Clinically validated line of therapy (LoT) algorithm for patients with metastatic non-small cell lung cancer (mNSCLC) can be implemented using systemic anti-cancer therapy (SACT) in Observational Medical Outcomes Partnership (OMOP) database

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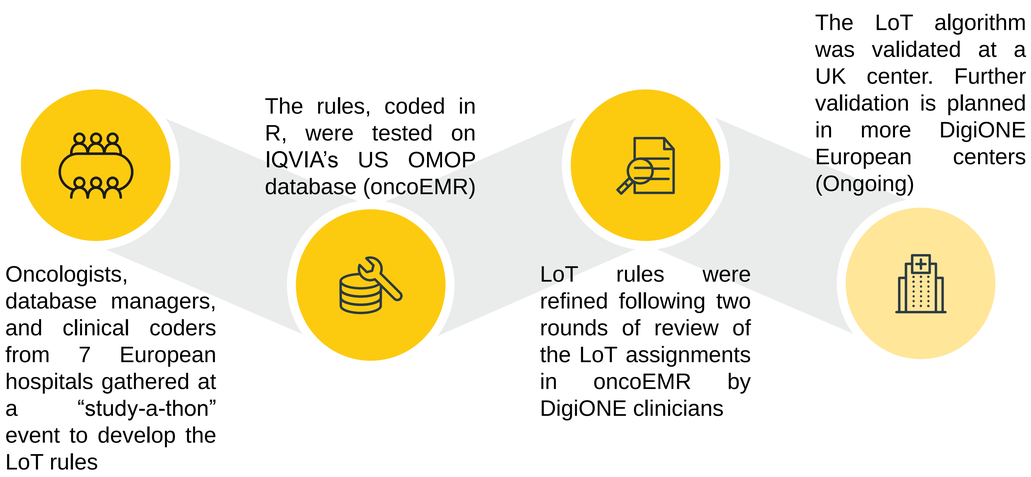
INTRODUCTION

- An accurate assignment of line of therapy (LoT) received is important in observational studies to assess response to therapy and prognosis, patient suitability for interventional trials, and for clinical audits[1].
- Currently, no common definition exists for LoT between hospitals and research groups which is straightforward to code.
- Here, Digital Oncology Network for Europe (DigiONE) introduces the approach to developing a clinically validated LoT algorithm specifically for mNSCLC and its key principles.
- The fundamental concept of LoT algorithm is that LoT advances when there is clinical progression of disease. However, since date of progression is typically manually inputted, which can vary in consistency across hospitals, this LoT algorithm infers disease progression based on drug-level data.
- The LoT algorithm developed considers SACT prescribed for mNSCLC with palliative intent in the real-world, including the use of any trial drugs.

METHODS

The DigiONE mNSCLC LoT algorithm development and validation involved four steps:



RESULTS

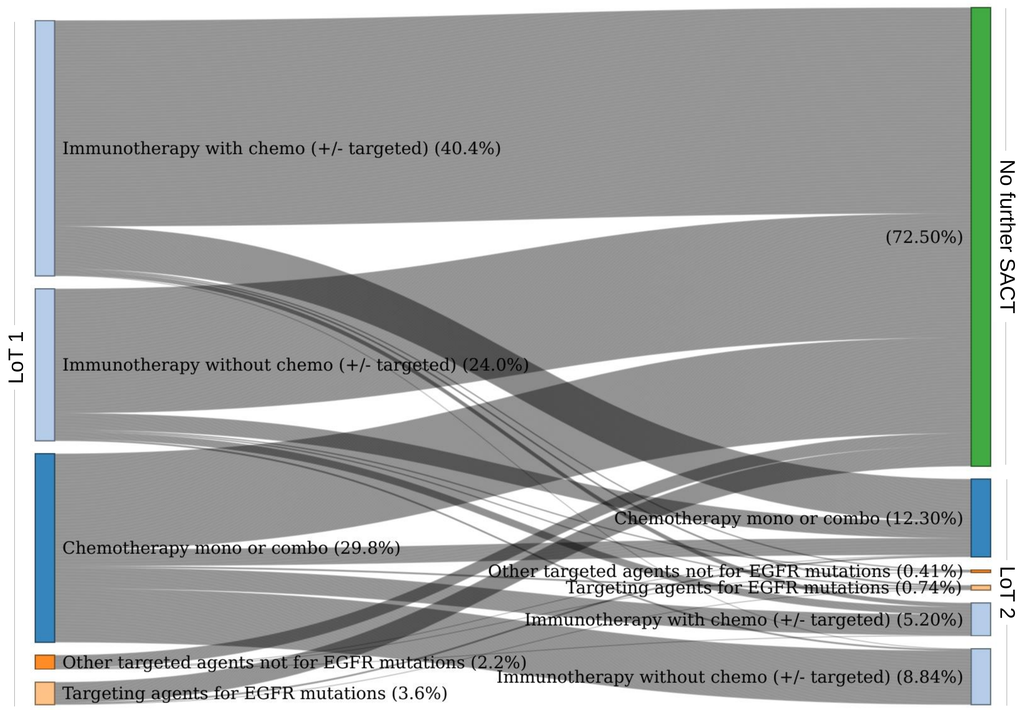
- The current DigiONE mNSCLC LoT algorithm rules (principles described in Table 1) were applied to oncoEMR in OMOP.
- Patients with another non-NSCLC primary malignancies were excluded to avoid capturing SACT prescribed for other malignancies.

Table 1. Principles of the DigiONE mNSCLC LoT algorithm

Rule	Rule definition
Start date of LoT	Earliest drug start date in the LoT. LoT may start before mNSCLC diagnosis due to early SACT initiation based on suspected metastases prior to confirmation from biopsy results
Grouping SACT into LoT	A LoT can consist of one or multiple regimens, and regimens may include one or multiple drugs with different start dates. Drugs that share the same start date are considered as a 'protocol'
Treatment changes that <u>do not</u> advance the LoT	If one or more drugs are stopped while other concurrently prescribed drugs continue
	If the dosage or administration route is changed, but the drug continues to be prescribed
	Switching between certain drugs which are presumed to be for toxicity reasons rather than for clinical progression of disease. Examples include • carboplatin and cisplatin • paclitaxel and nab-paclitaxel • pemetrexed, vinorelbine and gemcitabine with the same platinum-based therapy partner • PD1 and PDL1 inhibitors • first- and second-generation EGFR TKIs • targeted therapies that target the same mutations
	Stopping a drug for any duration if the same drug is initiated after the break
Treatment changes that <u>do</u> advance the LoT	Addition of a new drug that is not concurrently prescribed with other drugs, unless the drug is in the list of allowable switches due to changes for toxicity reasons
End of LoT	The latest end date of drugs prescribed within the LoT. If a patient has a date of death prior to the end date of the treatment in the database, the date of death is used as LoT end

- In oncoEMR, there were 2,302 eligible patients of which 52.6% received a 1st LoT and 14.5% received a 2nd LoT for mNSCLC (Figure 1).
- Reasons a patient may not initiate SACT for mNSCLC include they are deemed too unfit for SACT and therefore receive best supportive care, patient refuses treatment plan, or the patient dies before treatment is initiated[2]. This finding that approximately half of patients receive SACT for mNSCLC is aligned with clinical expectations[3].

Figure 1. Sankey diagram of treatment changes from 1st to 2nd LoT in oncoEMR



References

1. Saini K. S., Twelves C. Determining lines of therapy in patients with solid cancers: a proposed new systematic and comprehensive framework. Br J Cancer. 2021;125(2):155-63.
2. Hendriks L. E., Kerr K. M., Menis J., Mok T. S., Nestle U., Passaro A., et al. Non-oncogene-addicted metastatic non-small-cell lung cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Ann Oncol. 2023;34(4):358-76.
3. Hofmarcher T., Lindgren P., Wilking N. Systemic anti-cancer therapy patterns in advanced non-small cell lung cancer in Europe. J Cancer Policy. 2022;34:100362.

Acknowledgements

This work is part of the DigiCORE pan-European research network comprised of academic cancer centres and two industrial members (IQVIA and Illumina). The DigiONE project was funded by IQVIA and Illumina.

CONCLUSION

- Consistent application of a LoT algorithm is crucial for describing treatment and prognosis by LoT in multi-center cancer research.
- DigiONE introduced a **clinician-developed LoT algorithm** to group **SACT** prescribed for **mNSCLC**.
- The LoT algorithm **has been tested on US and UK OMOP databases**. There is **ongoing validation in other European centers** to assess its generalizability.
- The algorithm can be shared with researchers in the OHDSI community once finalized and is **most applicable within Europe** where patients are managed similarly, and EMA approvals are practised.

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OHDSI Global Symposium 2024, Oct 23-24, New Jersey