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INTRODUCTION

- Cancer diagnosis in an emergency setting is associated with substantially poorer outcomes compared to other diagnostic routes, even for the same cancer type and stage.^{1,2}
- In England, ~20% of all cancer diagnoses are made after emergency presentation (EP). Across cancer types, the proportion diagnosed through emergency presentation ranges from 5% of breast and 9% of prostate cancers, to 32% of lung and stomach, 35% of liver, and 44% of pancreatic cancers.³
- Survival outcomes vary substantially by diagnostic route. For example, 5-year net survival in England for stage III colorectal cancer diagnosed via screening is 83%, but just 48% if diagnosed in an emergency setting (Figure S1).⁴
- Avoiding EPs through screening could thereby represent an opportunity to improve patient outcomes.

OBJECTIVES

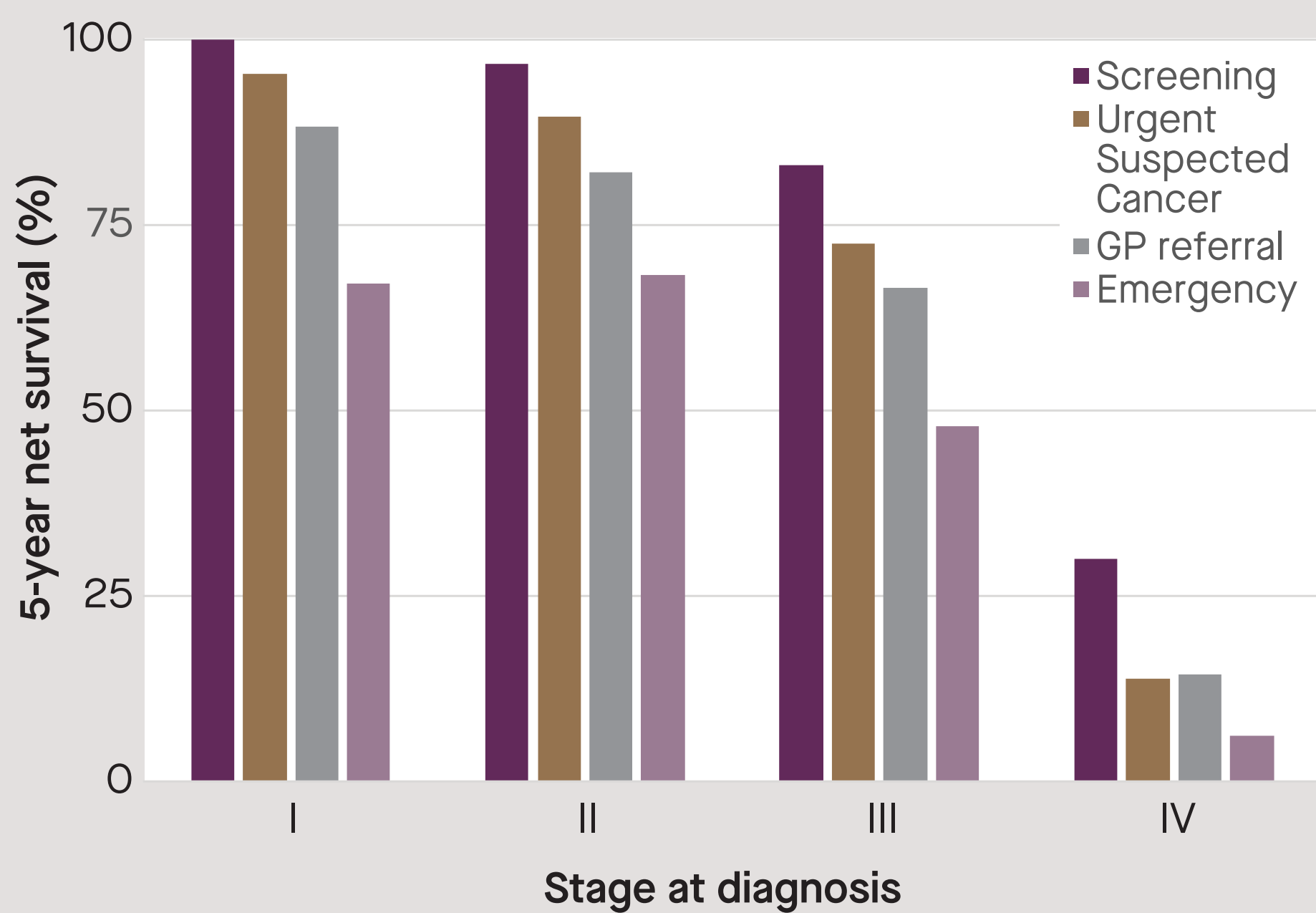
- We report the reduction in cancers diagnosed via EPs in the NHS-Galleri trial⁵, a randomised controlled trial of a multi-cancer early detection (MCED) screening test.
- Based on insights from NHS-Galleri, we estimate the potential population impact of MCED screening on EPs in England, under a range of population screening uptake scenarios.

METHODS

- Information on cancers diagnosed in the NHS-Galleri trial, including route to diagnosis, was collected via linked national cancer registration and healthcare datasets.
 - EPs in the intervention (MCED screening) arm were compared to the control arm (blood sample stored) after 3 screening rounds with ~12 months follow-up after each round.
 - The percentage reduction in EPs was calculated for all cancers combined and a group of 12 pre-specified high-mortality cancer types which includes: anus, bladder, colon/rectum, head and neck, liver/bile-duct, lung, lymphoma, oesophagus, ovary, pancreas, plasma cell neoplasm, stomach.
- Incidence data by route to diagnosis, cancer type and stage for patients diagnosed in England (2016–2020) was obtained from the National Disease Registration Service (NDRS). Population data were restricted to adults aged 50–79 years to approximate the age range represented in the trial.
- In the estimation of impact on stage III and IV cancers, population data were adjusted to reflect the stage distribution in the trial intervention arm as a result of MCED screening.
 - Proportions of stage IV or stage III/IV diagnoses observed in the trial after 3 annual screening rounds and ~12 months follow-up were applied to population denominators.

SUPPORTING DATA

Figure S1. Five-year net survival for colorectal cancer by stage and route to diagnosis: adults aged 50–79 years in England (2016–2020)⁴



AROUND 4800 EMERGENCY PRESENTATIONS COULD BE AVOIDED EACH YEAR THROUGH A NATIONAL MCED SCREENING PROGRAMME IN ENGLAND

CANCERS DIAGNOSED VIA EMERGENCY PRESENTATION IN THE NHS-GALLERI TRIAL

- Percentage reductions in EPs (in intervention vs control arm) for 12 pre-specified high-mortality cancer types were 28% for all stages, 42% for cancers diagnosed at stage III/IV, and 49% for cancers diagnosed at stage IV (Table 1).
- For all cancers combined, reductions in EPs were 21% for all stages, 39% for stage III/IV, and 48% for stage IV diagnoses.

Table 1. Cancers diagnosed via emergency presentation in the NHS-Galleri trial over 3 annual screening rounds with ~12 months follow-up after each round

	12 pre-specified high-mortality cancers ¹			All cancers types		
	Intervention arm	Control arm	% reduction	Intervention arm	Control arm	% reduction
All stages	135	188	28.2%	225	286	21.3%
Stage III/IV	81	141	42.6%	106	175	39.4%
Stage IV	55	108	49.1%	68	131	48.1%

¹Includes: anus, bladder, colon/rectum, head and neck, liver/bile-duct, lung, lymphoma, oesophagus, ovary, pancreas, plasma cell neoplasm, stomach

CANCERS DIAGNOSED VIA EMERGENCY PRESENTATION IN ENGLAND

- Among adults aged 50–79 years in England, there are ~32,500 cancers (all types excl. non-melanoma skin cancer) diagnosed via emergency presentation each year.
 - A 21% reduction (for all cancer types) would equate to~3400 fewer EPs each year with 50% MCED screening uptake, and ~4800 fewer EPs each year with 70% uptake (Table 2).
 - The majority of the reduction in EPs would be for stage III and IV cancers (Figure 1).
- For the group of 12 pre-specified high-mortality cancer types, there are ~22,500 cancers diagnosed via EP.
 - A 28% reduction (for the 12 pre-specified high-mortality cancers) could mean between 3100 (50% uptake) and 4400 (70% uptake) fewer cancers diagnosed as EPs annually (Table 2).

Figure 1. Predicted annual reduction in the number of cancers diagnosed via emergency presentation in England under a range of MCED screening uptake scenarios and assuming a linear relationship: all cancers, by stage

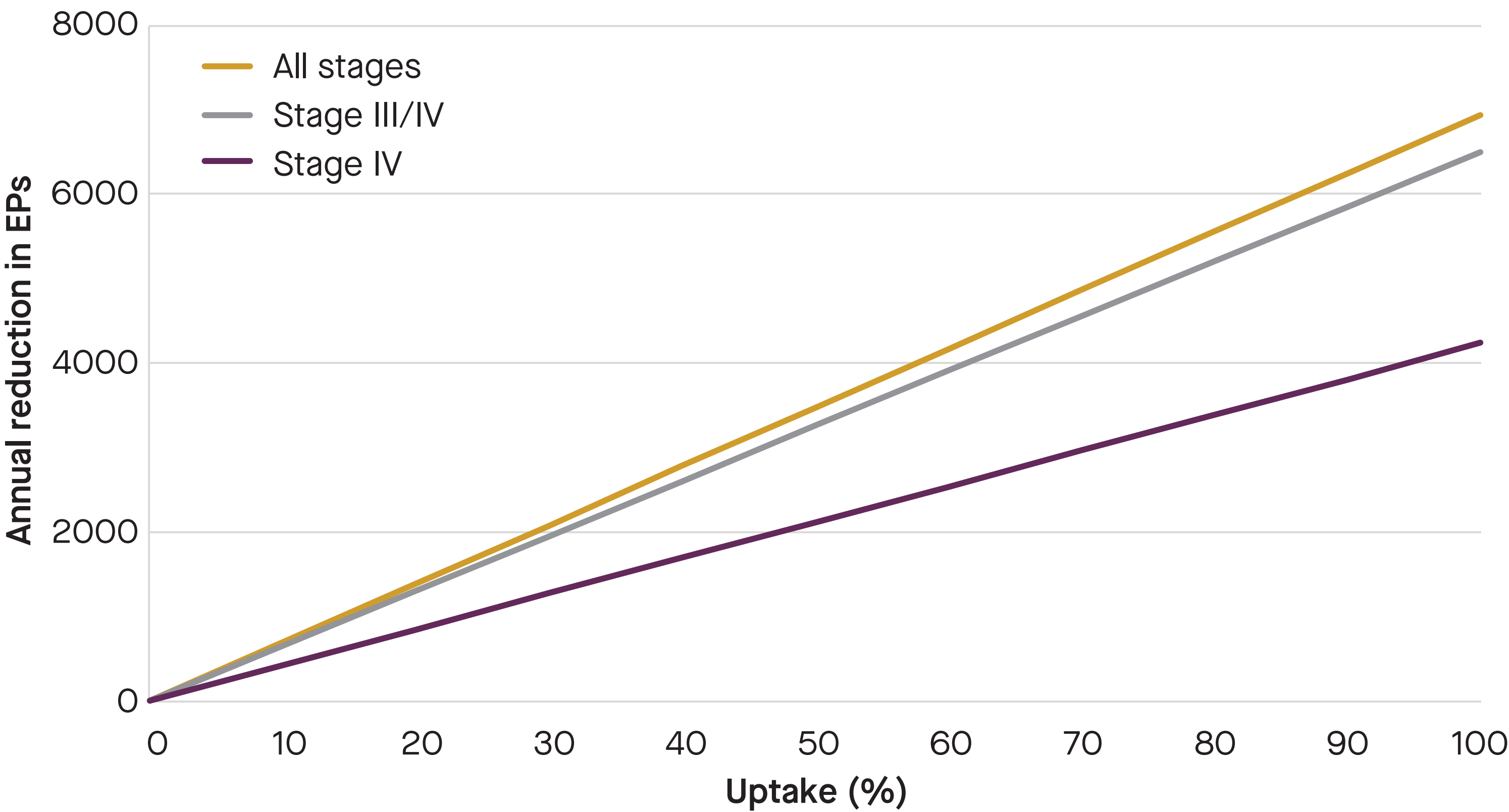


Table 2. Predicted annual reduction in the number of cancers diagnosed via emergency presentation in England under 50% and 70% MCED screening uptake scenarios

	12 pre-specified high-mortality cancers			All cancers		
	% reduction in EPs in NHS-Galleri ¹	Reduction in EPs in England		% reduction in EPs in NHS-Galleri ¹	Reduction in EPs in England	
		50% uptake	70% uptake		50% uptake	70% uptake
All stages	28.2%	3185	4459	21.3%	3472	4861
Stage III/IV ²	42.6%	2829	3961	39.4%	3254	4556
Stage IV ²	49.1%	1912	2677	48.1%	2117	2965

¹Average % reduction in EPs (for the 12 pre-specified high-mortality cancers, and all cancers combined) is weighted by the cancer types in the trial population.

²National population denominators are adjusted for differences in cancer incidence by stage in the intervention arm of the NHS-Galleri trial.

CONCLUSIONS

- If the reductions in EPs in the NHS-Galleri trial can be realised with a national MCED screening programme in England, around 4800 patients each year could benefit by avoiding a diagnostic route associated with poor survival outcomes.
- For the greatest population benefit, implementation of MCED screening must reach those most at risk of an emergency cancer presentation⁶.
- Further insight into the survival gain from avoiding diagnosis in an emergency setting, particularly with a screening programme, will help to quantify the potential benefit at the individual and population level.

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Disclosures

Study funded by GRAIL, Inc. LE, EG, RS and WL are current or former employees of GRAIL, Inc., with equity in the company.

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