

## A Deep-Learning Based Prediction of Pancreatic Adenocarcinoma with Electronic Health Records from the State of Maine

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**Abstract :** Predicting the risk of Pancreatic Adenocarcinoma (PA) in advance can benefit the quality of care and potentially reduce population mortality and morbidity. The aim of this study was to develop and prospectively validate a risk prediction model to identify patients at risk of new incident PA as early as 3 months before the onset of PA in a statewide, general population in Maine. The PA prediction model was developed using Deep Neural Networks, a deep learning algorithm, with a 2-year electronic-health-record (EHR) cohort. Prospective results showed that our model identified 54.35% of all inpatient episodes of PA, and 91.20% of all PA that required subsequent chemoradiotherapy, with a lead-time of up to 3 months and a true alert of 67.62%. The risk assessment tool has attained an improved discriminative ability. It can be immediately deployed to the health system to provide automatic early warnings to adults at risk of PA. It has potential to identify personalized risk factors to facilitate customized PA interventions.

**Keywords :** cancer prediction, deep learning, electronic health records, pancreatic adenocarcinoma

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