

Visualizing Prostate Cancer Patients Treated with Three- Dimensional Computed Tomography-Guided Brachytherapy



Faleh Al-shameri (falshame@gmu.edu)

Jee Vang (jvang@gmu.edu)

Interface, 2004

Background on Prostate Cancer

- Most common cancer among US men
- In year 2002
 - 189,000 US men diagnosed with prostate cancer
 - (of which) 30,200 died from prostate cancer
- **Risk Factors**
 - **Age:** White male over 50, Black male at 40
 - **Race:** Black male have incidence 1.5 times white male (China and Japan lowest)
 - **Geography:** Scandinavian (highest), Asia (lowest)
 - **Family History:** Male with first-degree relative with prostate cancer has twice increased risk for prostate cancer

Clinical Indicators of Prostate Cancer

- **Prostate-specific antigen (PSA)**

- PSA is a molecule produced by the prostate, and is the ultimate indicator of successful treatment.
- Continuous value (above 0.0)

- **Gleason's score**

- Whole numbers (1 – 10)

- **Stage** (the locality of the prostate cancer)

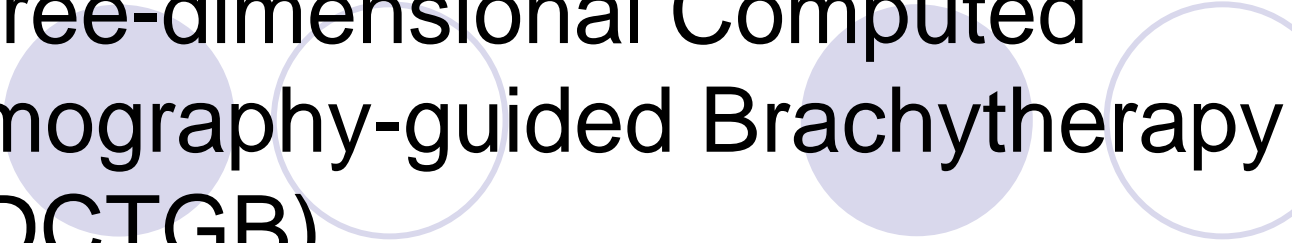
- T1a, T1b, T1c, T2a, T2b, T3a, T3b, T4

Treatments for Prostate Cancer



- No standard treatment
- Hormones
- Radical prostatectomy (aggressive cancer)
- External-beam radiation therapy (EBRT)
- Interstitial radiotherapy (radioactive seeds)

Three-dimensional Computed tomography-guided Brachytherapy (3DCTGB)



- Developed in 1995 by Dr. Panos Koutrouvelis at Uro-Radiology Prostate Institute
- Non-surgical, and no tissue removed.
- Uses CT to visualize prostate and guide appropriate doses of radioactive seeds to diseased areas

Project Dataset



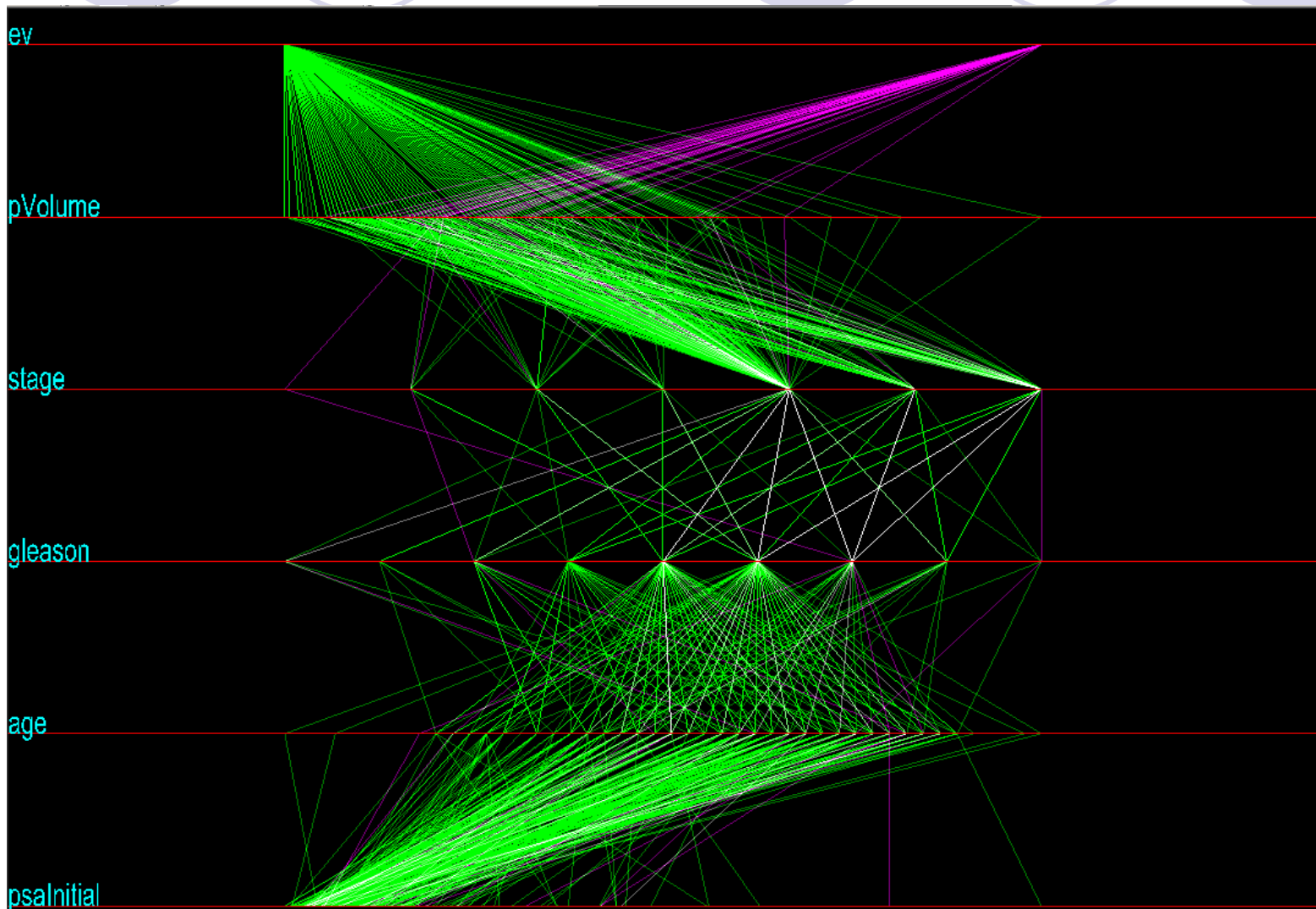
- 673 patients treated between June 1, 1994 and June 30, 2002
- Only 539 patients had enough follow-up PSAs to be used for biochemical analysis—hence our visualization
- We looked at 6 variables: initial PSA, initial prostate volume, Gleason's score, stage, age, and indicator of success/failure

Biochemical Results of Patients Treated with 3DCTGB n 539

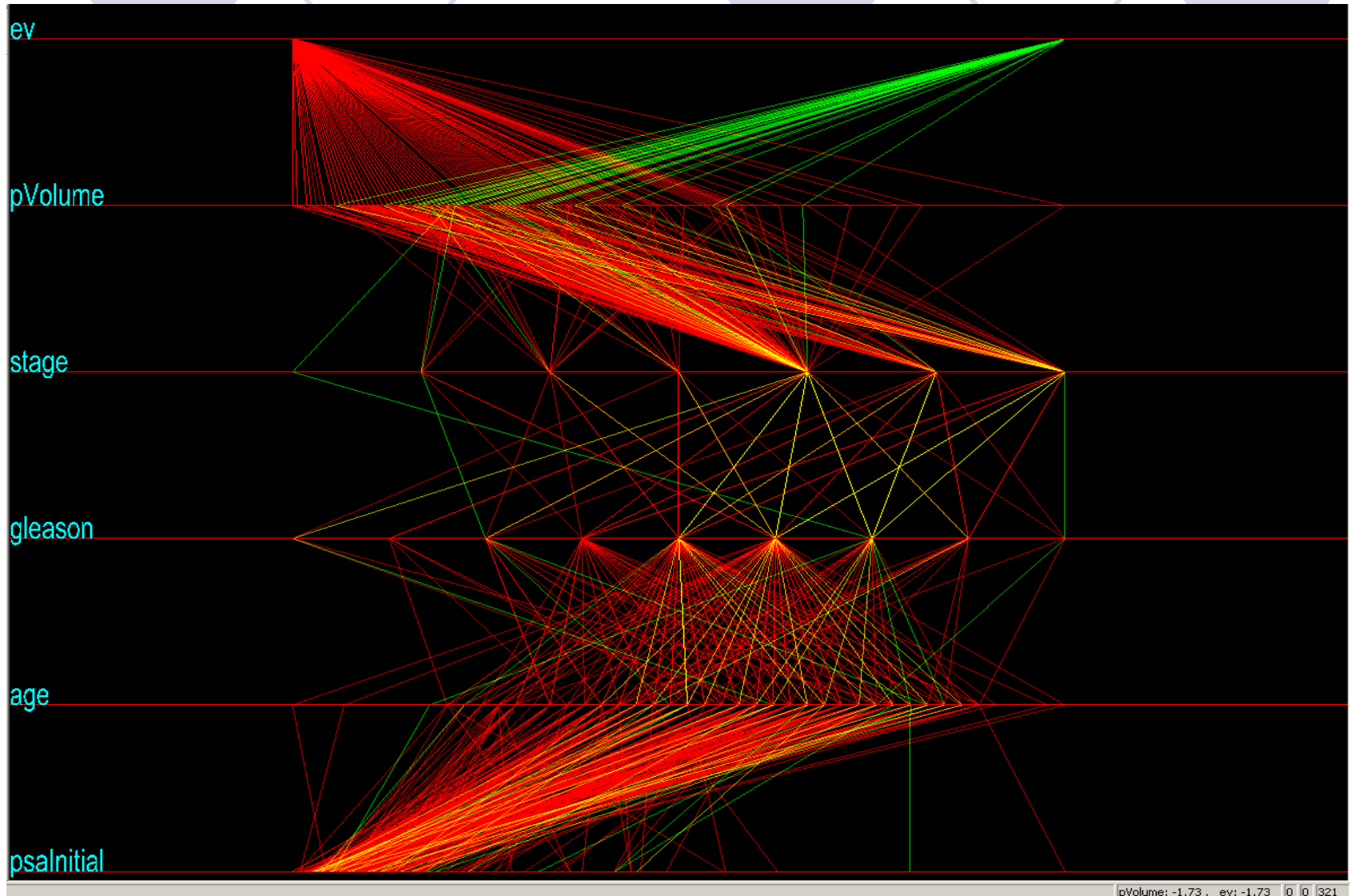
Risk Profile	# Patients	bNED* %
High	321	292 (91%)
Intermediate	74	72 (97%)
Low	144	143 (99%)
	539	507 (94%)

*Biochemical no evidence of disease.

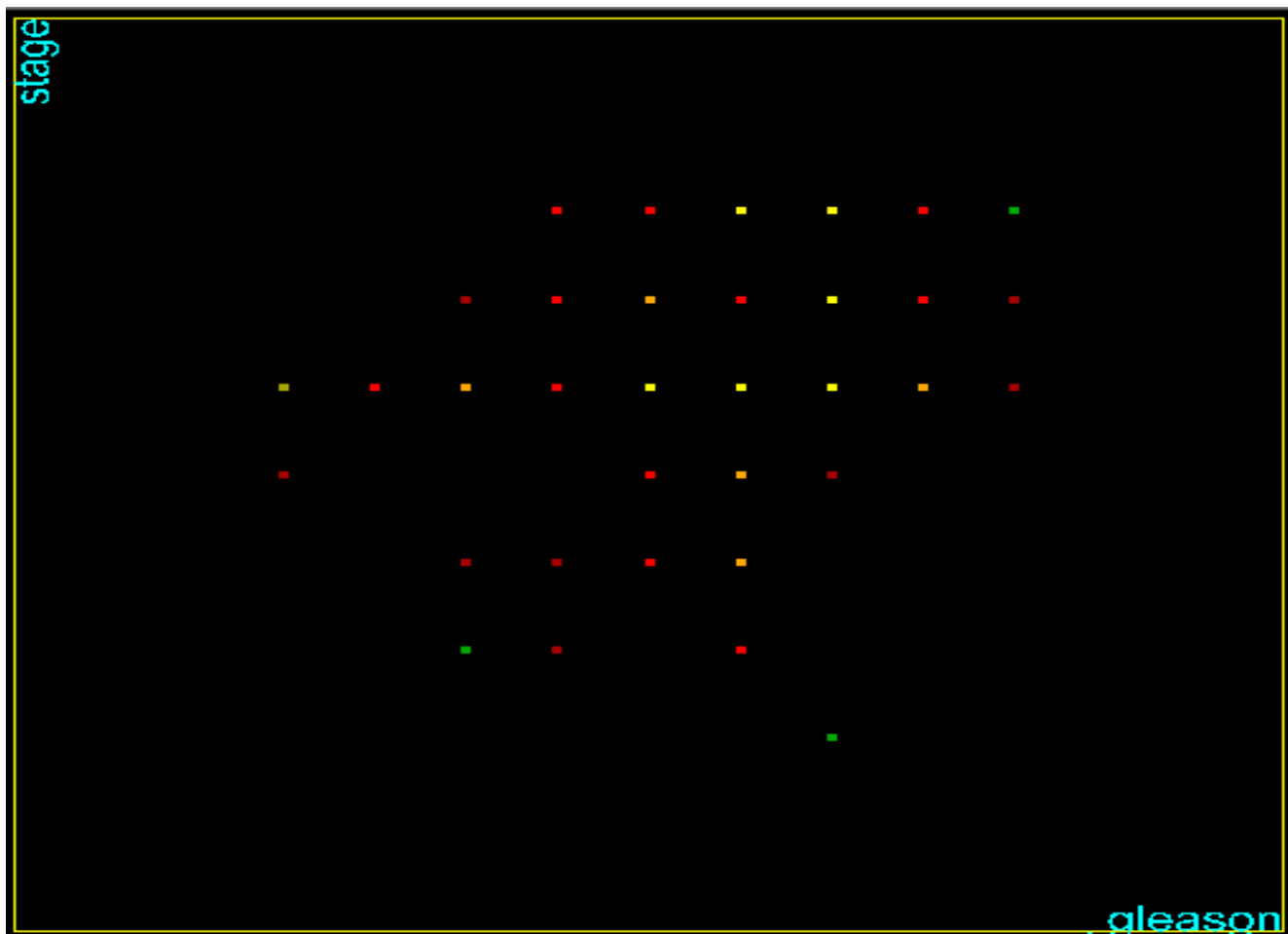
All Patients n 539



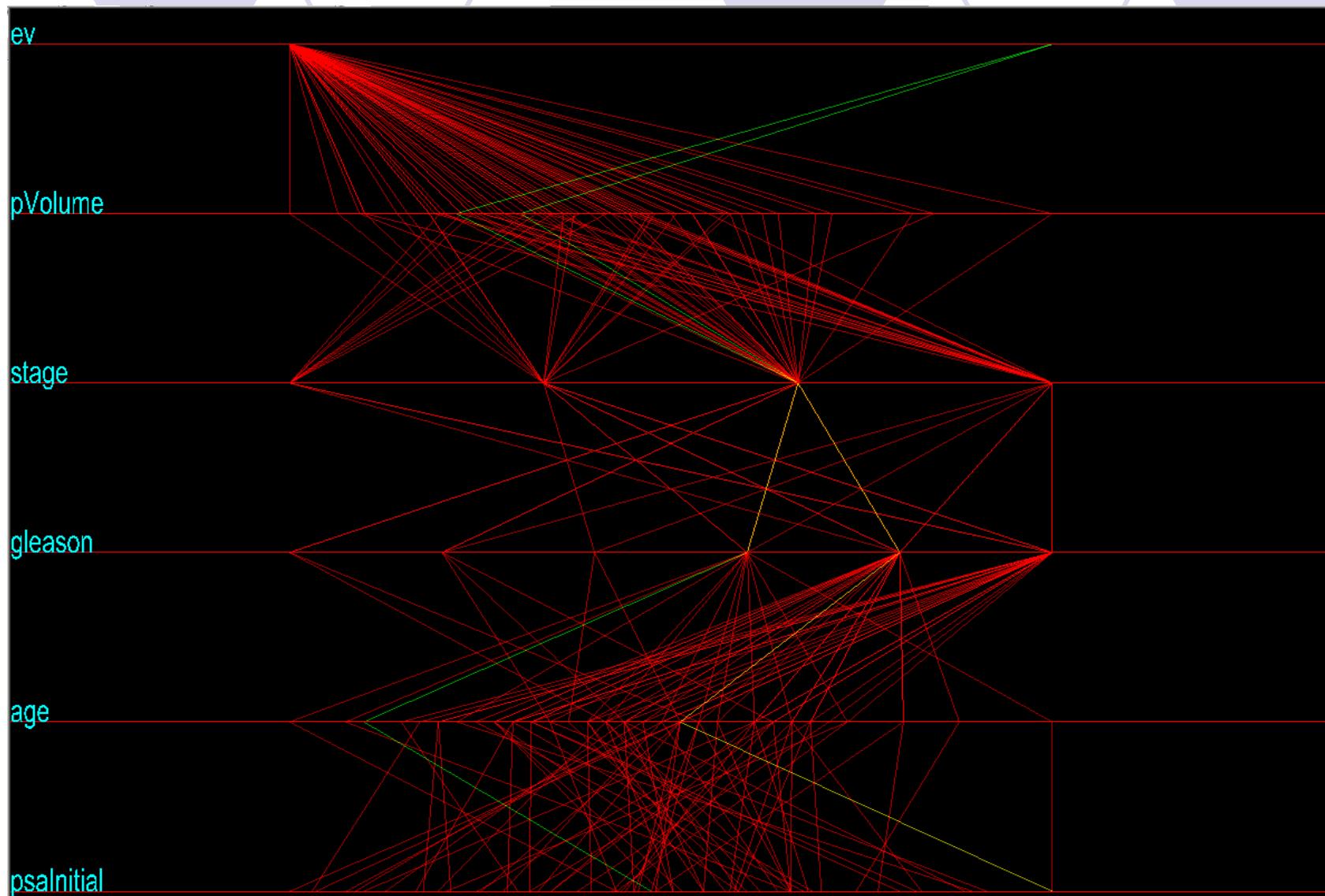
High Risk Patients n 321



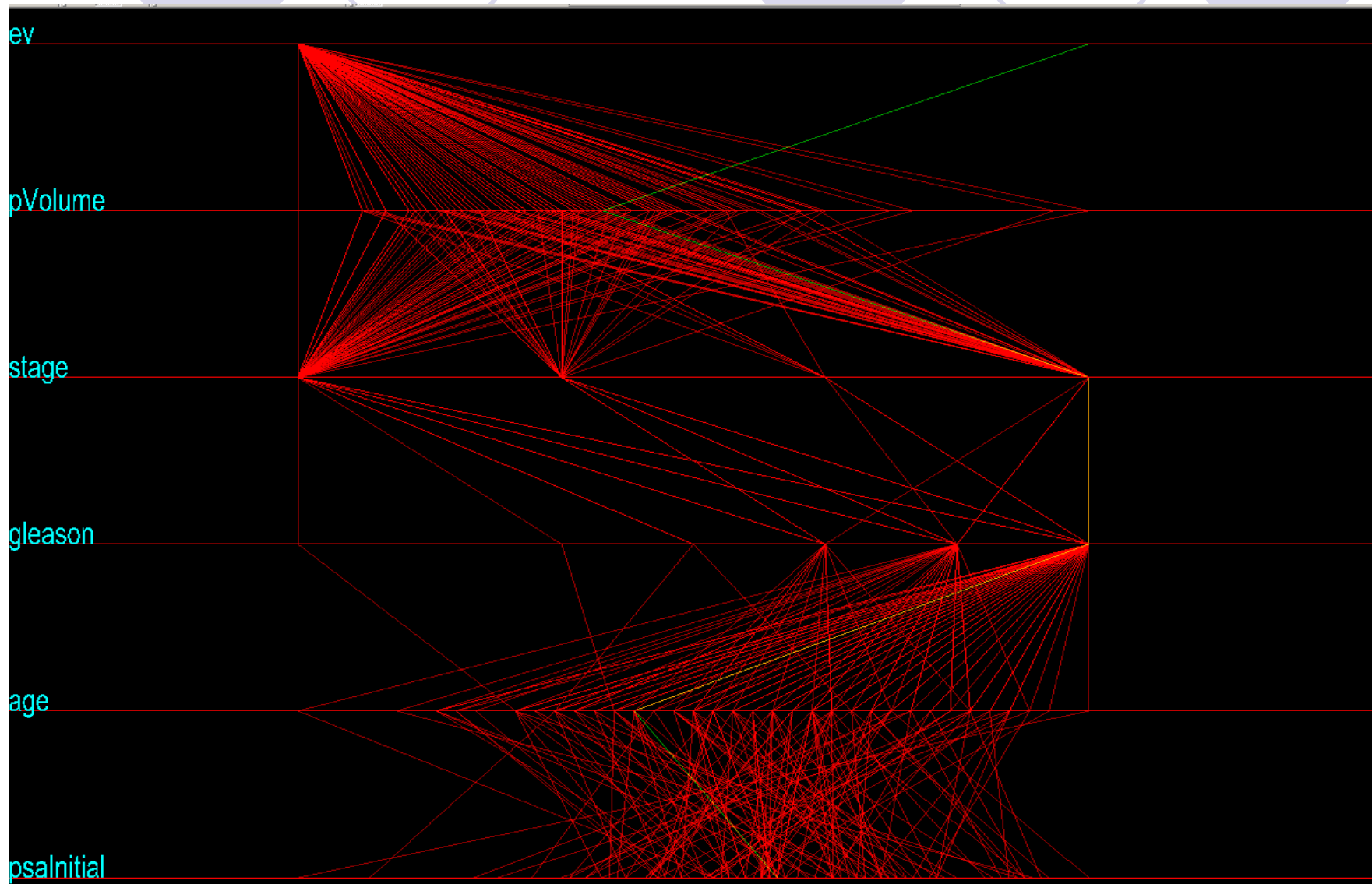
High Risk Patients n 321



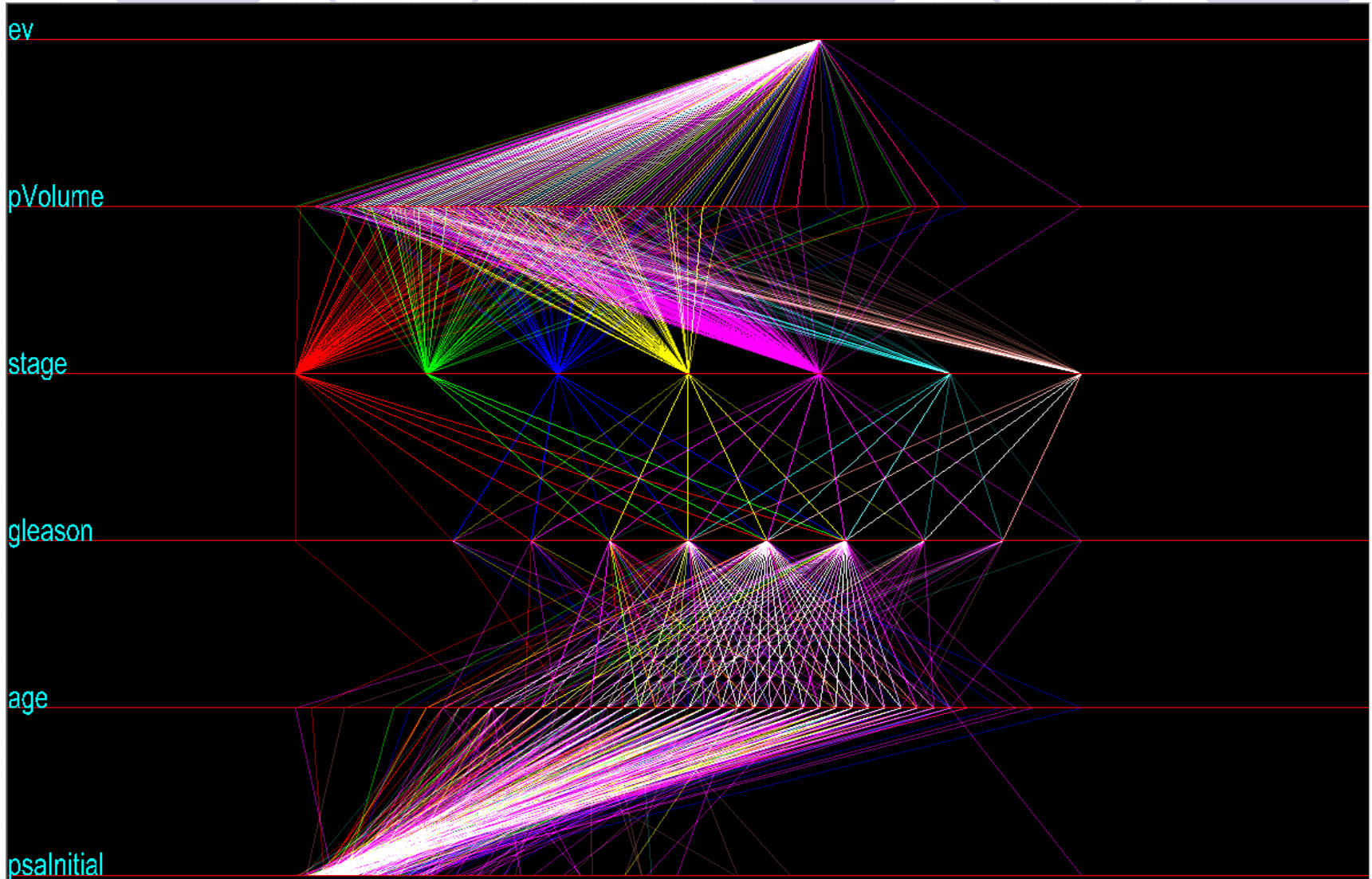
Intermediate Risk Patients n 74



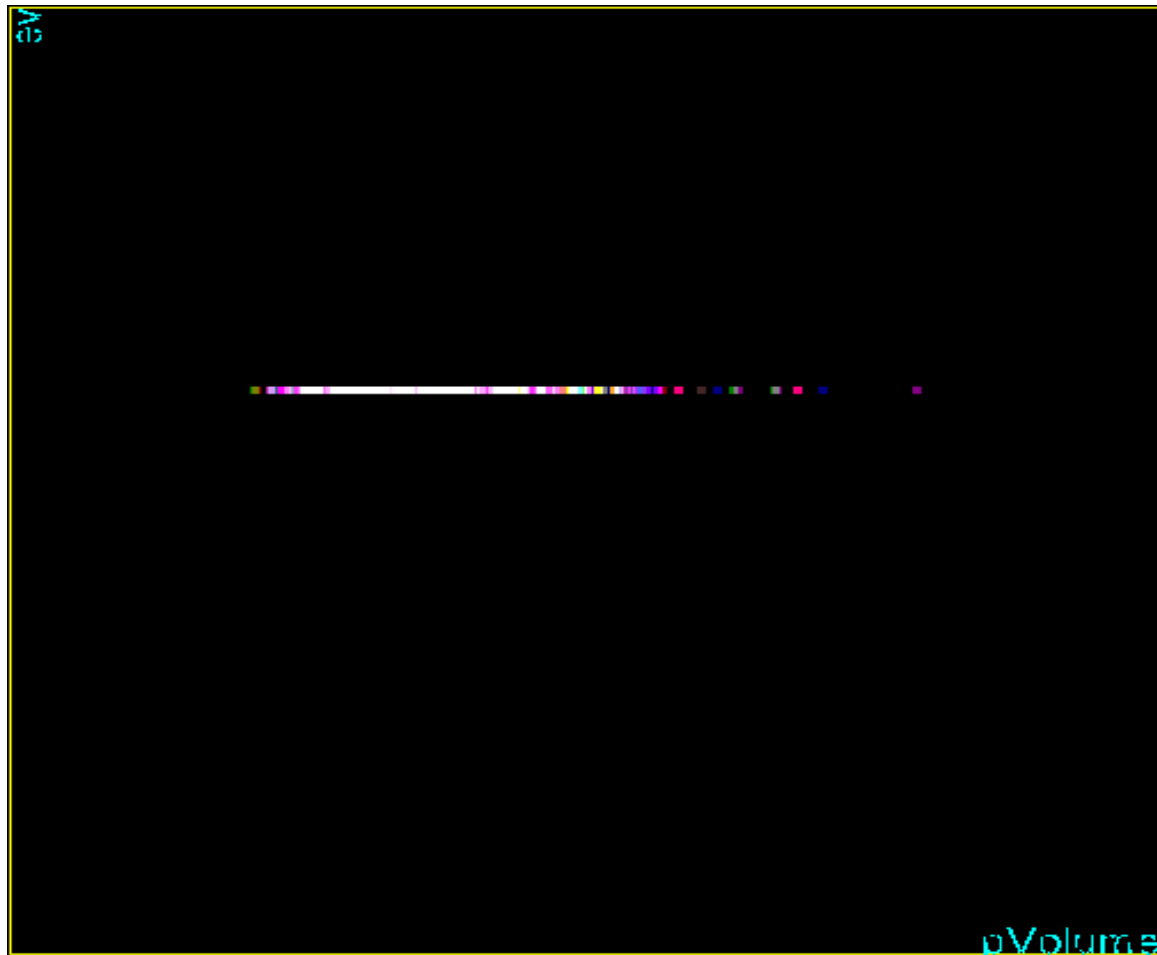
Low Risk Patient n 144



Successful Patients under 3DCTGB



Successful Patients under 3DCTGB





Discussion and Conclusion

- Successful patients under 3DCTGB have low initial PSA
- Patients who failed under 3DCTGB have both high Gleason's score and stage
- Outliers indicate that old age or a high initial PSA value may also lead to failure