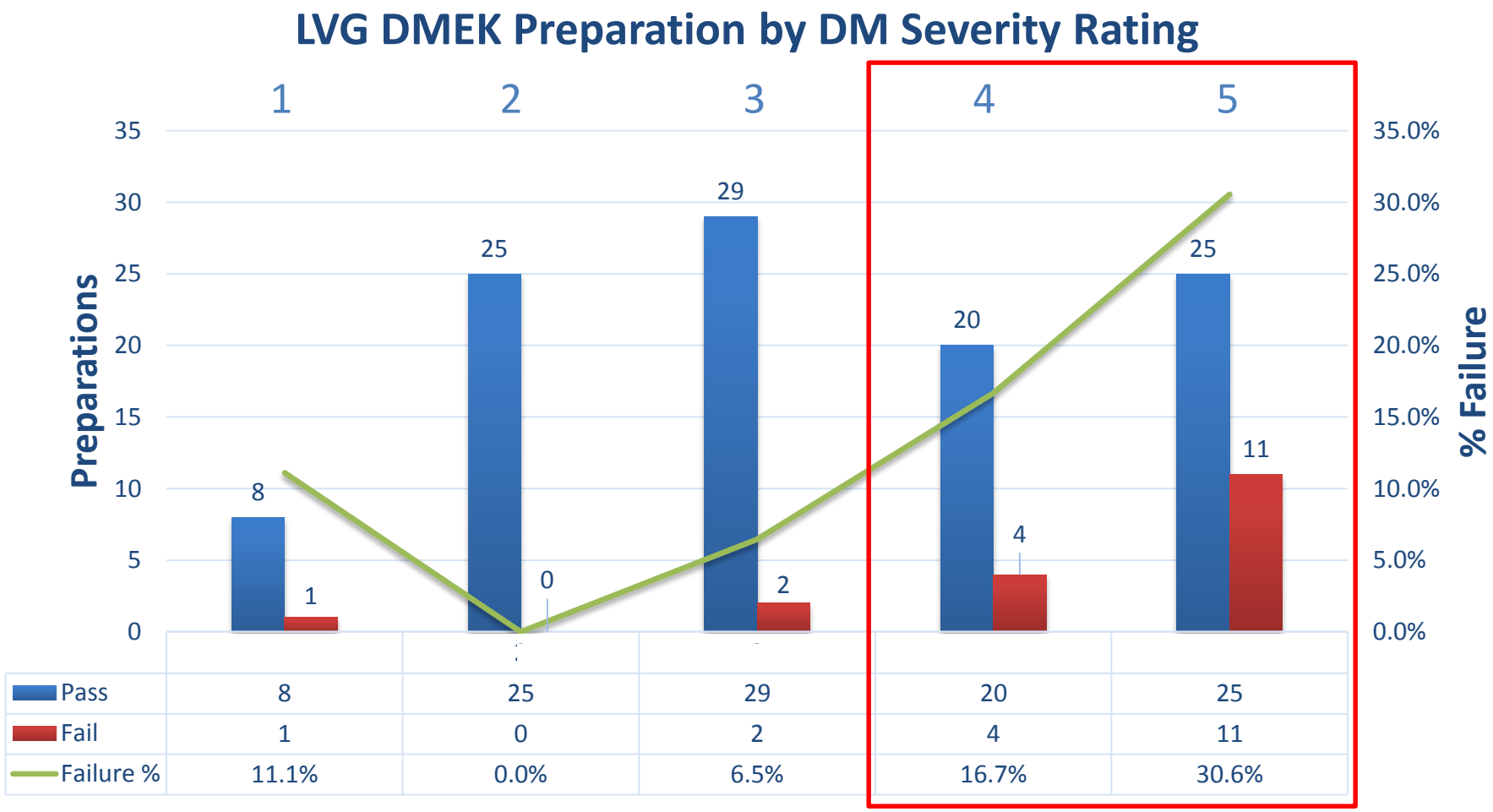
BMI: 50.4

DM Severity Rating = 5

Application of Rating System

- This system was retrospectively applied to 125 consecutive DMEK preparations of diabetic tissue done at LVG between Sep 2012 and Feb 2015
- The second tissue prepared of mated pairs was not included in the study
- Blinded to success or failure of specific preparation

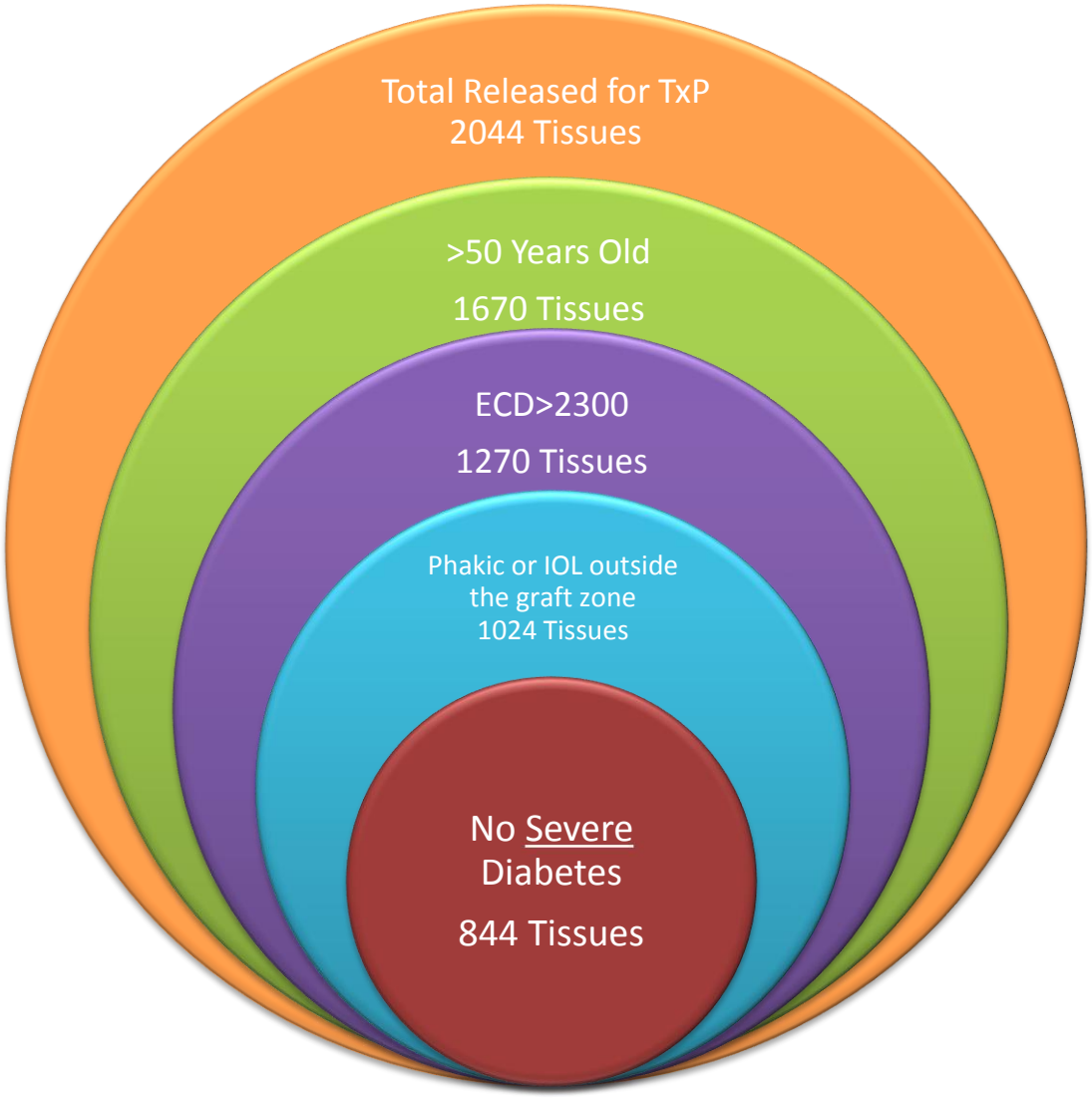
Results of Application



p = 0.009

LIONS VISIONGIFT

Tissue Supply with Scale Applied



Including DM Severity Rating 1,2,3

28% increase in available tissue.

LIONS VISIONGIFT

Conclusions

- Employing a DM rating system may be helpful in expanding the pool of available tissue for DMEK preparation
- A DM rating scale may reduce wasted tissue due to failed DMEK preparation

Thank You!

Questions?

Ryan@visiongift.org

LIONS VISIONGIFT