



## Stage: SEVERE

### Metadata Snapshot

Name: solomon

Age: 78

Gender: Female

Systolic (mmHg): 180

Diastolic (mmHg): 1180

BMI: 30.8

Glucose: 376

HbA1c: 8.6

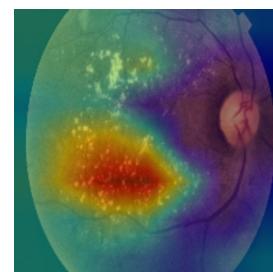
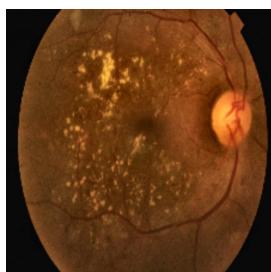
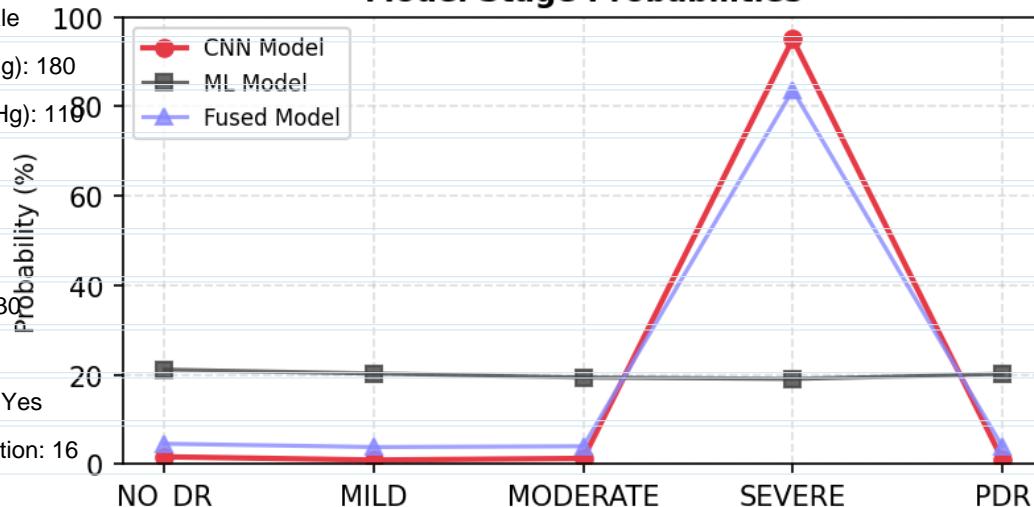
Cholesterol: 230

Smoking: Yes

Hypertension: Yes

Diabetes Duration: 16

### Model Stage Probabilities



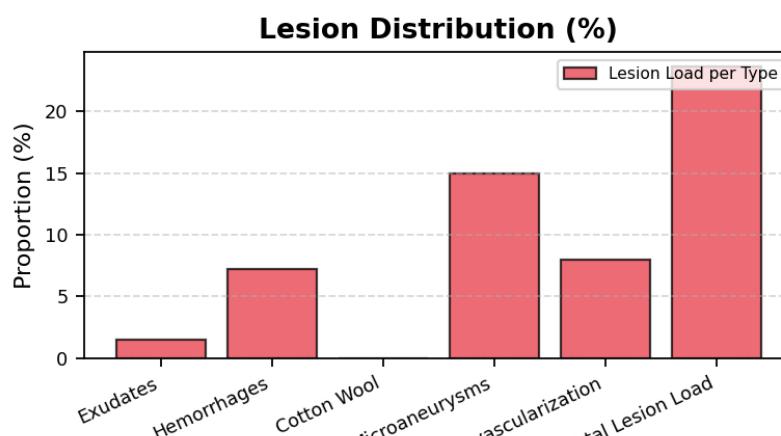
### Research Findings

- Research Notes
- UID: 217c1444
- Predicted stage: SEVERE
- Confidence: 83.6%

# Research Findings

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- Risk score: 95.42%
- Model stack & inference
  - CNN ensemble: EfficientNet, ResNet50, ViT
  - Metadata models: Random Forest, XGBoost, Stacked ensemble
  - Fusion method: weighted averaging with risk calibration
- - Inference device: CPU
- Explainability & lesion quantification:
  - Microaneurysms: 14.99%
  - Exudates: 1.44%
  - Hemorrhages: 7.17%
  - Cotton Wool: 0.00%
  - Neovascularization: 7.99%
  - Total Lesion Load: 23.61%
- SHAP / feature importance: check SHAP plots for systemic features (HbA1c, BMI, BP).
- Probability vectors:
  - CNN: [0.01661859080195427, 0.009372644126415253, 0.012959725223481655, 0.9499325752258301, 0.011116418056190014]
  - ML : [0.21136369507961952, 0.20268235745827803, 0.19376393050773666, 0.19047474400645248, 0.20171527294791336]
  - Fused: [0.04583035825762507, 0.03836910264489016, 0.04008035760254893, 0.8360139336333661, 0.03970624786156982]
- Performance metrics:
  - Accuracy: 0.947
  - F1-score: 0.938
  - AUC/ROC: 0.971
- Research recommendations:
  1. Validate lesion segmentation / cotton-wool detection against annotated masks (report dice/IoU).
  2. Add cotton-wool-spot specific augmentation and mask labels if false negatives observed.
  3. Measure GradCAM heatmap overlap (IoU) with human heatmaps for explainability calibration.
  4. Consider temporal models for progressive DR tracking and early-warning signals.



# Model Metrics

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- F1-score: 0.938
- AUC/ROC: 0.971