

Fem-Pop Bypass Grafting: A Retrospective Statistical Study

Sara Wezensky

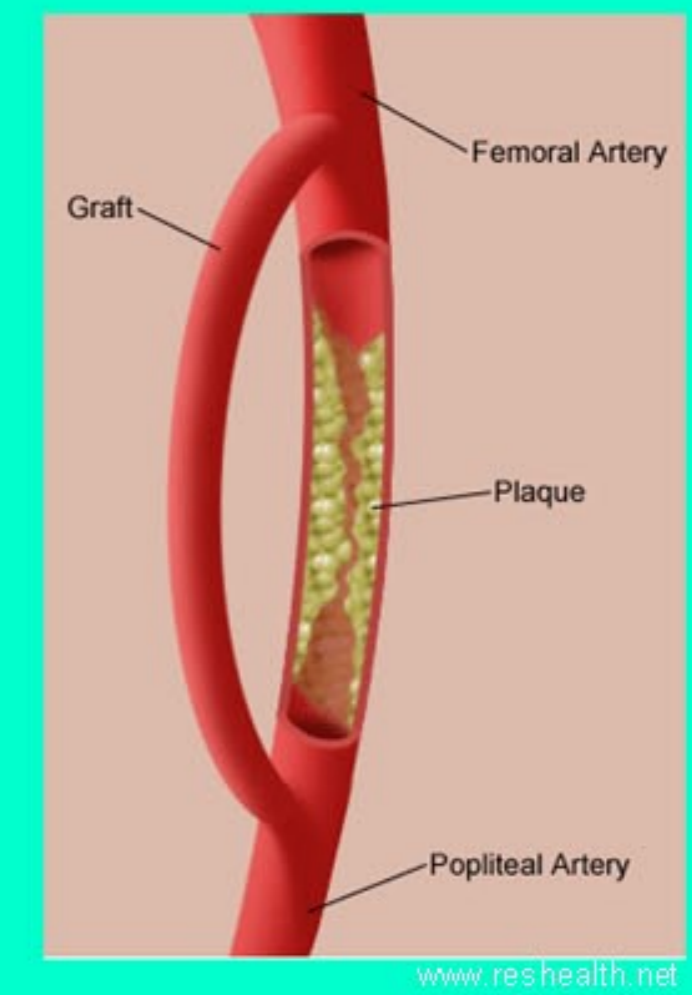
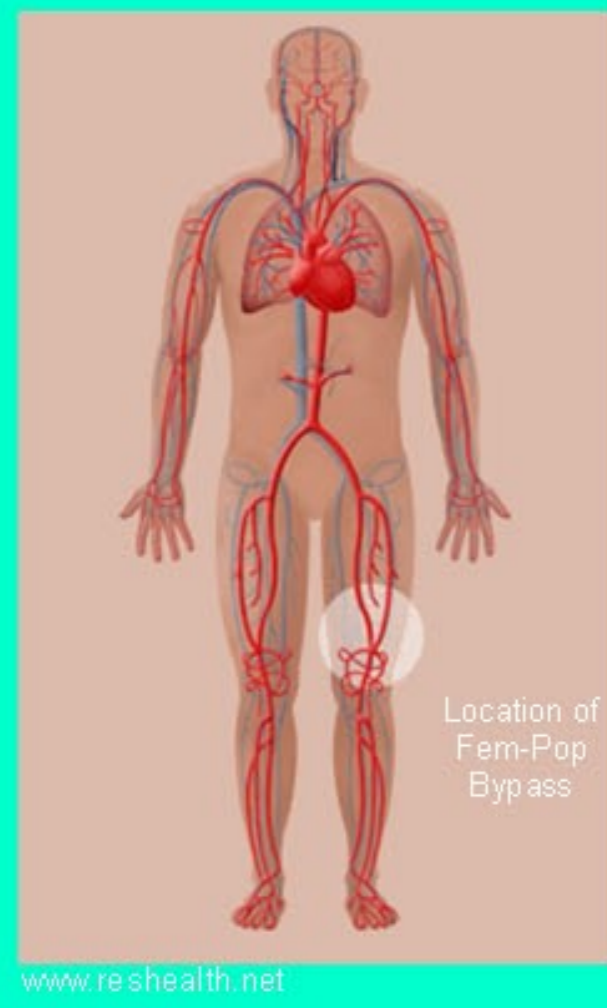
Montana State University

Research Alliance in Math and Science

Computational Science and Engineering Division, Oak Ridge National Laboratory

Mentor: Kara L. Kruse

https://wiki.ornl.gov/sites/rams/s_wezensky



Background

Any damage done in the vascular environment elicits an immune response to injured blood vessels. Immune factors attempt to staunch bleeding, and prevent any infection from taking hold. Surgical intervention is one such category of vascular damage that extracts this response. Intimal hyperplasia (IH) is the universal response to vascular healing gone awry. What started as the body's natural response to restoring hemostasis, instead reverses any surgical benefits that may have been intended. The most dangerous implication of IH is the narrowing of the artery lumen, decreasing the overall surface area available for blood to flow through. This can cause a dramatic increase in blood pressure, and decreased flow to the area of the body normally perfused. The following study was conducted to assess the role of IH after femoropopliteal (fem-pop) bypass grafting. This surgical procedure connects the femoral and popliteal arteries, therefore bypassing the area occluded with plaque. This procedure is intended to revascularize the lower limbs. Anecdotally, it is thought that patients on hormone replacement therapy have a diminished graft patency rate. This study sought to verify or contradict this anecdotal information, and also elucidate other co-factors or co-morbidities that may determine success or detriment of vascular repair.

Variables for Study

Variables for Study	
Cholesterol	Diabetes
Blood pressure	Smoking
BMI	Profession
Family history	Mental/mood disorders
Thyroid disorders	Cancer
Arthritis	Gastrointestinal problems
Skin disorders	Respiratory disorders
Allergies	Medications
Previous infections	Hysterectomy
Oophorectomy	History of vascular disease
Alcohol use	Illicit drug use
Type of HRT	Surgeries

Criteria for Inclusion:

- **Sex:** female
- **Age:** >18 years
- **Surgical procedure:** femoropopliteal bypass
- **Location:** University of Tennessee Medical Center
- **Time:** 1993-1998

Piranha: Categorical Grouping

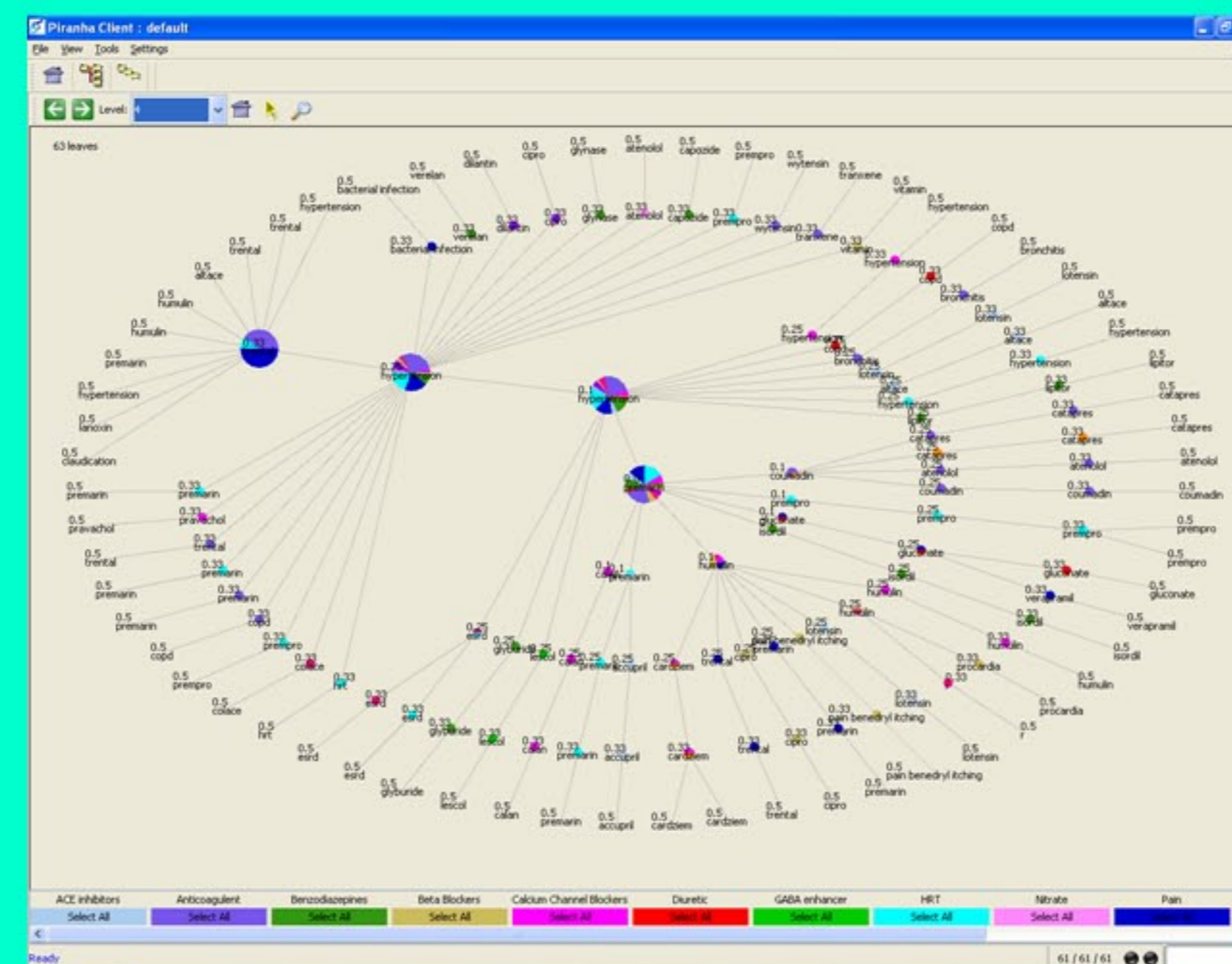


Fig. 2. Correlation between diabetes and HRT confirmed.

Brought out a known correlation between HRT and diabetes, identified by *Timaran et al. 2000*. This success led to consideration of other correlations with HRT: blood-thinners and SSRI's.

Statistical Analysis

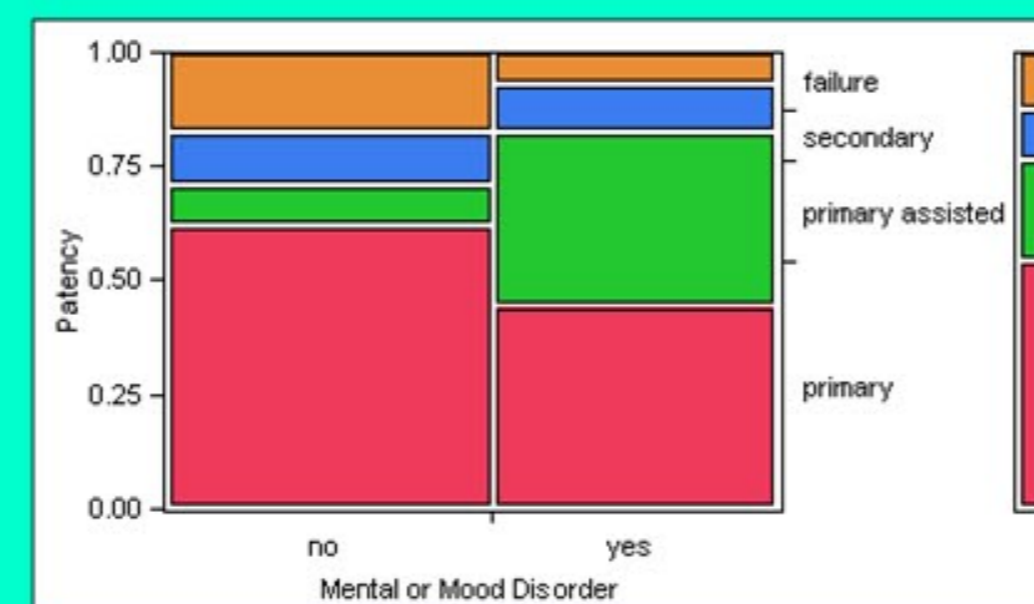


Fig. 3. Mosaic plot by JMP software. Significance of mental/mood medication in graft patency illustrated.

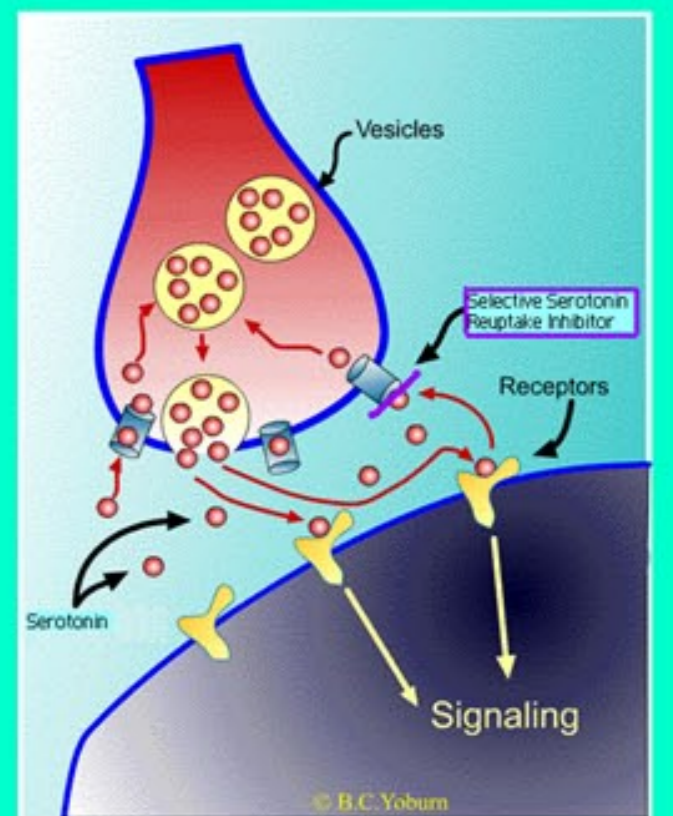
Count	primary	primary as sisted	secondary	
Expected	21	3	10	34
no	18.3492	7.55556	8.09524	
yes	13	11	5	29
	15.6508	6.44444	6.90476	
	34	14	15	63

P value = 0.178

Fig. 4. Chi-squared analysis of mental/mood disorder vs. graft patency.

Mental/Mood Disorders Linked to Graft Patency

- 85.7% of affected patients given Selective serotonin reuptake inhibitors (SSRI's)
- Common SSRI's include: Prozac, Zoloft, Cymbalta¹
- Mechanism: serotonin blocked from re-entering the releasing cell, therefore serotonin enters the brain, enhancing mood



SSRI's and Platelet Function

- Increases in platelet activity at the injury site increase IH
- SSRI's decrease platelet aggregation thereby decreasing E-selectin, P-selectin, and VCAM-1 release (Serebruany et al. 2003) and decreasing IH

Conclusions

- Piranha is a useful tool for data-mining medical software
- SSRI's have a significant statistical relationship with graft patency
- SSRI's can be theoretically linked to important immune response factors involved in intimal hyperplasia

Future Research

- Design a prespective study from the findings of this study
- Develop a statistical model for predicting the likelihood of developing IH

¹ These pharmaceutical drugs may have multiple mechanisms of action, however, their functions as SSRI's is the focus of this discussion.

Piranha: Data Mining

Text-based categorical analysis. Although originally designed to identify similar documents for the purpose of time-efficient document analysis, tests were conducted in order to utilize this ORNL-designed software program to data mine the case study.