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# *France HADRON:*

## benefits, challenges and future direction of a national collaboration

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*Coordinators of France HADRON*



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RÉPUBLIQUE FRANÇAISE

France HADRON

Centre ETOILE
GROUPEMENT DE COOPERATION SANITAIRE

Archade
ADVANCED RESOURCE CENTRE FOR HADRONTHERAPY IN EUROPE

cnrs
dépasser les frontières

INSTITUT CLAUDIUS REGAUD

CAL Nice

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# What is *France HADRON* ?

## *France HADRON has three dimensions:*

1) *It is a network of institutions engaged in hadrontherapy research and development with identified teams, laboratories and scientific capabilities and/or facilities*:

**These institutions are located in 5 sites in France:**

- **Lyon-Clermont-Frd (IPNL, LPCC, and late ETOILE project)**
- **Caen (LPCC, ARCHADE project, GANIL is coll)**
- **The 2 protontherapy centers at Nice** (CAL)
- **and Orsay** (ICPO)
- **Toulouse** (CCR and Pericles project)

**With the partnership of CNRS/IN2P3 (IPNL & LPC) and of IRSN,**

# What is *France HADRON* ? (2)

## *France HADRON has three dimensions:*

2) *It is a scientific collaboration gathering all the scientific teams engaged in hadrontherapy research and development in France.*
   - *More than 25 teams are thus identified and participating to the scientific project of FrHA*
   - *These teams are located in many places, not only in the nodes of the network:*
   - *Paris, Strasbourg, Lyon, Marseille, Grenoble, Clermont-Fr, Toulouse, Orsay, Nice, Caen, Nantes…*

*This collaboration is organized in 4 working packages*

# *France HADRON* – 25 teams

- **Multidisciplinary:** medicine, physics, biology, computer, etc.
- **Teams involved :**
  - Lyon - Clermont-Fd : teams of C. Rodriguez-Lafrasse, M. Beuve, D. Dauvergne, G Montarou, N. Foray, D. Sarrut, B. Shariat, B. Ribba, P. Pommier.
  - Nice : teams of JM. Hannoun-Levi, P. Mandrillon.
  - Orsay : teams of A. Fourquet / R. Dendale, A. Mazal, J. Hall / F. Pouzoulet.
  - Caen : teams of D Cussol / J. Colin, M. Bernaudin, K. Boumediène, JL. Lefaix, MH. Moscatello, JL. Habrand.
  - Toulouse : teams of E. Moyal, P. Celsis / A. Laprie / M. Delannes, R. Ferrand
  - Marseille: team of Ch. Morel
  - Strasbourg: Team of D. Brasse/ Rousseau

# *France HADRON* – scientific collaboration

# *France HADRON* – WP leaders

- **Organized into 4 working packages:**
  - **WP1 - How to identify and assess the medical value of hadron therapy (clinical research); Jean Louis HABRAND (Caen-Paris)**
  - **WP2 - How to improve treatment plans (measurements, modeling and computer simulation); Daniel CUSSOL (Caen)**
  - **WP3 - How to better understand the effect of treatment (radiation biology, radiotoxicology); Claire RODRIGUEZ-LAFRASSE (Lyon)**
  - **WP4 - How to improve the quality control of treatment (instrumentation); Denis DAUVERGNE (Lyon).**

# What is *France HADRON* ? (3)

## *France HADRON has three dimensions:*

3) *It is also an <u>economical program</u> as one of the ≈12 <u>national infrastructures for health and biotechnology</u> development supported by the so called "grand emprunt" launched in 2010 by the French government.*

- **The goal of this program is to sustain investments for future economical and societal returns.**
- **France HADRON has thus been credited of a global amount of 15M€ for seven years.**
- **Beyond this date it will have to find its own incomes to continue.**

# *France HADRON* received 15 M€ for 2013-2019 principal support

The provisional distribution is the following:

- 5495,60 k€ for the general activities, the beam access cost and the clinical research support
- 5900,00 k€ for equipments to make possible new and easier beam access: 5 M€ for proton in Nice and Orsay and 0,9 M€ for carbon at GANIL
- 3604,40 k€ are kept as a reserve for future developments presently in discussion.

# From where comes *France HADON* ? A bit of history (1)

**The *France HADRON collaboration* is based on a large heritage:**

- The sites of Caen (GANIL), Nice (Médicyc) and Orsay (ICPO) are existing for more 20 years…
- A Regional program for hadrontherapy research (PRRH) has been initiated in 2002 in Lyon just after the announcement of the carbon ion project in 1997, known as **ETOILE project**
- The CNRS launched the Mi2b GDR, end of 2004
- Caen presented its own project , Asclépios, in 2005
- A first attempt of national program in 2007 did not succeed (opposition of the INCa…)
- However the 3rd "plan cancer" (2014-2019) proposes a "**national regulation** for expensive facilities *as for example* protontherapy facilities"

# A bit of history (2)

- **Projects** for new centers or upgrade of existing centers are existing for both carbon ions and protons: at Lyon (former **ETOILE**), Caen (**Archade**), Orsay (2010), Nice (2014-16) and more: Toulouse, Nantes, Lyon, … for **protons**.
- **Since 2001** the French teams have **effective links** with the CERN, GSI, CNAO, MedAustron and the NIRS. Moreover, they have actively participated to every **European consortia** and research programs as: Enlight (2001-…), Enlight++, ULICE (2009-14), ENVISION, Partner (2010-13), Intervision.
- **Teams from other towns** than those having project of centers are joining and actively participating, mainly through **CNRS teams**: Clermont-Ferrand, Marseille, Strasbourg, Grenoble… totalizing more than twenty research teams all over France.
- **Hadrontherapy applications and researches are thus active in France for more than twenty years**

# A bit of history (3)
# Difficulties to overdraw in 2010…

- The **spreading** (and sometime competition) of the material and teams
- The deep **lack of access to the beams**, which are either:
  - In medical centers with few research infrastructure (Nice, Orsay)
  - Or in research centers which agenda is not specifically devoted to hadrontherapy (GANIL)
- A **weak industrial and governmental support** in France although a very high know how in research institution (IN2P3, CEA) and some well known small corporations (Pantechnic, Sigmaphi)
- **The lack of referent carbon ion center in France and advanced protontherapy center**
- **And the lack of controlled randomized comparative clinical studies in the domain of hadrontherapy** although 27 years of neutrontherapy and 22 years of protontherapy in France (circa 10000 patients, 50% having ocular tumours)

# *France HADRON* – objectives are to overdraw these difficulties

- To federate research teams and organize research at a national level,
- To fund beam time and beam line access for research.
- To open new research beam lines for protons and carbon ions, to increase available beam time
- To optimize technical means and procedure for hadrontherapy,
- To network in the frame of the European programs
- To have a positive input on economy

# Governance

National Agency for research (ANR)
and CNRS for management (DR19 in Caen)

**France HADRON**

**Coordinators: Jacques Balosso & JL Habrand**
(3 years mandate)
+
Assistance (**2 persons**)

**Scientific Advisory Board (SAB)**

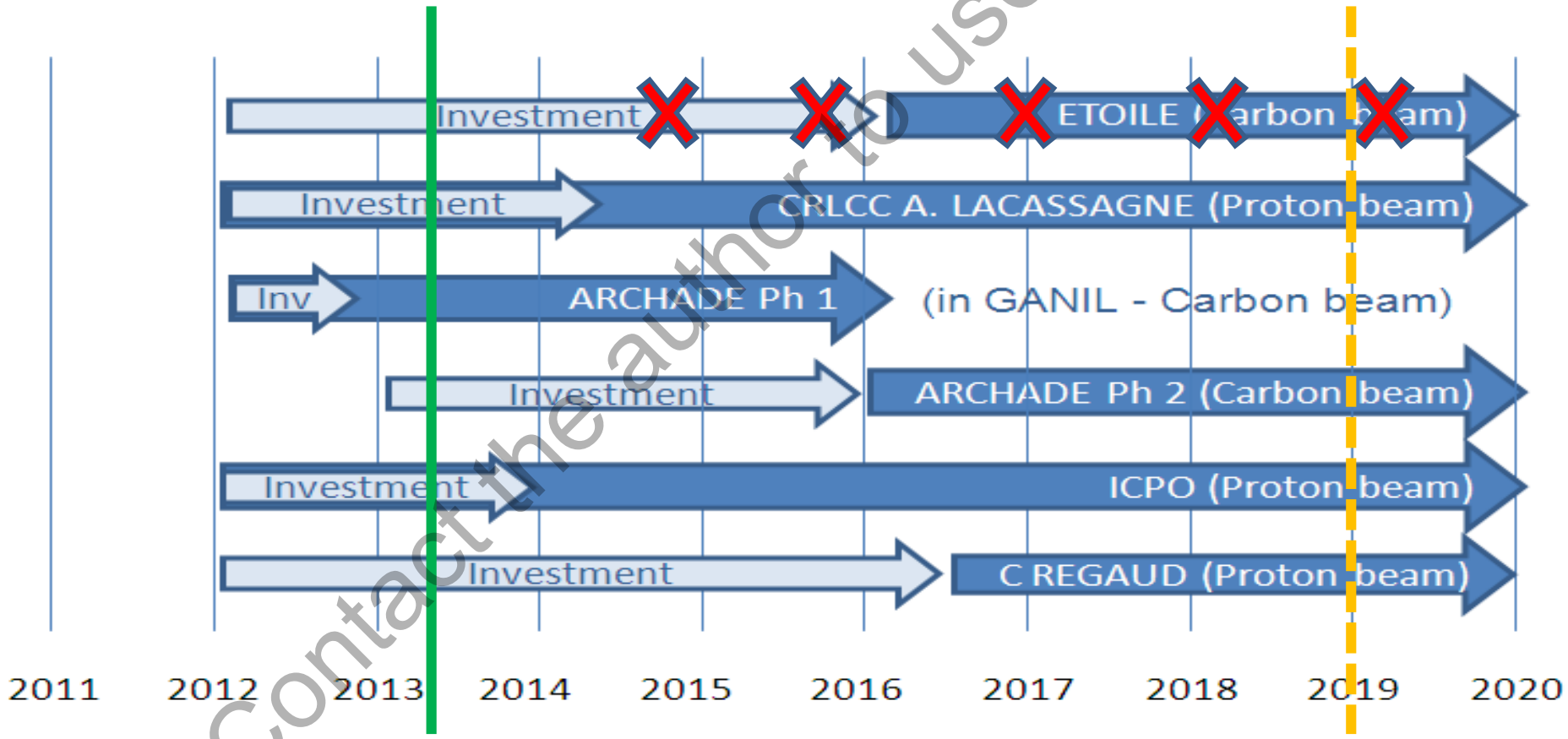
(annual meeting)

**Steering Committee (SC/CD)**
(President **Gérard Montarou**, 3 years mandate)
- IN2P3 representative
- ITMO TS representative
- ITMO Cancer representative
- Partners and Node representatives
- Scientific representative of territorial Councils
- Regional representatives of Minister of science (DRRT)

**Executive Management Committee / Experience Committee (MC/CG)**
(monthly meeting)
(President **Régis Férrand**, 2 years mandate)
- Node representatives
- WP leaders

# France HADRON – time table

**The financial starting point is 1st of March 2013, the financial agreement has been signed mid September 2013, the launching meeting took place in Meudon (near Paris) the 14th of October 2013**







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# *FrHA* early experience (1)

- **300 hours** of beam access have been provided
- **5 internal meetings** for scientific coordination have been carried out
- **Monthly** remote of presential meeting of **MC**
- 2 meetings/y of the **SC**
- **2 Scientific advisory board** meetings in 2011 and 2015
- **A consortium agreement has been signed by 23 parties**
- **Scientific production**:
  - Since 2013 : **47** full international papers, 1 patent
  - About **50** participations to meetings (oral or poster)
  - Most of the publications are still issued from **Lyon** group ≈ 50%
- FrHA has **a web site**: www.france-hadron.fr

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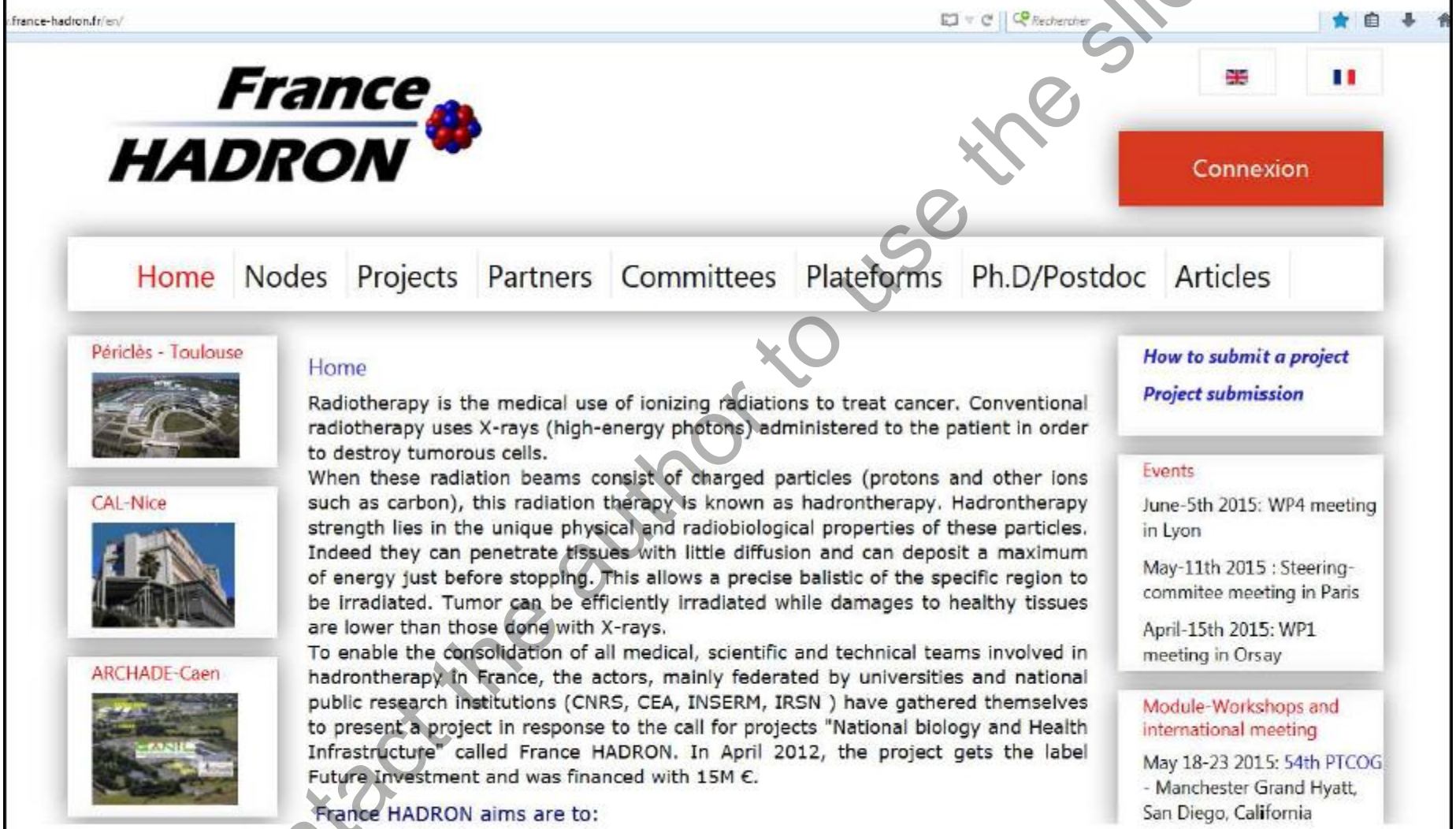


# *FrHA* early positive experience (2)

- Thanks to FrHA the hadrontherapy research domain is now:
  - **unified and coordinated**
  - has gained **more visibility**
  - and should have **continuity…** hopefully.
- **WP leaders** have a very important role and are gaining visibility and authority to manage their part of the project
- The **success of R&D** in new imaging instrumentation and in **high LET radiobiology** in Lyon
- **Rising demands** internal and external to participate…
- Good and active **participation** to the WP meetings

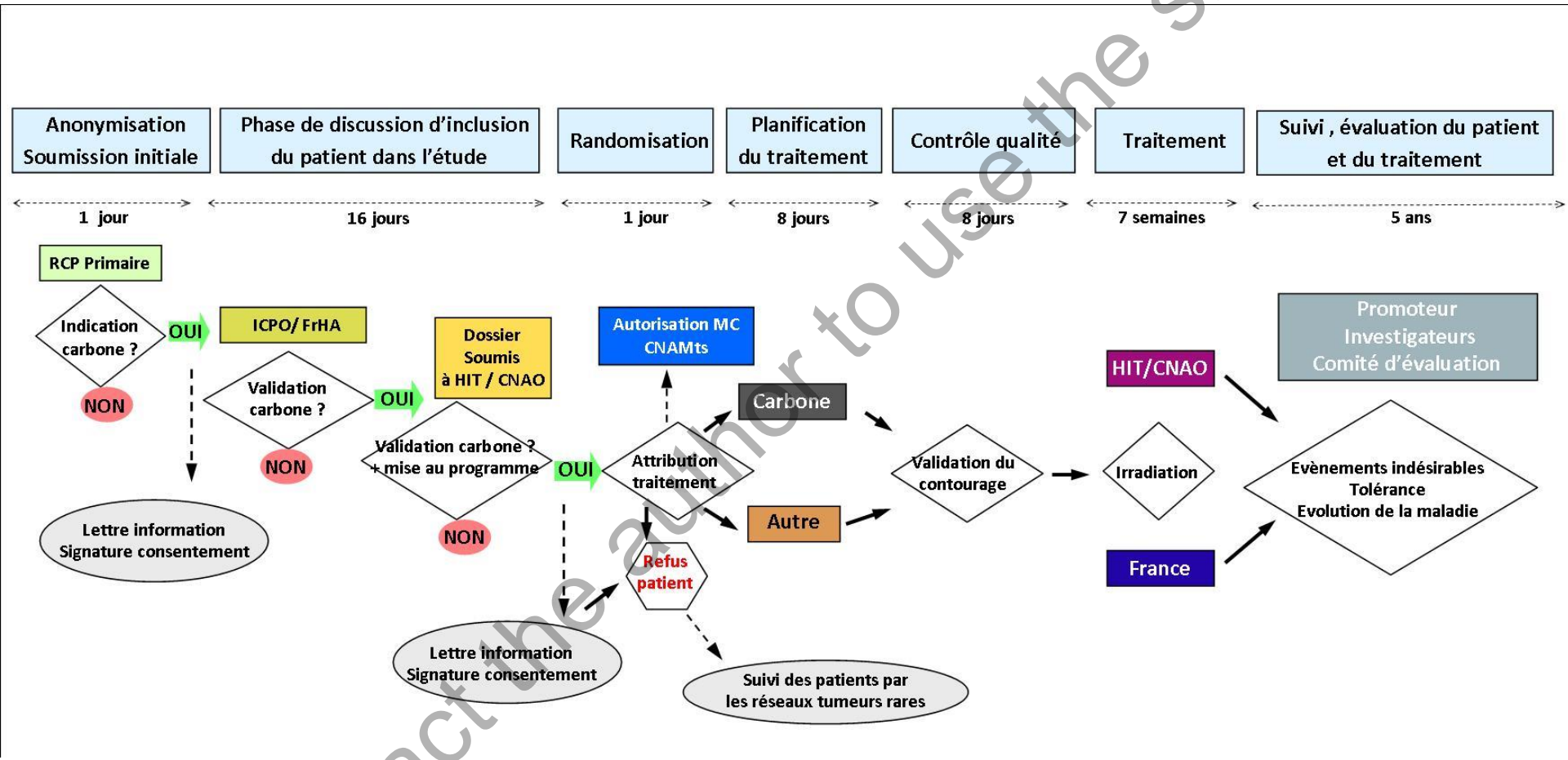
# *FrHA* early experience (3)

- Challenges are many!
  - Turning into **cooperation** former competition
  - Coping with oriented and **medically applicable research** goals
  - Running a multi site - multi institutional - multi disciplinary – multi personalities … project
  - **Balancing** protons and carbon ion researches and institutional interests
  - Attracting **more MD** interest ***AND*** participation…
  - Attracting less eventually **futile demands** "just to test hadrons"…or so.
  - Producing good science and publishable works from **new comers** although long lasting wait for beam and repeated experiments…
  - How to **integrate** new scientific teams and new facilities?

# Future directions

- **For clinical activities** two project are going to boost participation:
  - The multicenter international **clinical trial France HADRON – CNAO – ULICE**: it will involve all the large radiation oncology department of France
  - The **ProtonShare network** to access comparison of treatment plan for decision making in protontherapy
- **For R&D** FrHA has to make relevant choices for the complementary investments to strengthen its best positions: **carbon ions scientific facility** and **hadron QA imaging** for treatment …
- More implication in **medical training** activities
- To have **yearly scientific assessment** (SAB) about different topics each year
- To participate actively to **European programs** (as did ETOILE) in the frame of ENLIGHT and Horizon 2020 and maybe international one in collaboration with **NAPTA.**

# Workflow of the FrHA – CNAO – ULICE trial



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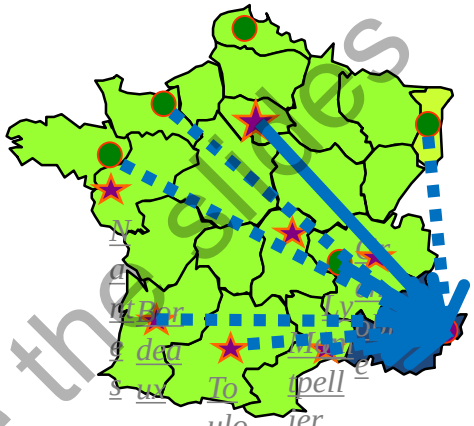
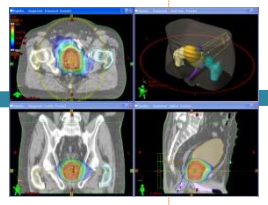
# ProtonShare



Refering centers

Particle therapy Centre

DICOM data
Images, Contours, Doses
Medical data
Keyboard or .pdf

Planification for protons

Automatically Comparison of the treatment plans


Report of the Expert

Review of the medical record

Acceptation of the treatment


Treatment total of partial ?
Follow-up ?
Registration of side effects

***Automatical analysis of the side effects***

Extensive medical and dosimetric data base



Automatic email notification | PDF export | DICOM RT files | Action in Share Place

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# Thank-you