Supplementary Information

Appendix

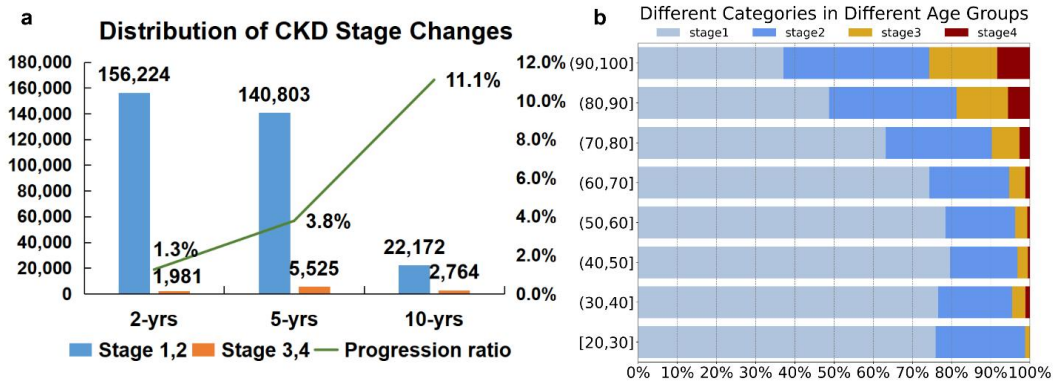

Fig. A1: Proportions of chronic kidney disease stages by age and the changes in 2-, 5- and 10-years

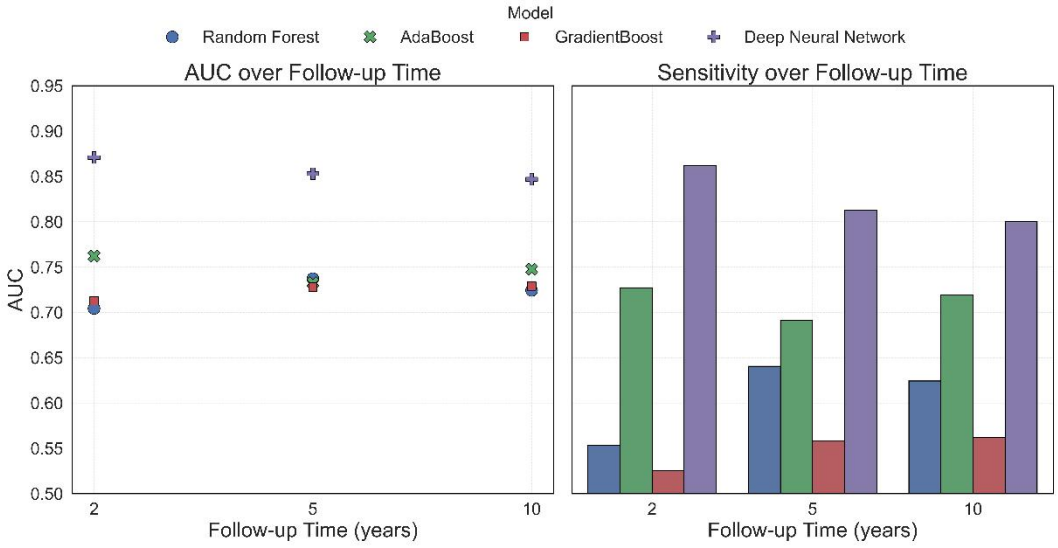

Fig. A2: Comparison of deep neural network performance with other machine learning models.

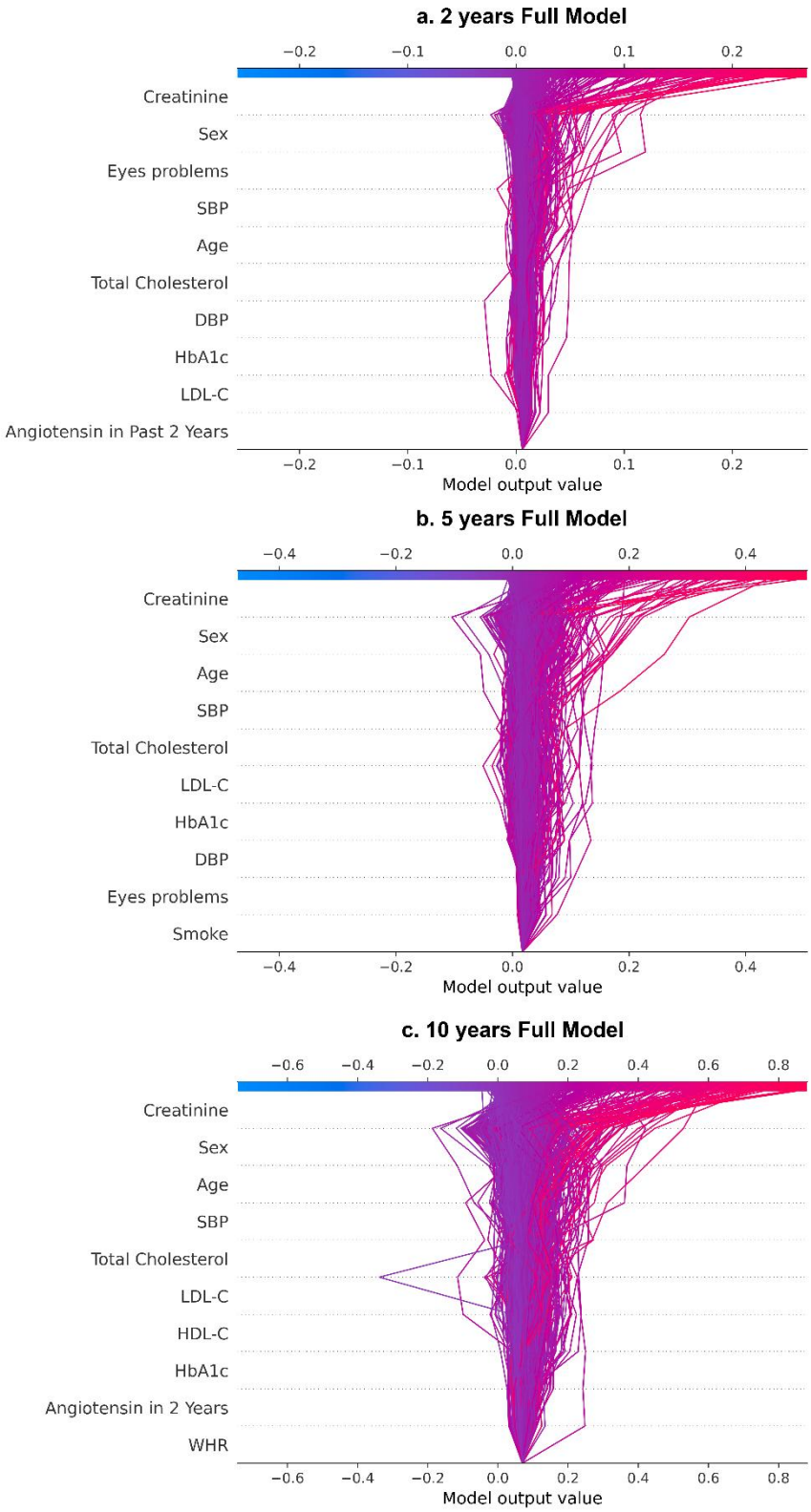

Fig. A3: Contribution of the features of the CKD progression prediction model to the model output at different follow-up years

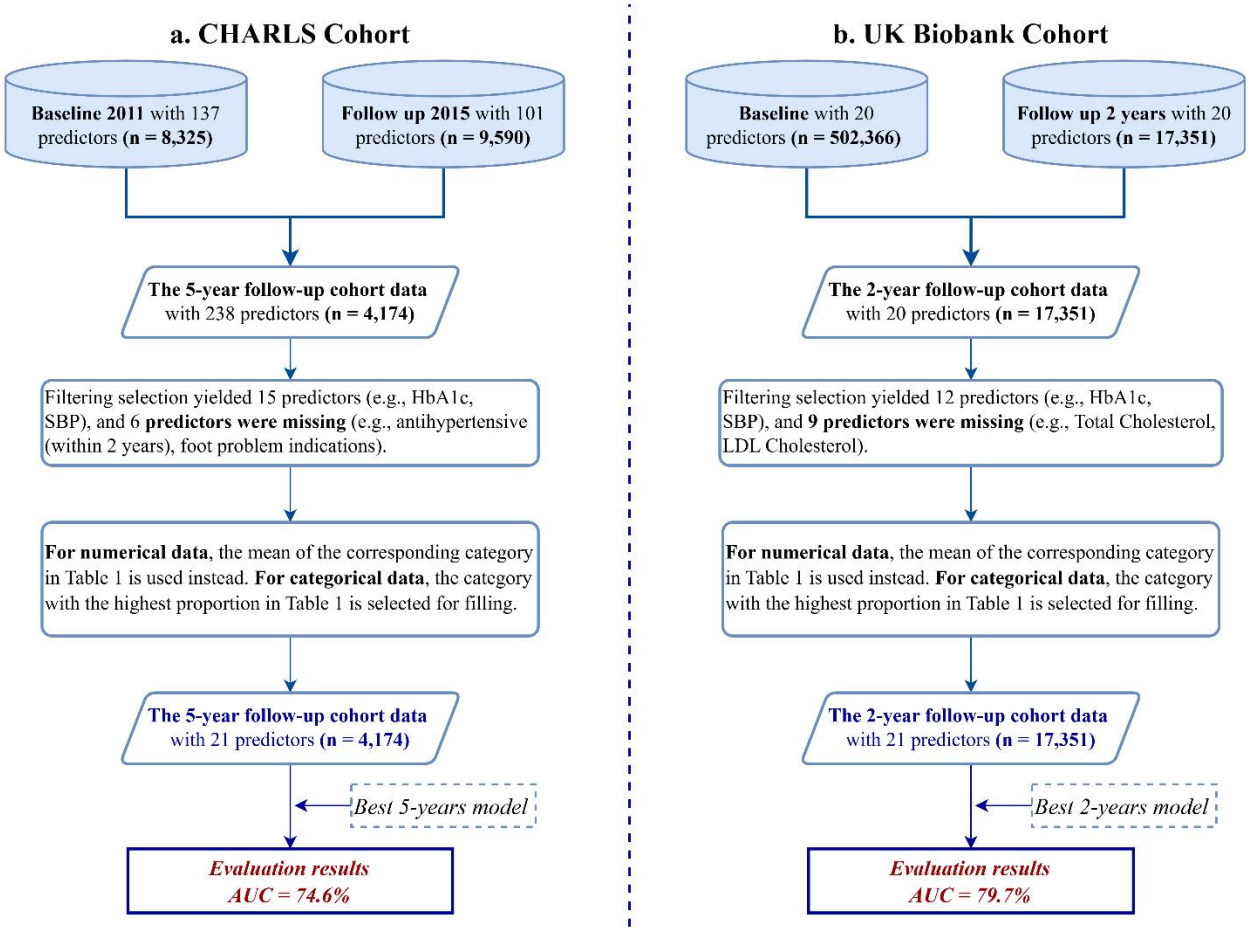

Fig. A4: Workflow for external evaluation of CHARLS and UK Biobank data

Table A1: Deep neural network model performance compares with machine leaning models

Follow up time （years）	*Model*	*Oversampling approaches*	*AUC*	*Sensitivity*
2	*Random Forest*	*ADASYN*	0.7043	0.5534
5	*Random Forest*	*ADASYN*	0.7372	0.6406
10	*Random Forest*	*ADASYN*	0.7242	0.6243
2	*AdaBoost*	*ADASYN*	0.7622	0.7273
5	*AdaBoost*	*ADASYN*	0.7327	0.6912
10	*AdaBoost*	*ADASYN*	0.7476	0.7190
2	*GradientBoost*	*ADASYN*	0.7127	0.5252
5	*GradientBoost*	*NAN*	0.7280	0.5581
10	*GradientBoost*	*NAN*	0.7290	0.5621
2	*Deep Neural Network*	*NAN*	**0.8710**	**0.8621**
5	*Deep Neural Network*	*NAN*	**0.8530**	**0.8129**
10	*Deep Neural Network*	*NAN*	**0.8470**	**0.8000**

Table A2: Comparison of the AUC and sensitivity of different deep learning models based on different oversampling techniques over different follow-up times.

Follow up time	*Model*	*oversampling approaches*	*AUC*	*Sensitivity*
2	*DNN model*	*N*	**0.8710**	**0.8621**
5	*DNN model*	*N*	0. 8530	0.8129
10	*DNN model*	*N*	0. 8470	0.8000
2	*DNN model*	*Borderline SMOTE*	0.7586	0.6429
5	*DNN model*	*ADASYN*	0.7768	0.6720
10	*DNN model*	*Borderline SMOTE*	0.7989	0.7543

Table A3. Weibull Accelerated Failure Time (AFT) Model Summary for CKD Progression

Variable	Coef	SE	95% CI (Coef)	exp(Coef)	z	p-value
lambda_ Intercept	2.42	0.03	[2.36, 2.49]	11.28	71.83	<0.005
lambda_ RiskScore	-1.28	0.10	[-1.48, -1.07]	0.28	-12.18	<0.005
rho_ Intercept	1.09	0.03	[1.03, 1.14]	2.97	38.92	<0.005