NOVEL PREDICTION MODEL FOR SURGICAL SITE INFECTION OF COLON CANCER USING ARTIFICIAL INTELLIGENCE

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COI DISCLOSURE

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The speaker have no financial conflicts of interest to disclose concerning the presentation.

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BACKGROUND

- Surgical site infection (SSI) is a common postoperative complication and occurs in 5-40% of patients undergoing colorectal surgery.
- Increasing evidence suggests that postoperative infection is associated with poorer long-term outcome in various malignancies.
- This study aimed to preliminarily evaluate a novel artificial intelligence-based prediction model for SSI in patients with Stage II-III colon cancer.

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METHODS①

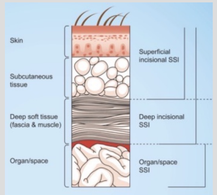
- Patients: January 2000 - October 2018
  763 patients who underwent radical surgery for Stage II-III colon cancer at our institute.
- Study design: A single center retrospective cohort study
- Primary endpoint: SSI incidence

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METHODS②

The definition of SSI:

- Superficial incisional SSI, Deep incisional SSI, Organ space SSI
- Clavian-Dindo Classification: Grade 1-3b



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METHODS③

Normal statistical analysis:

- Data were analyzed by univariate and multivariate analyses. The chi-square test and Kruskal-Wallis test were used for univariate analysis.
- Binomial logistic regression analysis was used to calculate the effect of variables on SSI incidence in multivariate analysis.
- Predictive accuracy was assessed by ROC curve analysis.

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METHODS④

Artificial intelligence:

- We used the machine learning software, **Prediction One** (https://predictionone.sony.biz; Sony Network Communications Inc.), to predict SSI incidence for Stage II-III colon cancer using the same model that was used for normal statistical analysis.
- ROC curve analysis was used to evaluate the accuracy of the artificial intelligence model as well.

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RESULTS①

Patient and tumor characteristics

- SSI occurred in 77(10.1%) patients.

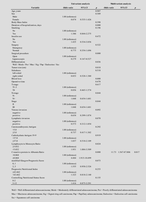


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RESULTS②

Prediction model using binomial logistic regression analysis

- In multivariate analysis, CAR (p=0.017, OR: 11.73 (95% CI: 1.567 – 87.806)) was the only independent risk factor for postoperative SSI.

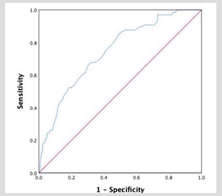


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RESULTS③

Prediction model using binomial logistic regression analysis

- The ROC curve of this multivariate analysis model for predicting SSI is shown below. The AUC value was **0.744** (95% CI: 0.684 – 0.804).

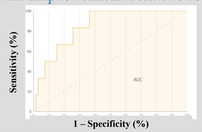


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RESULTS④

Artificial intelligence analysis

- The AI model was also used to predict SSI based on the same covariables. Data from 763 and 100 patients were used for the learning model and validation model, respectively.
- The ROC curve of the AI model is shown below. The AUC value was **0.851**, corresponding to a significant improvement relative to the multivariate analysis model.



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DISCUSSION

- Although the accuracy of the normal statistical model in the present study, which had an AUC value of 0.744, was as good as those previously reported, the AI model had an AUC of 0.851, which was significantly higher.
- In general, conventional statistical analysis using a general linear model focuses on explaining data, and is said to be inferior to AI in terms of predictive ability. Therefore, linear models might not be capable of adequately predicting outcomes, and this may explain the differences observed in predictive accuracy between the multivariate and AI models.

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