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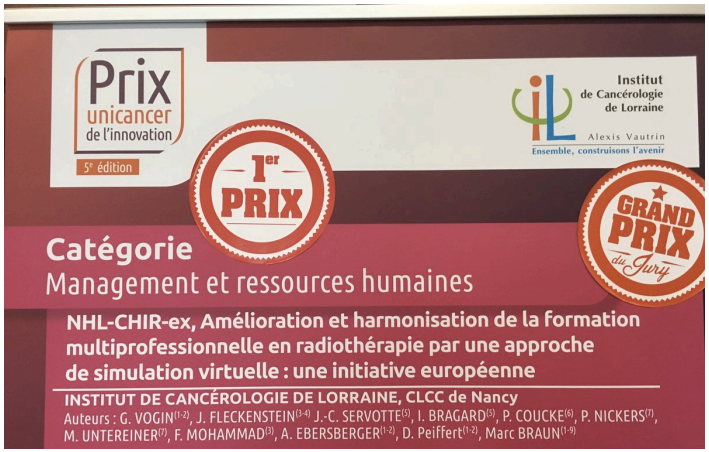
NHL
NANCY • HOMBOURG • LIÈGE • LUXEMBOURG
CHIREX

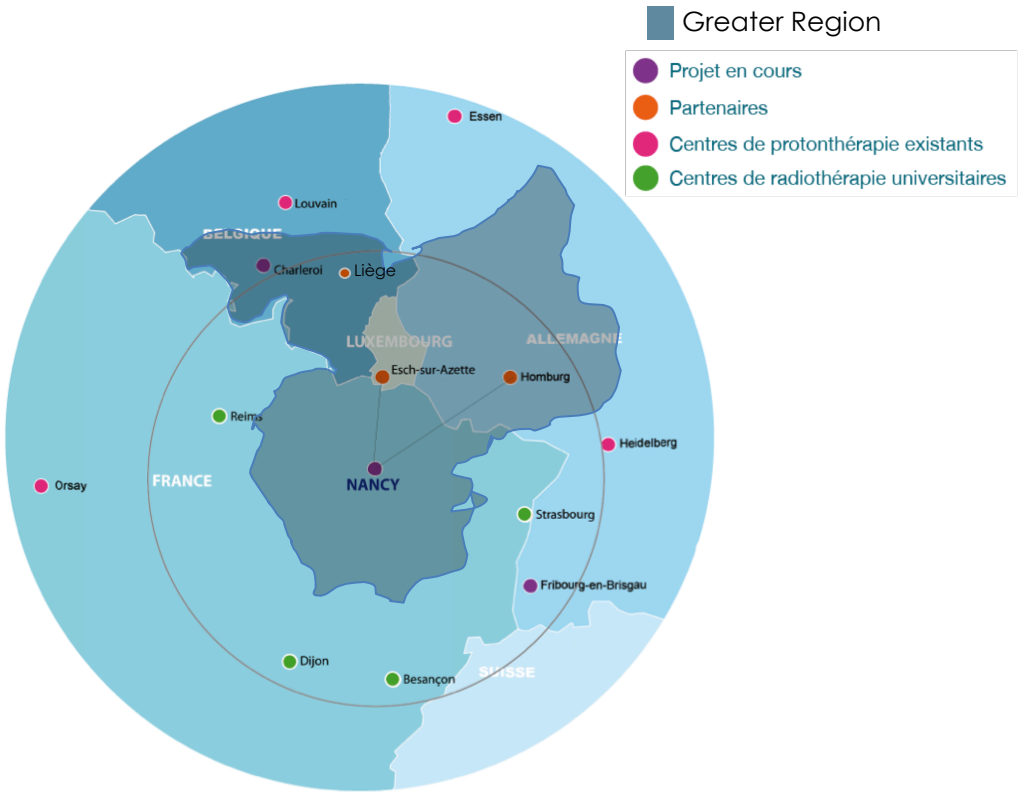


Pr. Guillaume Vogin MD, PhD
Centre François Baclesse, Luxembourg
Université de Lorraine
Université du Luxembourg

Interreg Grande Région | Großregion · NHL CHIREX · Université de Lorraine · Universität des Saarlandes · Liège université · CHU de Liège · Centre François Baclesse · Institut de Cancérologie de Lorraine Alexis Vautrin Ensemble, construisons l'avenir · Université de la Grande Région Universität der Großregion · Johannes Gutenberg Universität Mainz

Environment: the Greater Region

- GR: 11,5 M_{inhab}
- University of Greater Region
- 85 000 new cancer cases/y
- 5 universities & 6 associated sites + RTT schools
- a hundred professionals trained / year
- Poles of excellence in innovative pedagogy
- Common research topics



RT, a unique organizational model

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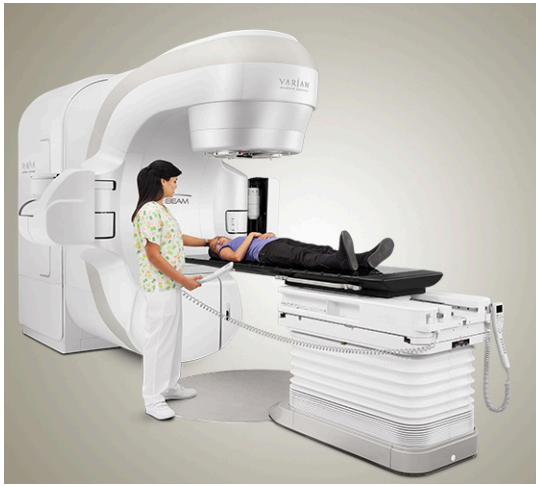
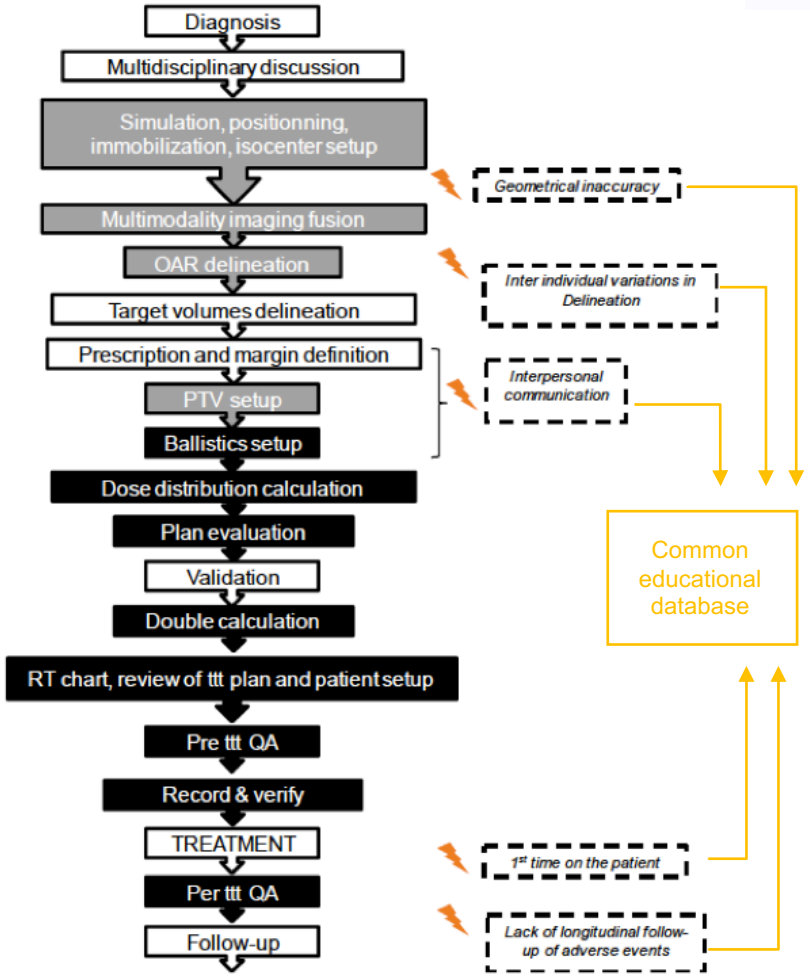


Supplementary and avoidable morbidity could be induced during some critical steps of the RT process.



Rationale

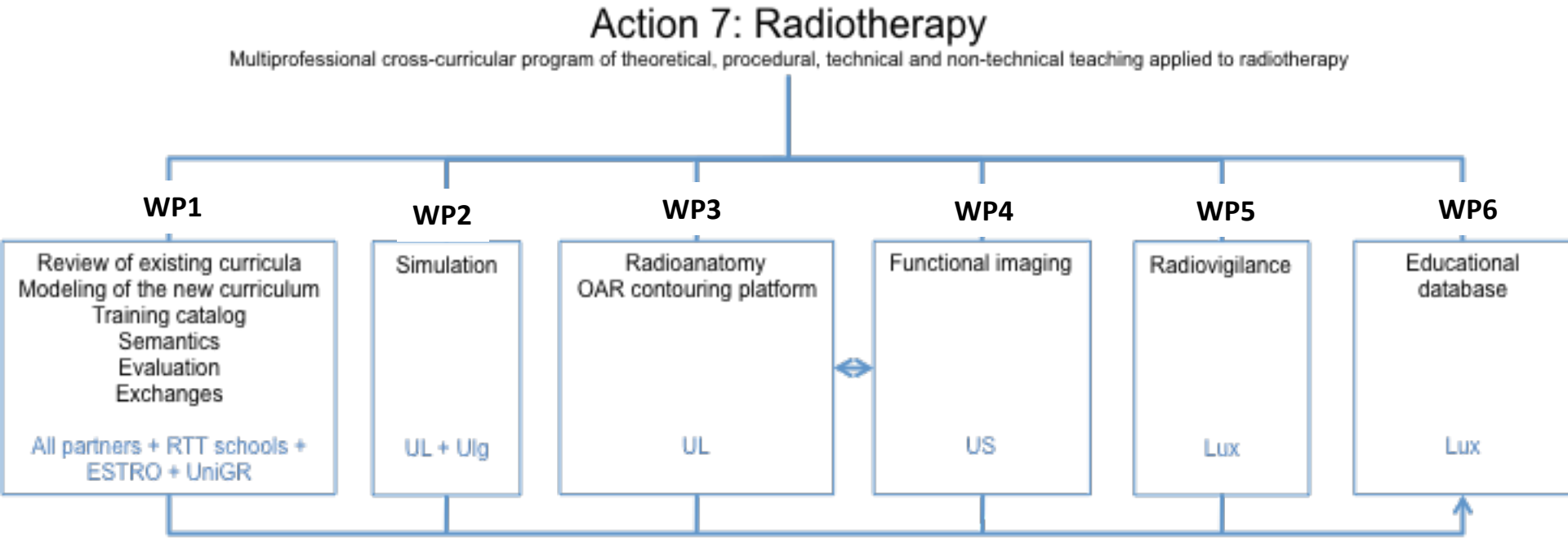
- 15 radiation oncologists, as many medical physicists, 80 RTT/dosimetrists and a few quality managers trained in the GR each year
- limited cross-border exchange
- European core curricula BUT initial training highly heterogeneous
- Interprofessional Education (IPE) initiatives within the field of RT are lacking

Strenghts to pool

- Each partner's educational innovations
  - simulation learning in Liège
  - functional imaging in Homburg
  - EU-awarded excellence simulation center "*Hôpital Virtuel de Lorraine*" (HVL) in Nancy
  - radiation vigilance in Luxembourg

+ methodological partners : UniGR, ICL, Gutenberg University Mainz Medical School

Workplan



Standardized data

WP2: Simulation - IPE

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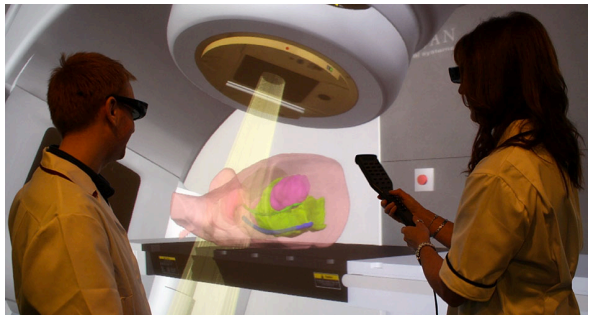
→ 3D radioanatomy, basics of radiophysics and instruments, RT concepts and techniques, positioning/immobilization and image acquisition procedures, introduction of simulated errors and impact on the patient and the trainee's behavior, comparison of ballistics, QA, maintenance of skills; improvement of IP communication.

→ Collaboration RTT schools network
→ Two virtual linacs will enrich the offer of the HVL.
  → delivered in July 2019 (HVL, Nancy)
→ 6 teachers trained in Nancy (2 RO & 4 RTT) in July 2019
→ Implementation in Nancy and Liege ; meeting @ Liege in June 2019
→ First sessions in Liège then Nancy



Courtesy of Vertual LTD

https://www.youtube.com/watch?v=rcT2tdjBNaQ

WP2: The tool

- https://www.vertual.co.uk/products/vert/

WP2: Simulation – IPE

- Liege **"Skills improvement in RO"**
  - Survey
  - 3+4+3 sessions in 2020-22
  - Public: RO and RTT

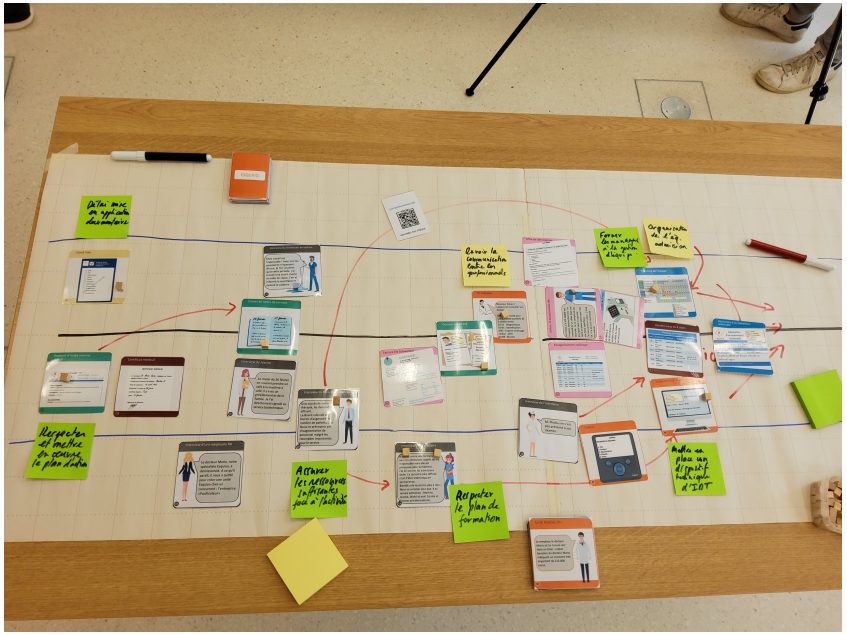
-

WP2: Simulation - IPE

- Nancy «**Advanced quality management in RO practice**»
  - E-learning + game
  - 2 scenarii
  - Training in 2022

WP2 : serious game

- ESQUIVO



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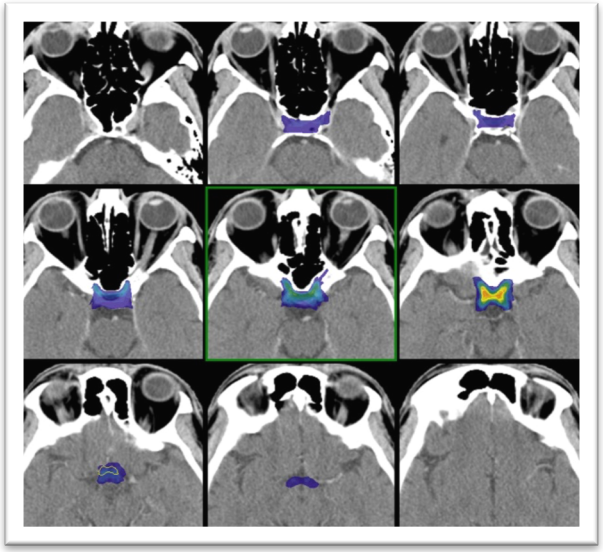
WP3: OAR contouring platform

- OAR Delineation = task devoted to RTT/dosimetrist, physicist, resident, senior RO
- Heterogeneous learning in radioanatomy
- Heterogeneous tools and practices available
- OAR over dosage risk if insufficient knowledge or skills
- Impact on clinical trials results
- **interest to homogenize OAR delineation practices among the participating RT centers (paper published)**



Vogin G, *Radiat Oncol* 2021

WP3: OAR contouring platform

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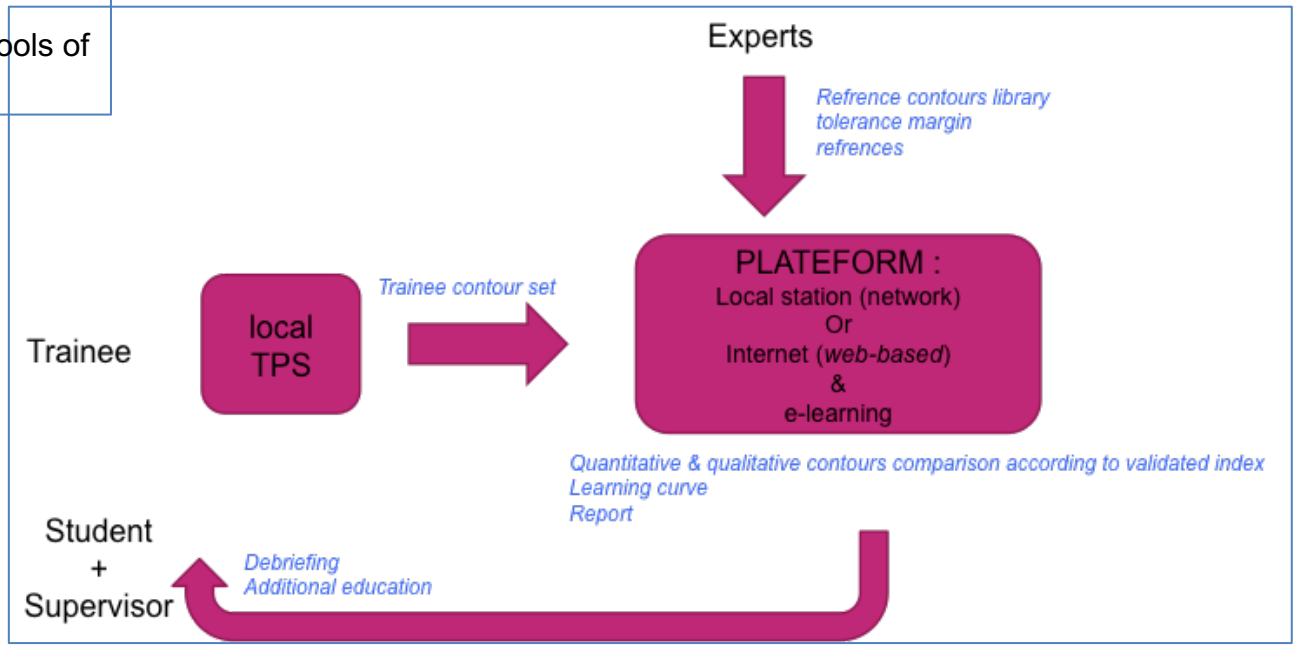
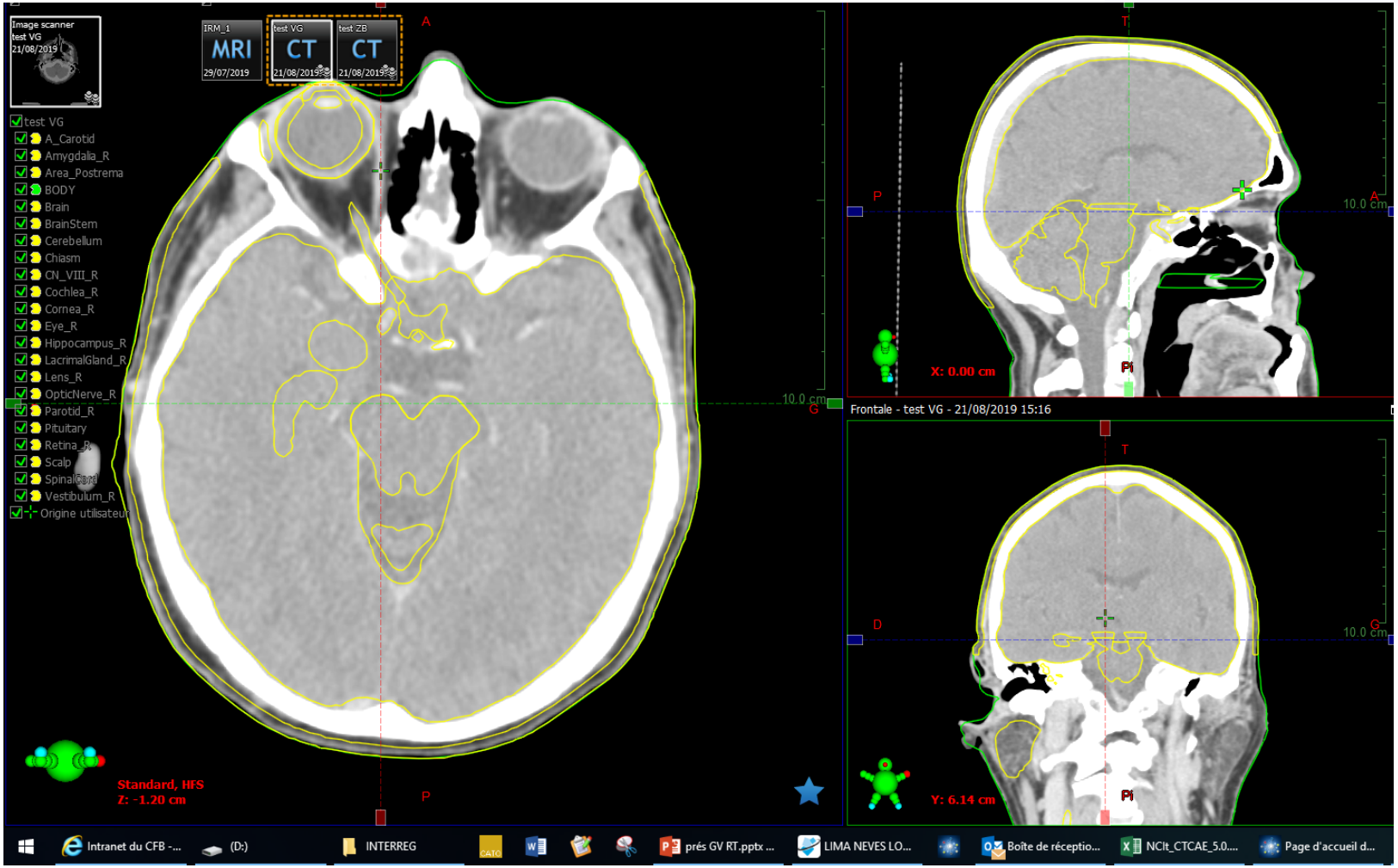
e-learning

- Radioanatomy lectures
- OAR contouring guidelines repository
- Tutorial for the delineation tools of the main TPS



WP3: OAR contouring platform



WP3: Affectation de zones de criticity (0-3)

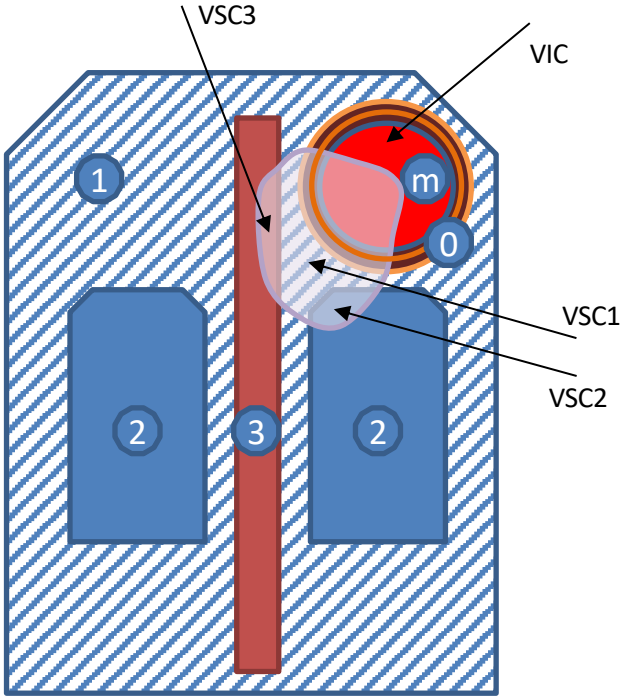
- Chaque OAR (1-3) selon tableau
- Externe – All OARs (1)
- Zone de « blur » du ROI (GTV ou OAR) (0)
- Intérieur du ROI (GTV ou OAR) (m)

Evaluation des VSC (Volume Sup Contouré
et VIC (Volume Inférieur contouré) pour chaque ROI

Calcul d'un score global est un cumul des différents volumes, avec pondération en fonction de la zone de criticité :

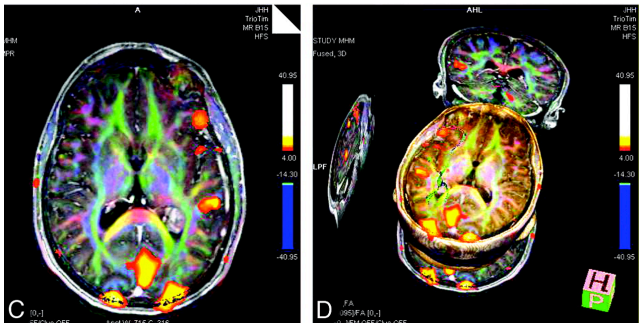
(c1 VSC1 + c2 VSC2+⋯+ m VIC) / ((c1 + c2 +… + m) VCr)

Où :
Cx : Contour du participant - Jaune
Cr : Contour de référence (de l'expert) - Vert
cx : facteur de pondération du volume en criticité x
m : facteur du volume manquant dans la structure



WP4: Functional imaging for OAR delineation

- Definition of anatomical/functional series of interest
- Definition of novel functional OAR to optimize RT tolerance – connectome
- Image acquisition and fusion procedures
- Quality of treatment plans
- Offering training courses on delineation in Homburg → transnational mobility of trainees; training session scheduled in Homburg



Pillai, AJNR 2010

WP5: Radiovigilance tool

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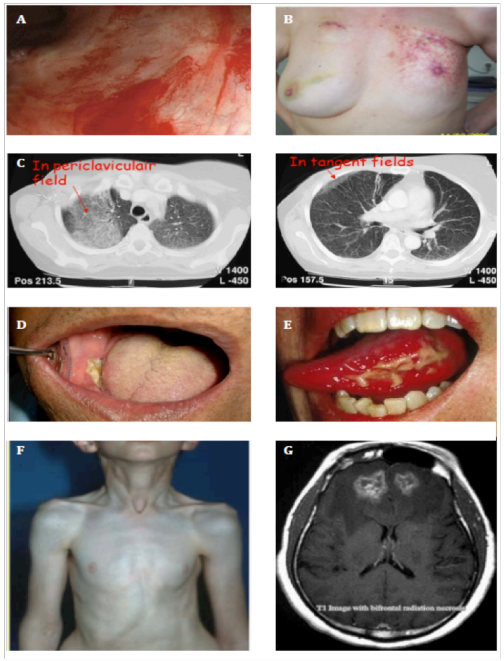
- Way to evaluate the long-term impact of the program on patient outcome
- Morbi-mortality registries to detect unusual toxicity
  → real time collection of AE
- Shared semantics
- Training of quality managers



WP5: Radiovigilance tool

- Survey
- Pilot solution proposed
- Trips to assess infrastructures (GDPR, IT)
- Extra institutional development – implementation @ CFB
- Dissemination

WP5 : Logiciel partenaire

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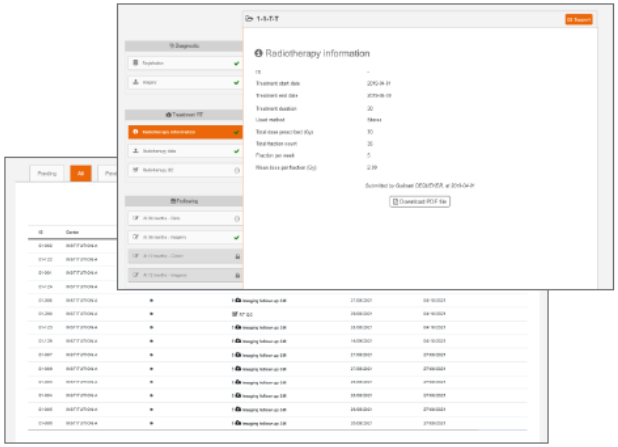

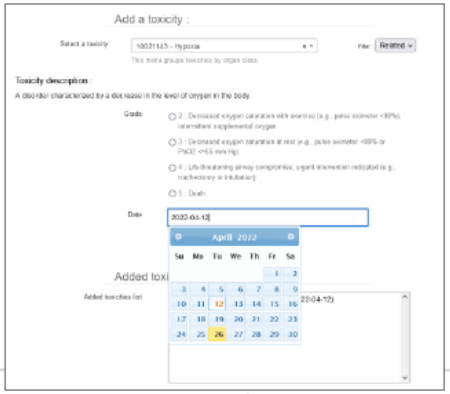

CTCAE form

DPI CFB

API CFB

API Varian

DICOM Pusch

OIS / TPS Varian

WP5: Analyse des données

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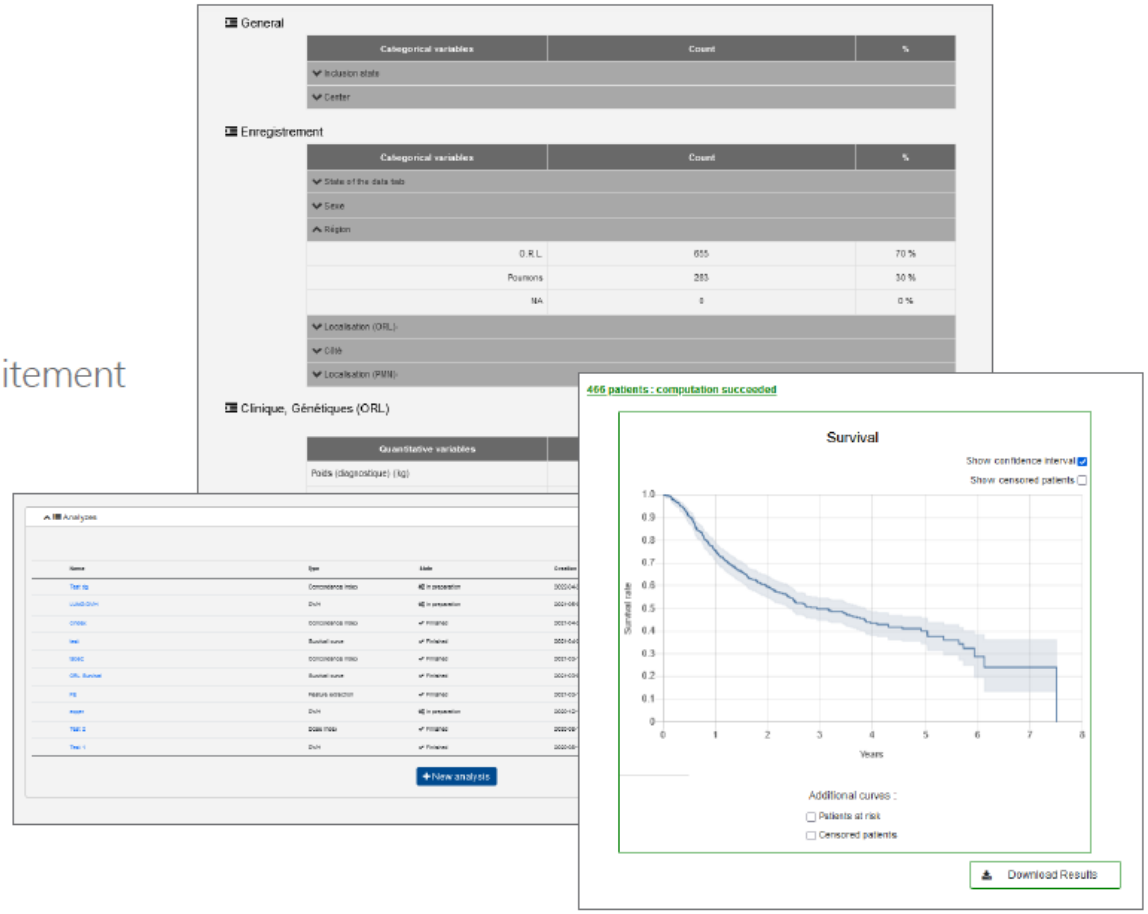
- Analytics

- Statistiques globales

- Sets de contraintes / localisation / traitement

- Analyses
  - Calcul / Lecture de DVHs
  - Extraction de features de Dose
  - Courbes de survie
  - Concordance Index
  - Custom analysis (script python)
  - *Radiomics WIP*
  - *Statistic tools WIP*

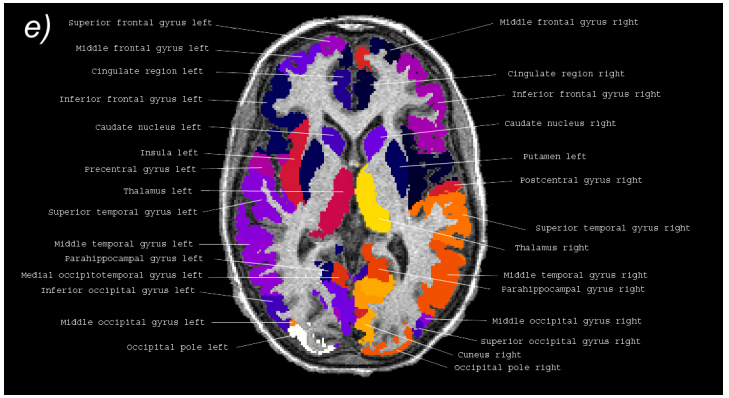


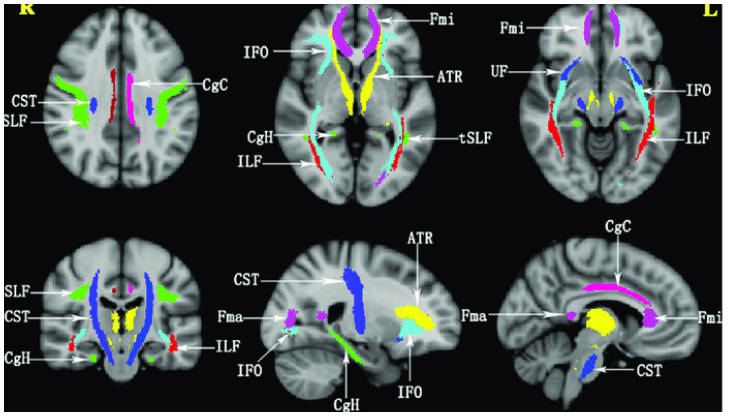
WP6: Educational database

- common prospective project dealing with the delineation of "novel" anatomic and functional OAR in brain and the impact on the dose distribution and neurologic quality of life outcomes (including PROs)

Clinical trial (WP6)

- Impact of novel OAR on the dose distribution and functional outcome of SRT in brain oligometastatic disease
- Phase II rando
- Collaboration CFB+UNiLu+CHL+GR-partners
- Pilot study : atlas





Common WP1

- Review of existing curricula
- Common semantics – 3 languages (EN-DE-FR) based on ESTRO lexical
- Definition of the training offer on the different WP;
- Declination in the different partner centers: the example of the ICL comprehensive CC
- Relevant evaluation and interoperable parameters to feed the educational database.
- How to select and train the trainers? UL-Ulg collaboration on simulation and evaluation

- Need for working groups:
  - Radiation oncologists
  - Quality managers
  - RTT
  - Transversal
  - Local in each partner center

Two publications

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NHL-ChirEx : An interprofessional cross-border education Initiative in the Greater Region with a focus on radiation morbidity and patient safety

G. Vogin[1,2], J. Fleckenstein[3,4], JC. Servotte[5], I. Bragard[5], P. Coucke[6], P. Nickers[7], M. Untereiner[7], F. Mohammad[3], A. Ebersberger[8], D. Peiffert[1,2], M. Braun[1,9] on behalf of Greater region radiation oncology consortium.

Radiotherapy & Oncology
European Society of Radiotherapy and Oncology

RESEARCH Open Access

Cranial organs at risk delineation: heterogenous practices in radiotherapy planning

Guillaume Vogin[1,2,3*], Liza Hettal[2], Clarisse Bartau[4], Juliette Thariat[5,6], Marie-Virginie Claeys[7], Guillaume Peyraga[8], Paul Retif[9], Ulrike Schick[10], Delphine Antoni[11], Zsuzsa Bodgal[3], Frederic Dhermain[12] and Loic Feuvret[13]

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