



# **Preoperative Prediction of Sinonasal Papilloma by Artificial Intelligence Using Nasal Video Endoscopy: A Retrospective Study**

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40<sup>th</sup> Congress of the International Society of Inflammation and Allergy of the Nose (ISIAN)  
22<sup>nd</sup> Congress of the International Rhinologic Society (IRS)

# Introduction

## Studies on artificial intelligence(AI)

**C**olorectal cancer diagnostic support system

**5,000** endoscopic images ▶ accuracy rate: **98%**

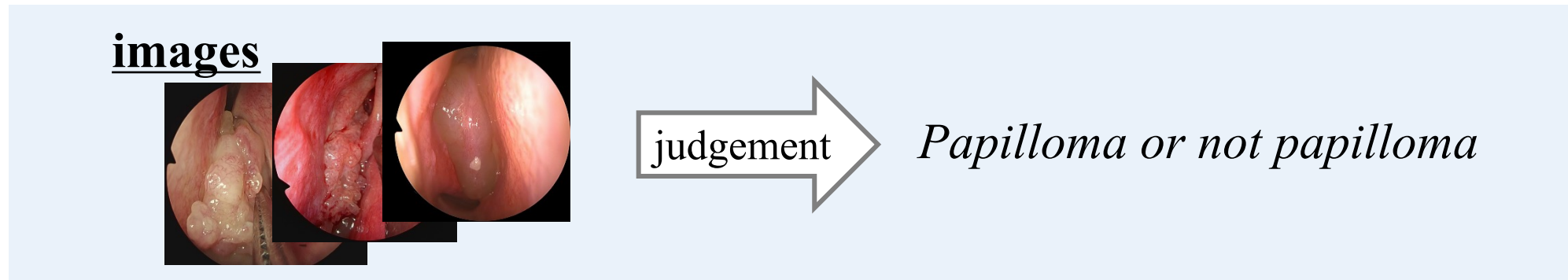
Yamada M, Sci Rep. , 2019.

**S**kin cancer diagnostic support system

**5,000** skin tumor images ▶ accuracy rate: **92%**

Esteva A, Nature, 2017.

▶ **There are few reports of the application in nasal sinus diseases.**



▶ **Nasal sinus diseases are not very common and it was difficult to collect a large number of cases.**

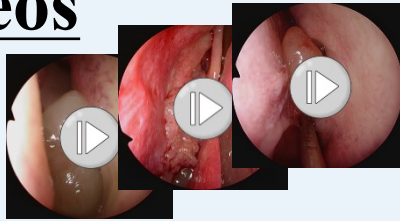


# Introduction

more information

We collected endoscopic videos instead of ~~endoscopic images~~.

videos

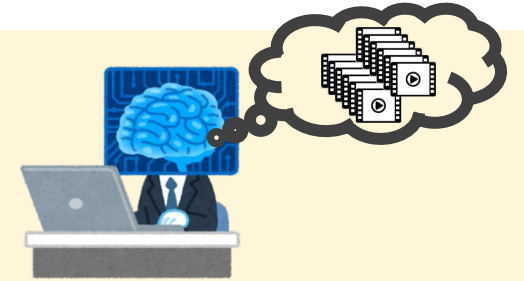


judgement

*Papilloma or not papilloma*

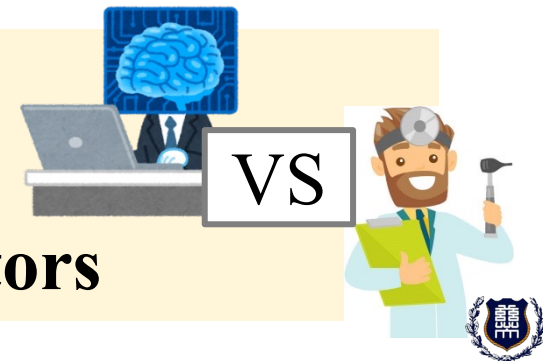
## Objective 01

to investigate the potential of **AI diagnostic models** in improving the accuracy of endoscopic diagnosis



## Objective 02

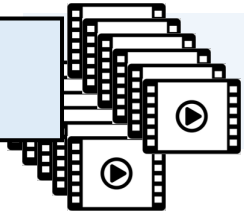
to evaluate the model's accuracy by comparing the rate of correct diagnoses made by it with those made by **ENT doctors**



# Materials and Methods

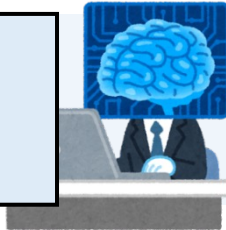
Patients: papilloma 21 cases, CRS with nasal polyp 32 cases

Editing videos



surgical endoscopic videos ▷ 2-3 minutes

Developing a diagnostic system



training on nasal endoscopy videos repeatedly

Visual examination by otolaryngologists



We engaged 25 ENT staff members who viewed all the videos and answered the questions.



# Results



$$(\text{Sensitivity} + \text{Specificity}) \div 2$$

Method	Model	Sensitivity	Specificity	Average
Continuity analysis	Single	77.9%	86.0%	82.0%
	Ensemble	81.0%	87.3%	84.1%
Five-second scoring analysis	Single	77.5%	86.9%	82.2%
	<b>Ensemble</b>	<b><u>81.0%</u></b>	<b><u>87.6%</u></b>	<b><u>84.3%</u></b>

our original methods and models to predict

**Despite the limited and small number of cases, we were able to construct an AI diagnostic model with an 84.3% accuracy rate.**



# Results

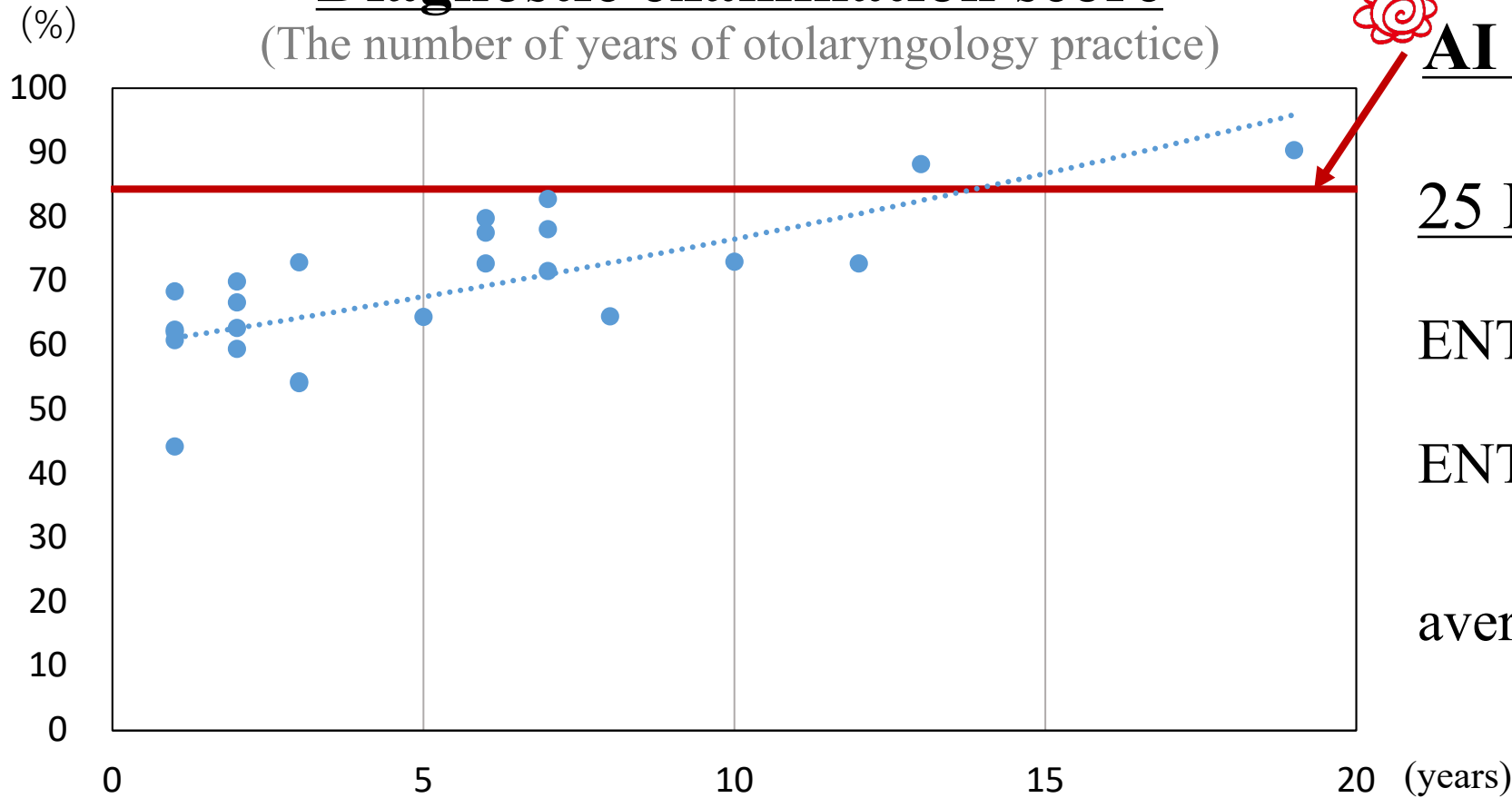


VS



## Diagnostic examination score

(The number of years of otolaryngology practice)



AI model ...84.3%

25 ENT doctors

ENT residents...61.8 ± 7.9%

ENT specialists...77.6 ± 7.3%

(>5 years)

(\* :<0.01)

average...69.4 ± 10.9%

**The accuracy of this AI model exceeded not only the overall average of the ENT doctors but also that of the experienced doctors.**





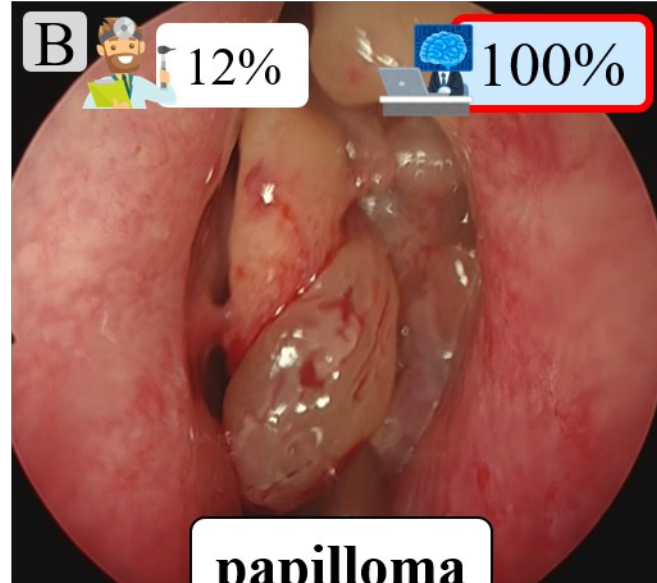
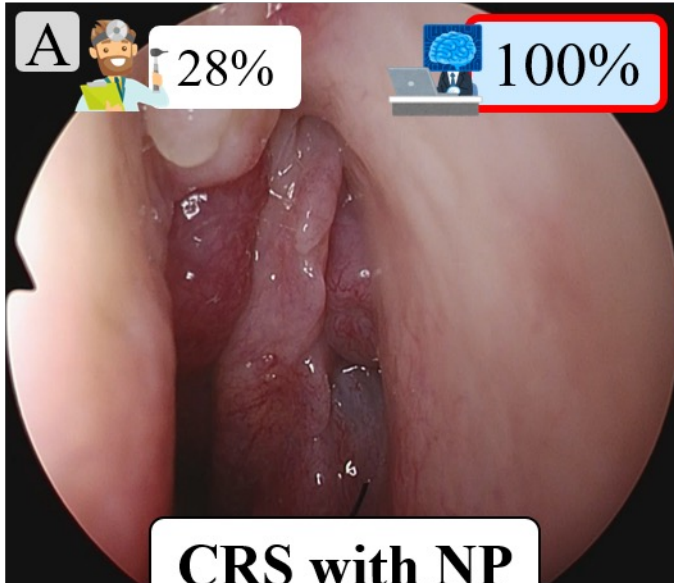
# Discussion -Accuracy rate-



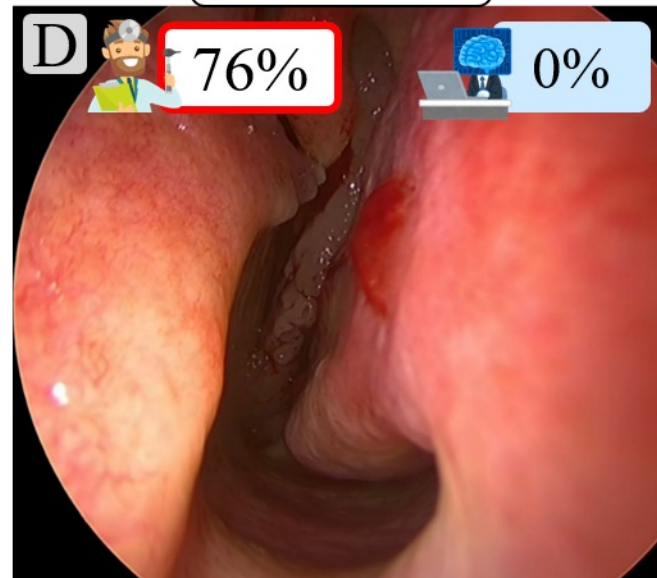
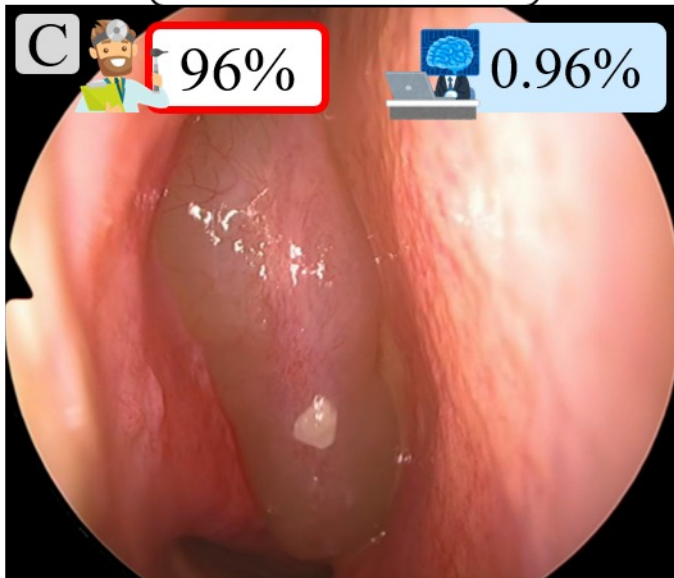
ENT doctors



AI model



AI can provide accurate diagnoses in cases difficult for humans to determine.



AI and ENT doctors differ in cases with high accuracy rates.





# Discussion

-To enhance the accuracy-

## - The recognition differs between humans and AI.

AI is not good at detecting small lesions in the image. Yamada M, Sci Rep, 2019.

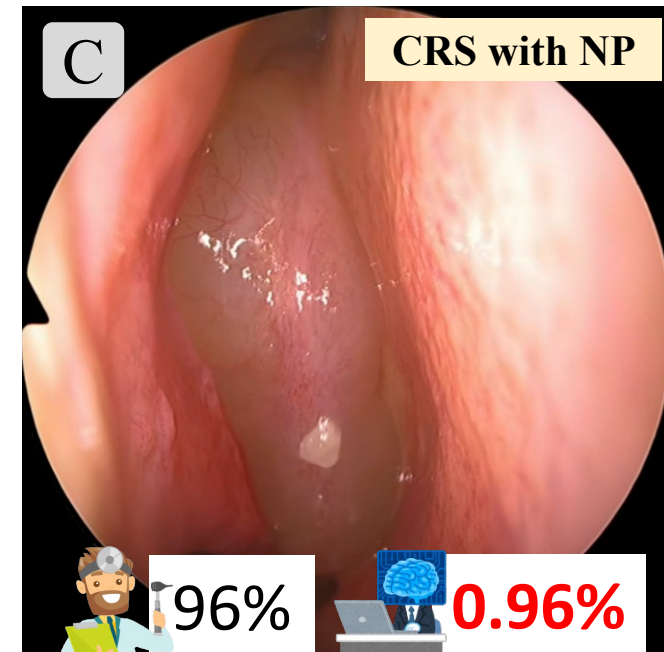
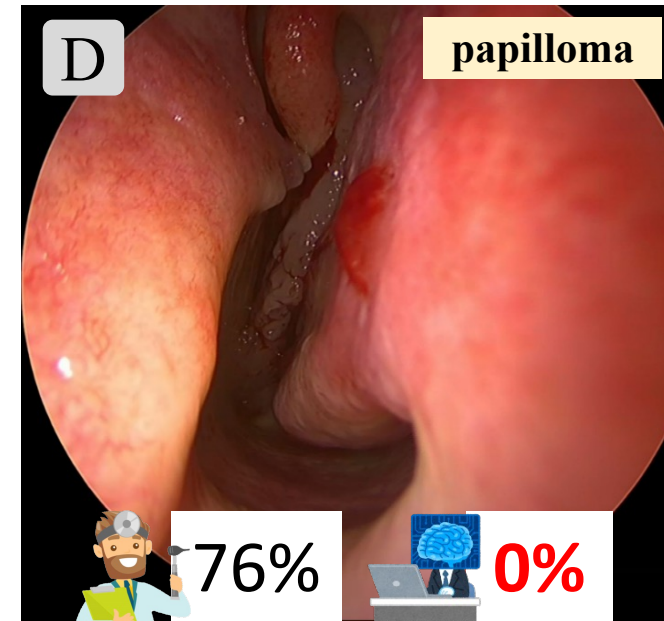
▷ Capturing more close-up images

## - AI may misdiagnose cases with obvious findings, as in the lower right image, if there are no similar findings in the machine learning data.

Biased medical images in machine learning can adversely affect model performance.

Baxter JSH, Comput Assist Surg, 2022.

▷ Increasing the number of cases



# Conclusion

- 🗨️ We have developed a highly accurate AI model using endoscopic videos from a limited number of cases.
- 🗨️ As there are certain cases with low AI accuracy, the objective of future studies will be to enhance the accuracy by standardizing imaging methods and including more cases.
- 🗨️ As many otolaryngological diseases are not common, we aim to expand this method to other diseases.

