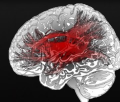


Imagerie de Tenseur de Diffusion et Traumatisme Crânien : Etat de l'Art et Perspectives

Pr. Denis DUCREUX
MD, PhD, HDR,

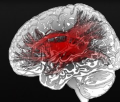


BRAINANALYZE

To Analyze the Brain in Function



Trauma Crânien Léger : Problématique



BRAINANALYZE

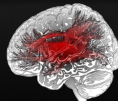
To Analyze the Brain in Function



Problématique

Trauma Crânien :

- 155 000 cas/an en France
- 10% d'emblée sévères, 10% modérés, 80% légers
- 20% des TC Légers ont des symptômes persistants > 3 mois (n= 25 000)
 - Anxiété, irritabilité émotionnelle, dépression
 - Troubles de la concentration, de l'attention, de la mémoire
 - Céphalées, vertiges
 - Impression d'avoir la « tête dans du coton »
 - => « Syndrome subjectif des Traumas Crâniens »
- Imagerie (conventionnelle) le plus souvent négative pour les TC légers (scanner, IRM)
- Pb : reconnaissance des symptômes et indemnisation par examen neurologique et imagerie

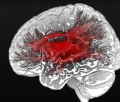


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Trauma Crânien : Imagerie Conventiennelle

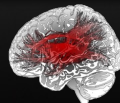


BRAINANALYZE

To Analyze the Brain in Function



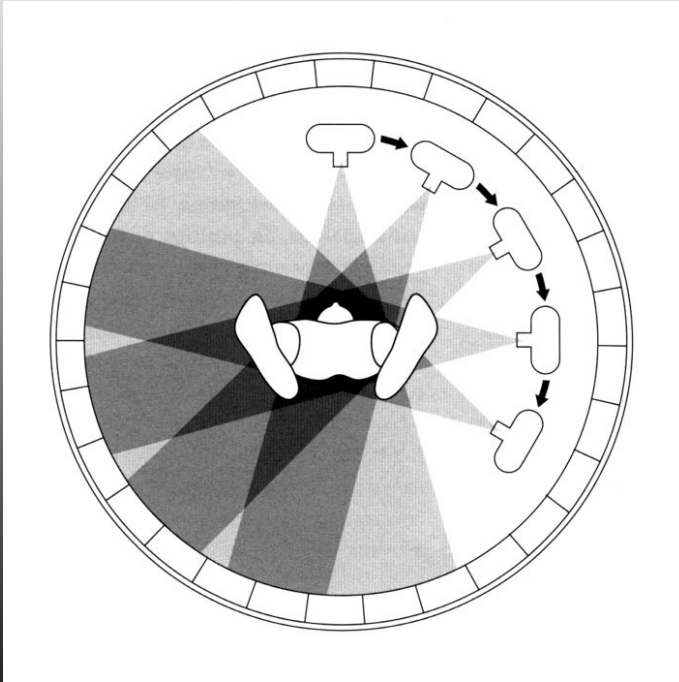
Scanner Cérébral



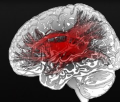
BRAINANALYZE

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Principes de la TDM



La tomodensitométrie (T.D.M.), ou scanographie, est une image numérique représentant des coefficients d'atténuation obtenus au niveau des tissus, explorés selon un plan de coupe déterminé. Elle permet de visualiser ces tissus après traitement des données au moyen d'un ordinateur.

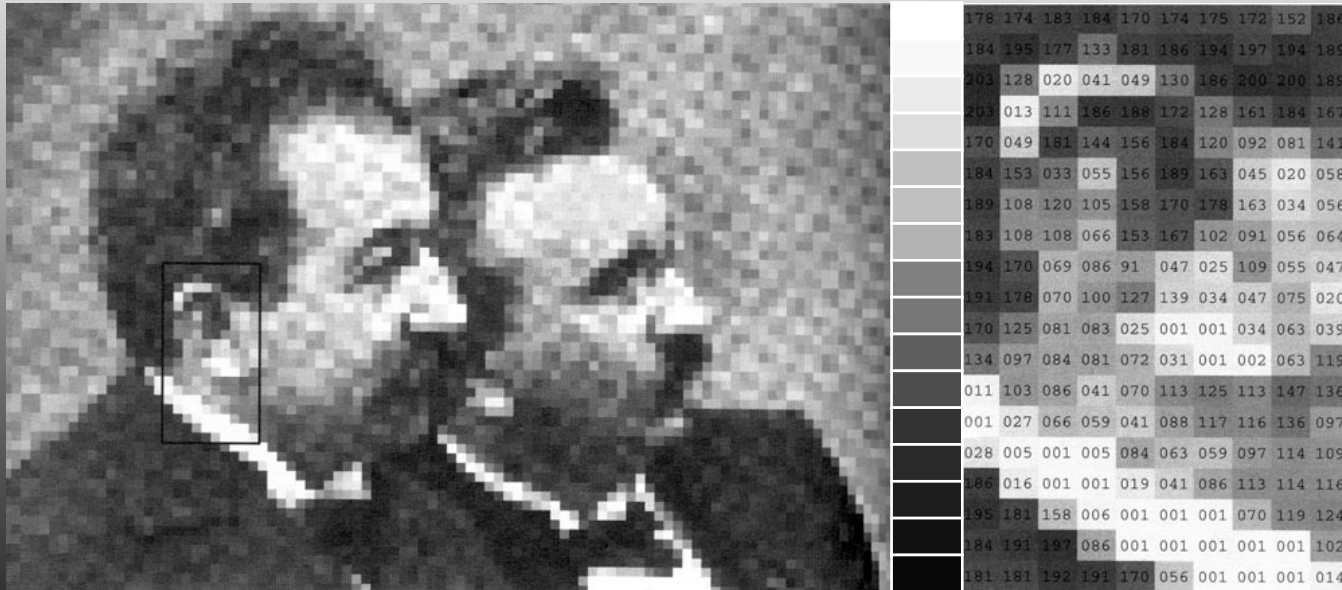


BRAINANALYZE

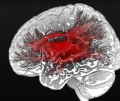
To Analyze the Brain in Function

Principes TDM

Os = 1000 UH



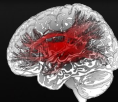
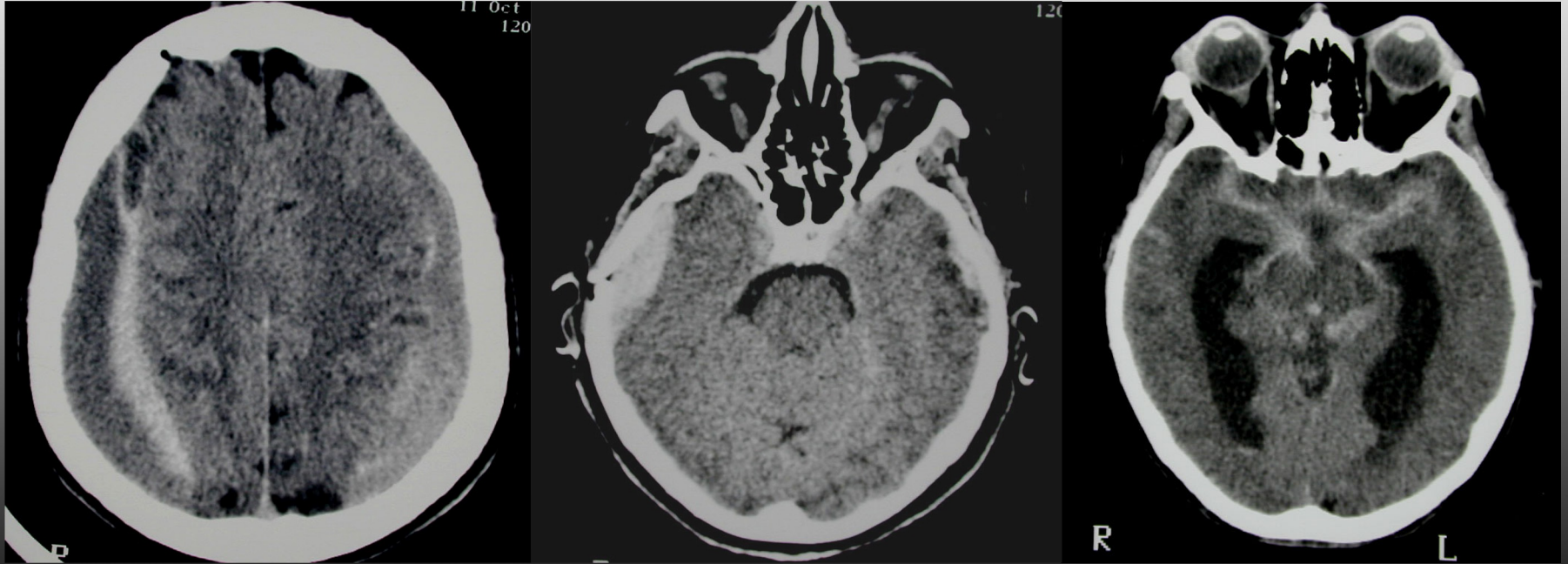
Air = - 1000 UH



BRAINANALYZE

To Analyze the Brain in Function

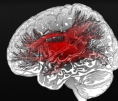
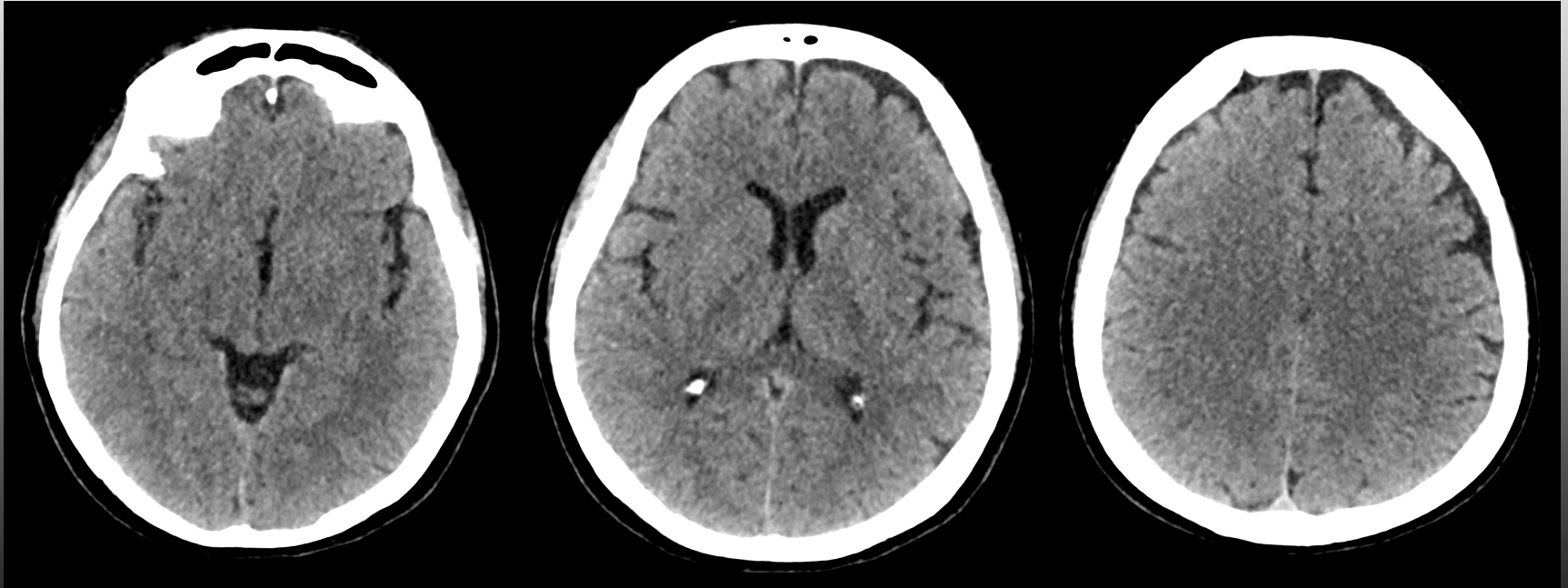
Hématomes & Hémorragies



BRAINANALYZE

To Analyze the Brain in Function

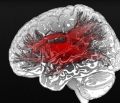
TC Léger : Rien à voir !



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IRM Cérébrale Morphologique

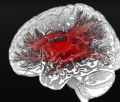
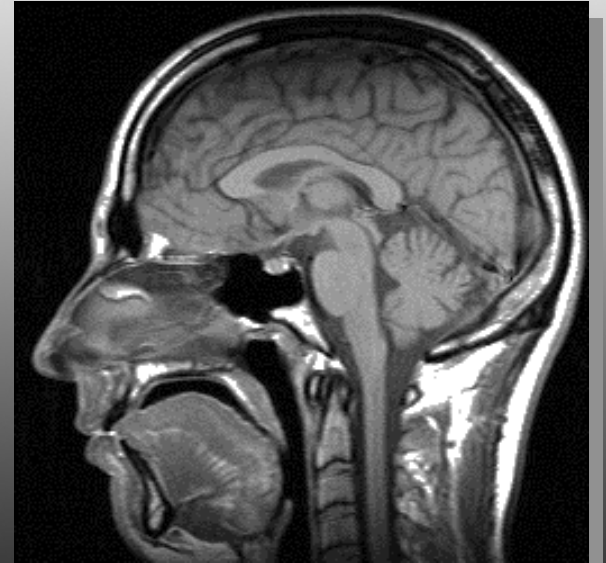
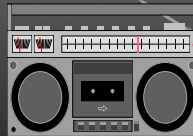
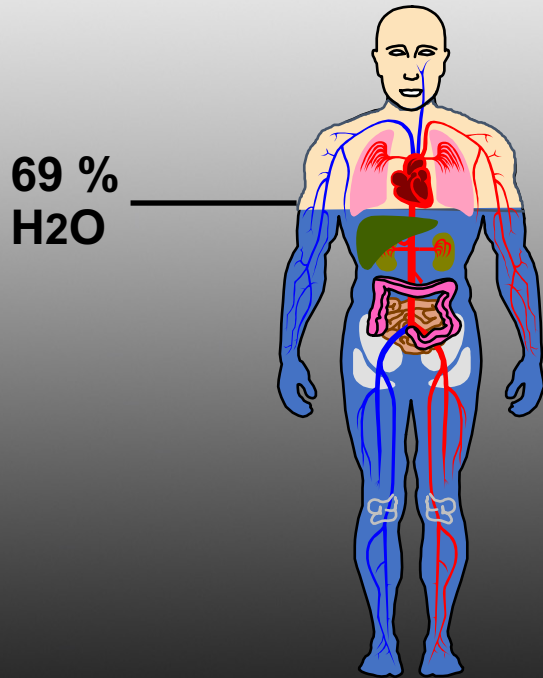


BRAINANALYZE

To Analyze the Brain in Function



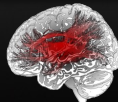
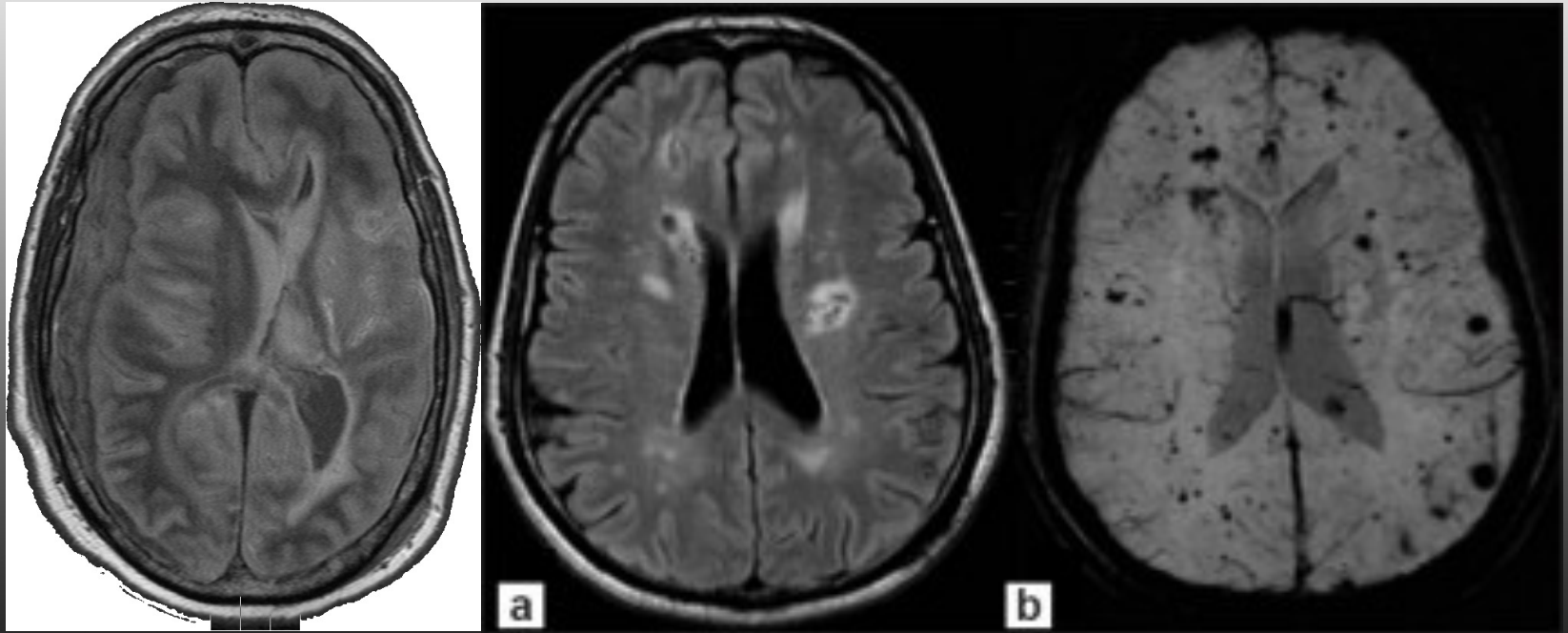
Principes de l'IRM



BRAINANALYZE

To Analyze the Brain in Function

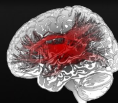
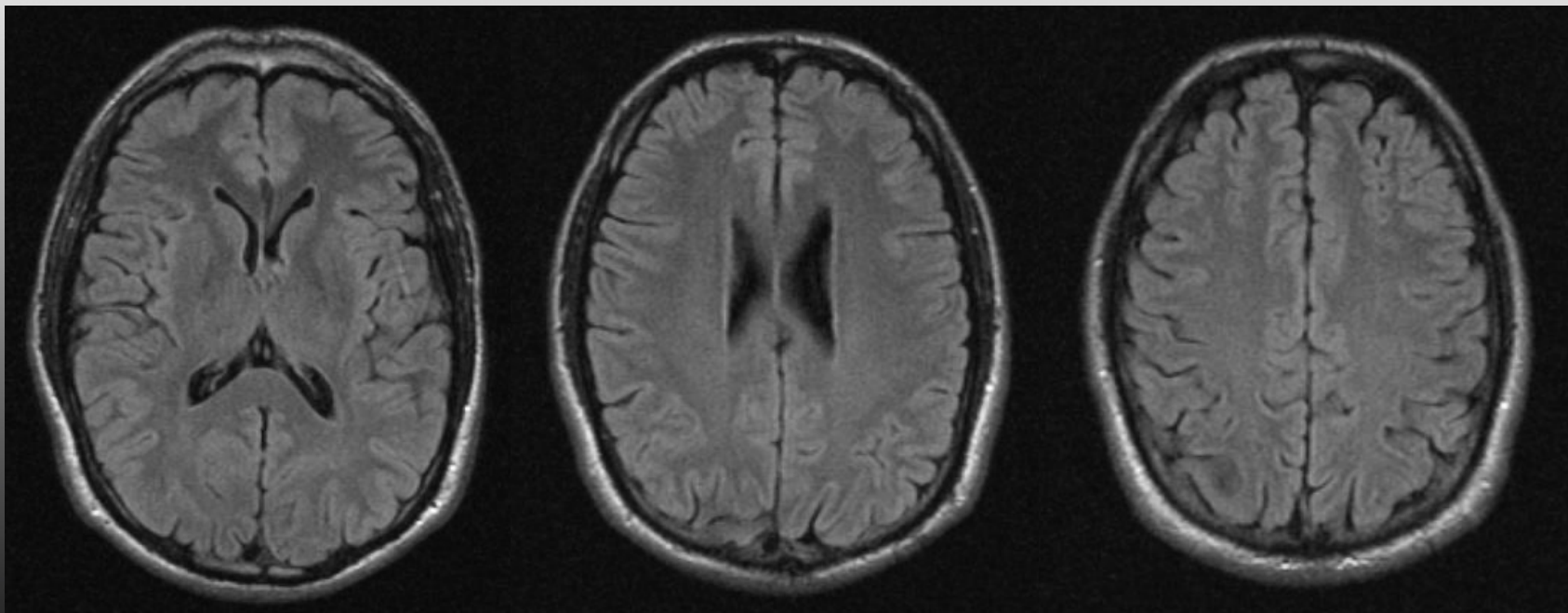
Hématomes & Hémorragies



BRAINANALYZE

To Analyze the Brain in Function

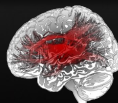
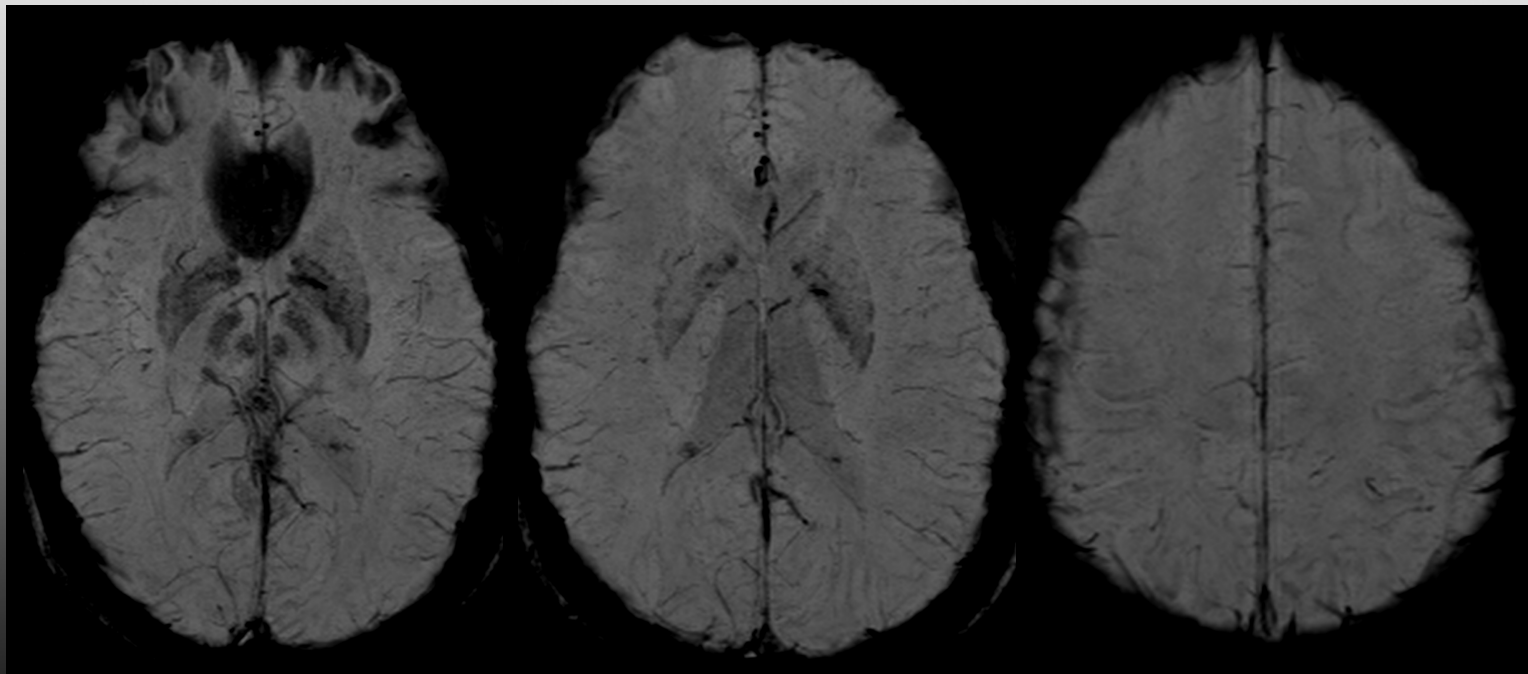
TC Léger : Rien à voir sur le FLAIR !



BRAINANALYZE

To Analyze the Brain in Function

TC Léger : Rien à voir sur le SWI !

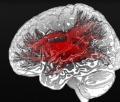


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IRM de Tenseur de Diffusion

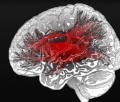
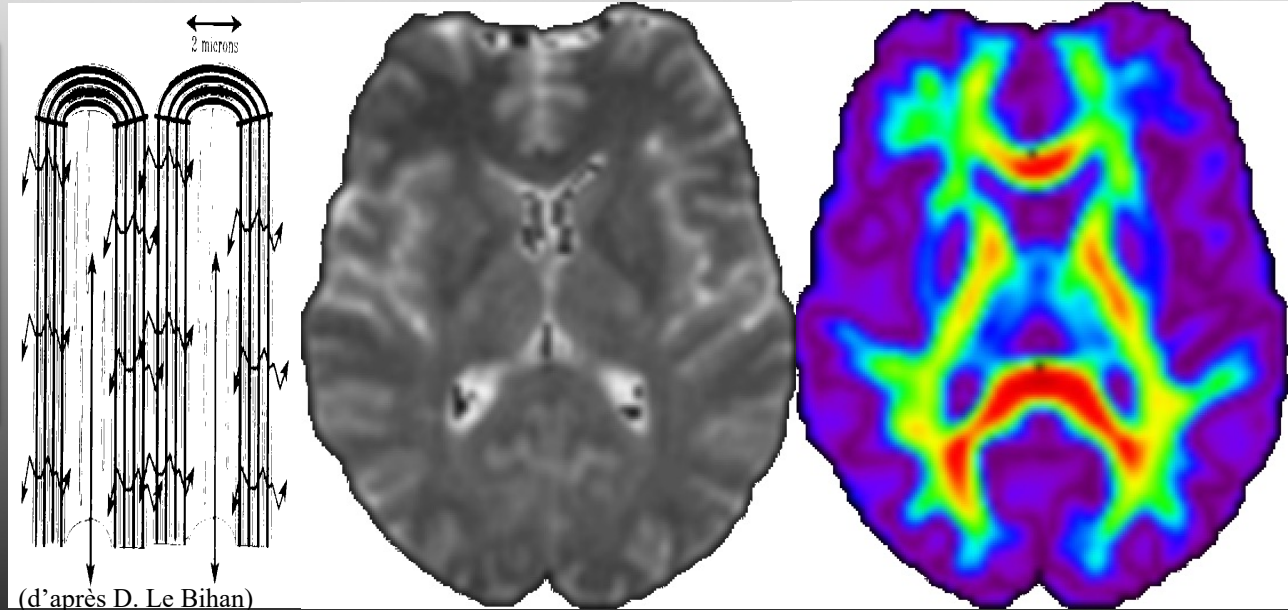
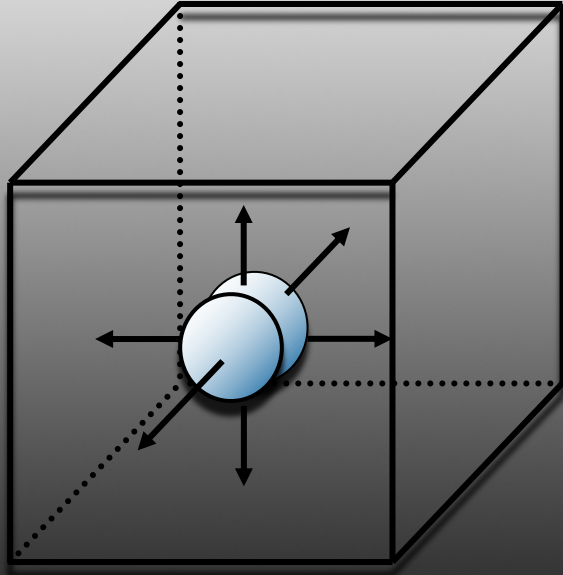


BRAINANALYZE

To Analyze the Brain in Function



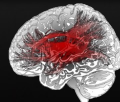
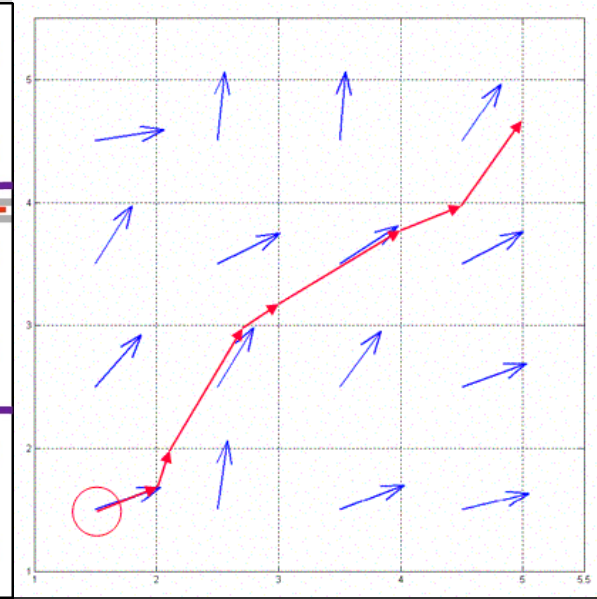
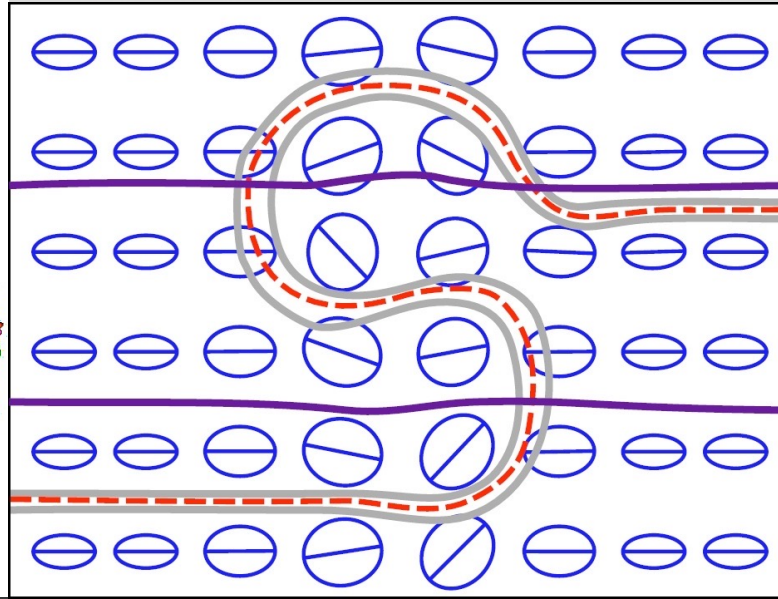
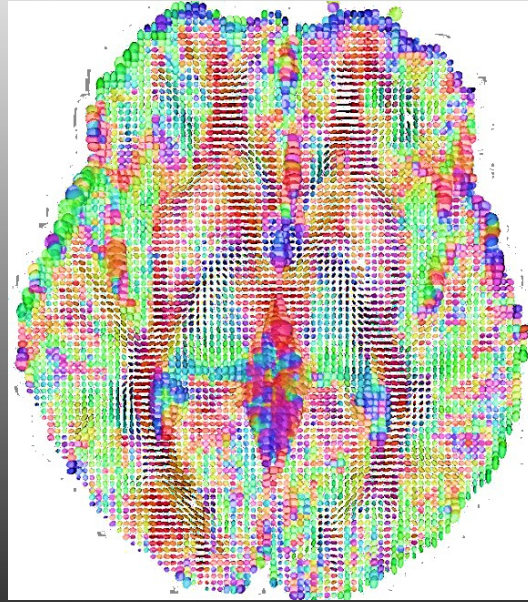
Principes du Tenseur de Diffusion



BRAINANALYZE

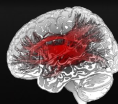
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Tractographie



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BrainAnalyze, 25 rue du Maréchal Foch, 78000 Versailles, France



+33 1 39511522



contact@brainanalyze.com

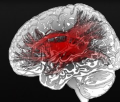


<https://brainanalyze.com>



@BrainAnalyze

Trauma Crânien : Tenseur de Diffusion

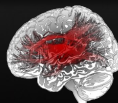
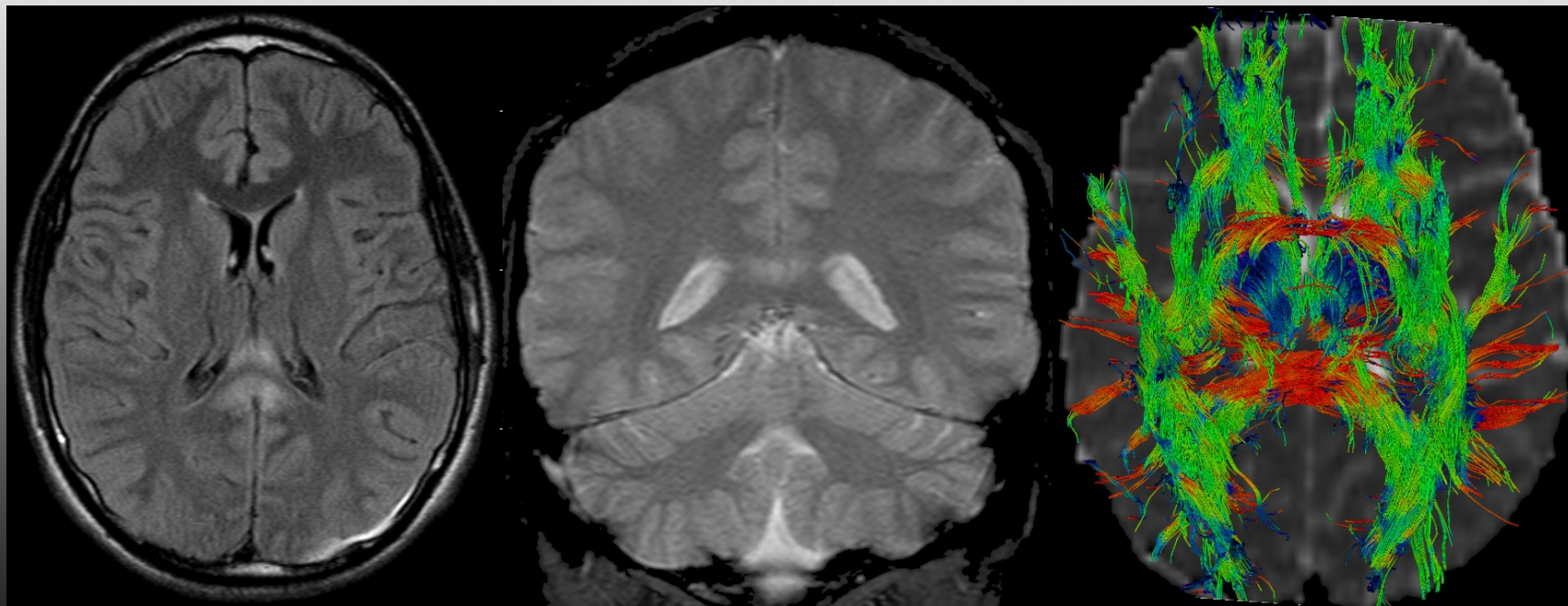


BRAINANALYZE

To Analyze the Brain in Function



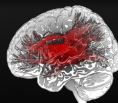
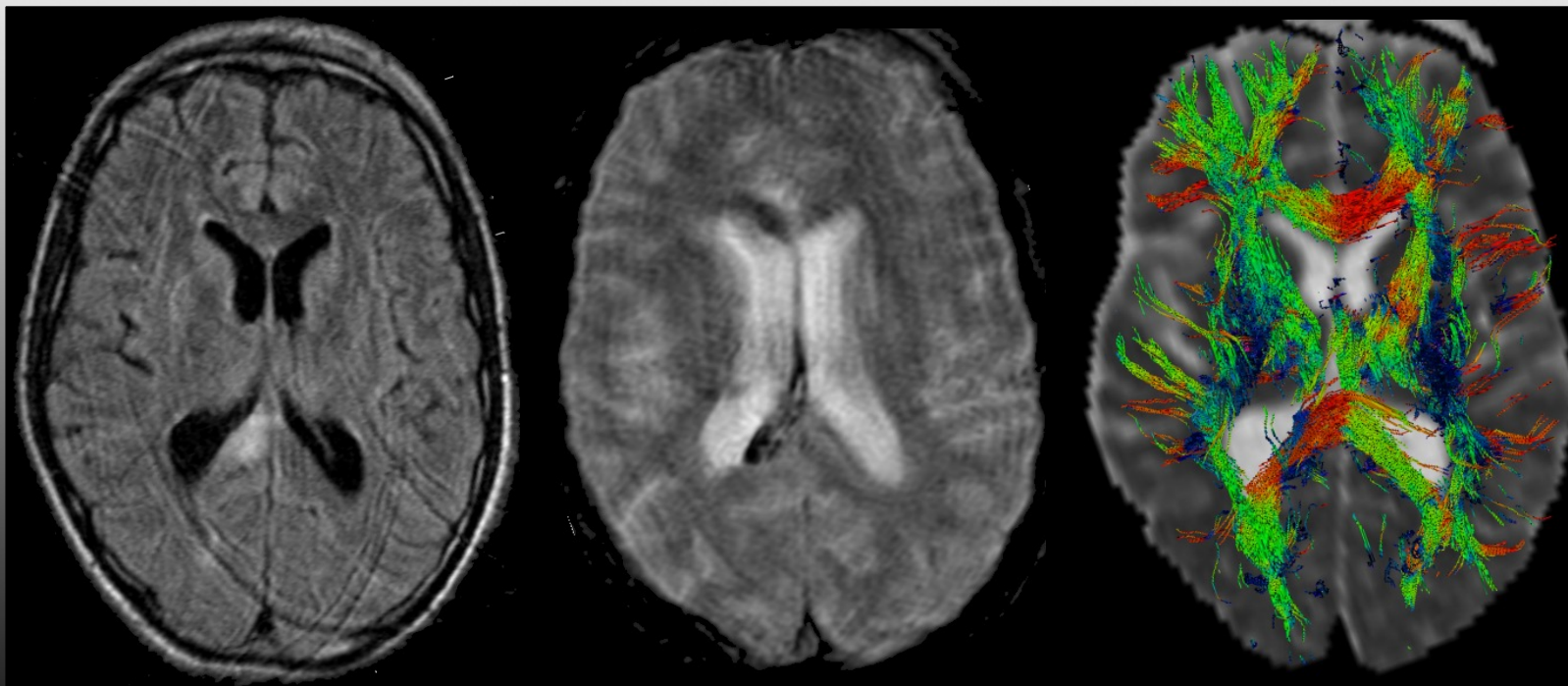
Lésions de Cisaillement Axonal



BRAINANALYZE

To Analyze the Brain in Function

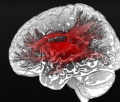
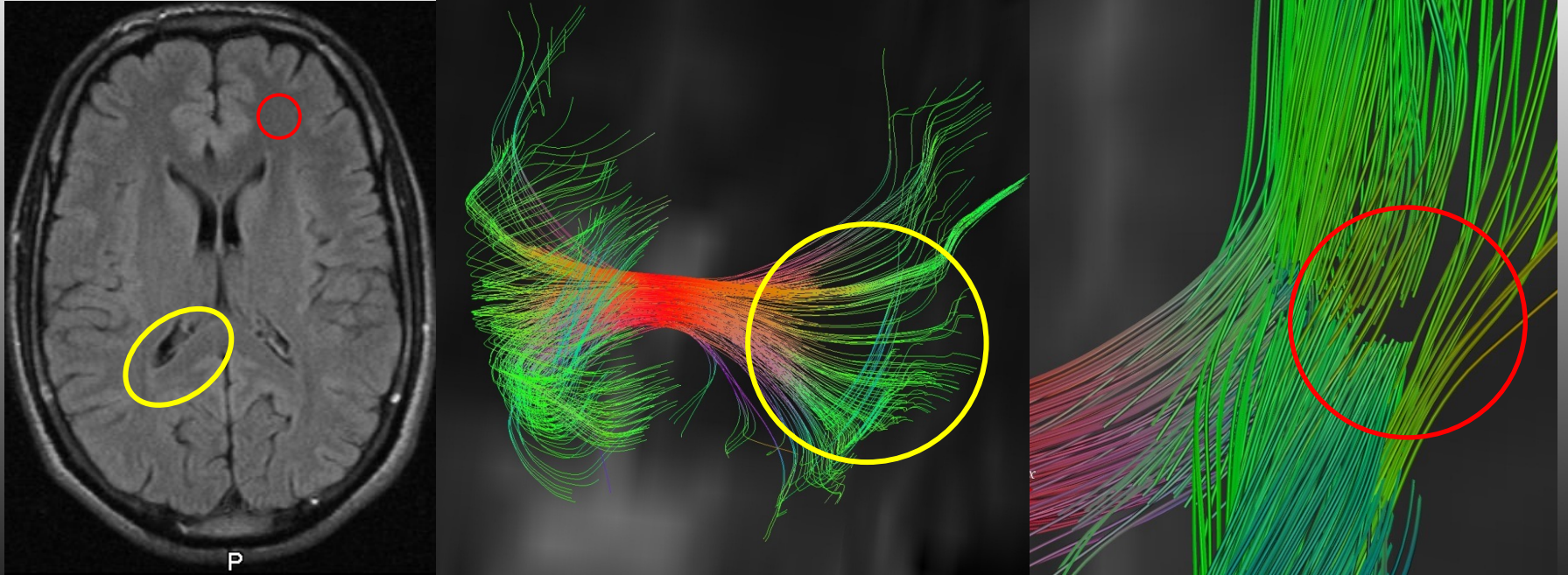
Lésions de Cisaillement Axonal



BRAINANALYZE

To Analyze the Brain in Function

TC Léger : Vraiment Rien ?

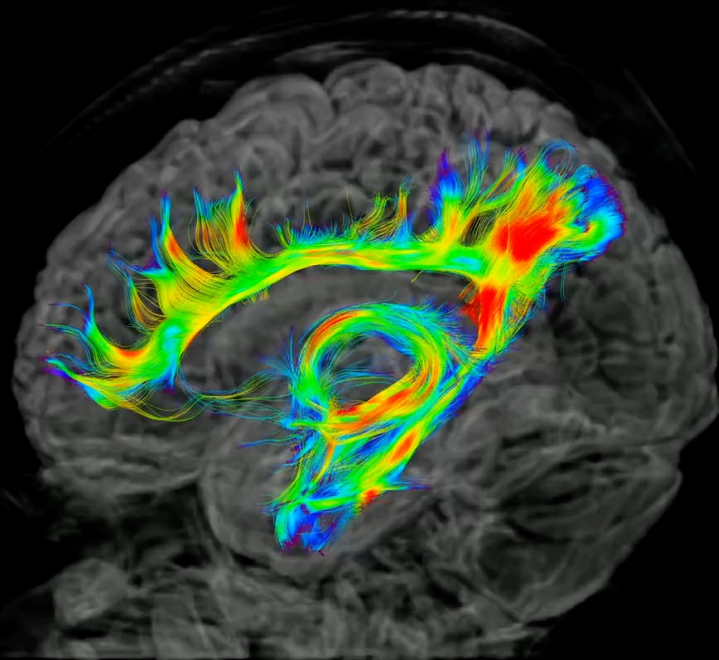


BRAINANALYZE

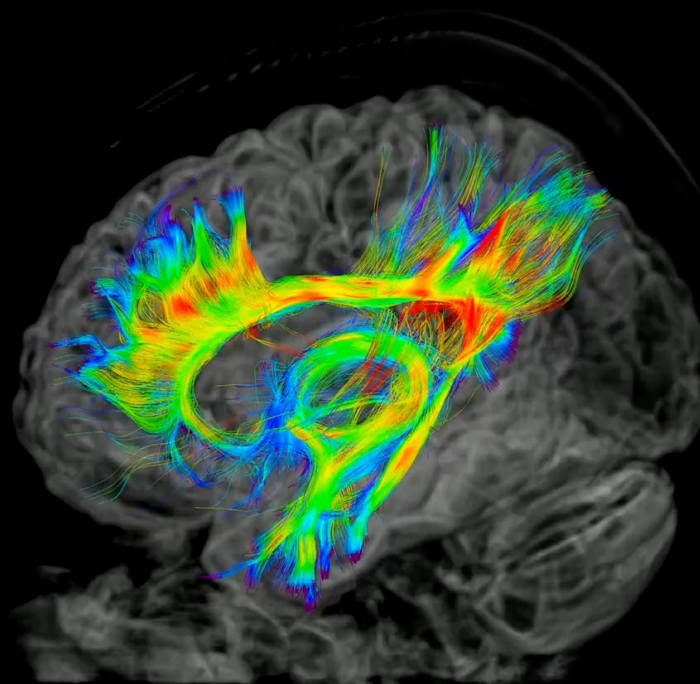
To Analyze the Brain in Function



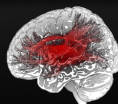
Made with BrainAnalyst



Mild Brain Injury



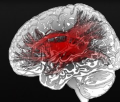
Normal Subject



BRAINANALYZE

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Trauma Crânien Léger : Perspectives

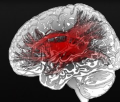


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IRM Fonctionnelle

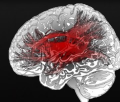
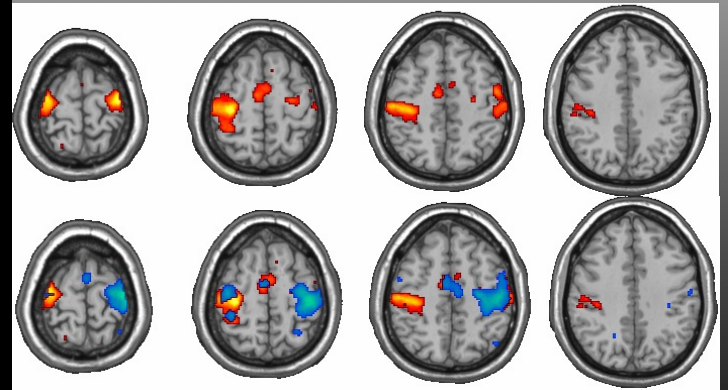
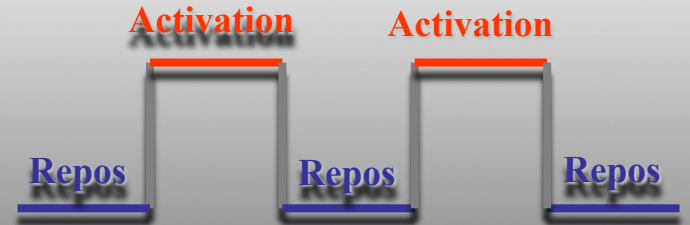
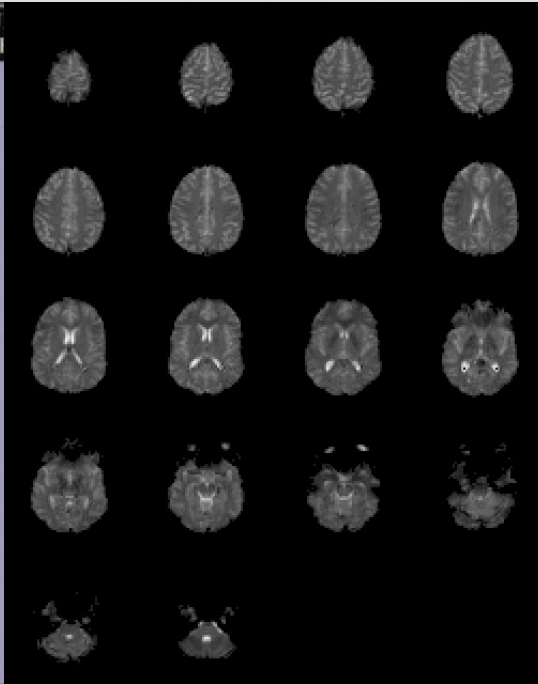
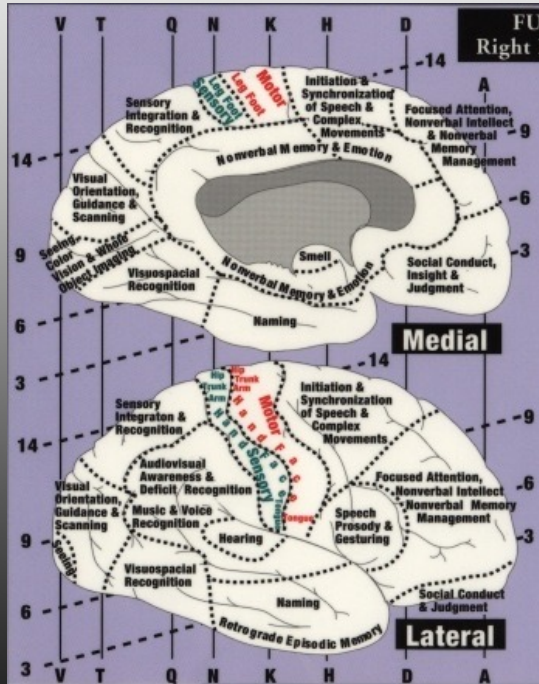


BRAINANALYZE

To Analyze the Brain in Function

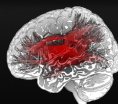
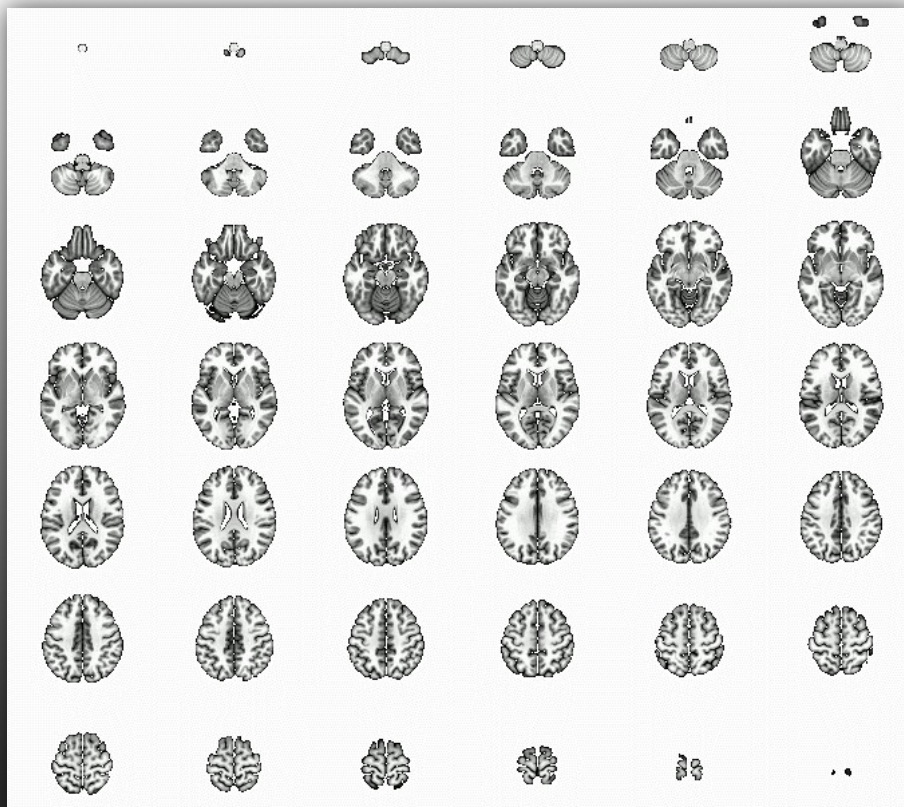


IRMf : Principes



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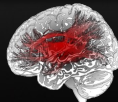
To Analyze the Brain in Function



BRAINANALYZE

To Analyze the Brain in Function

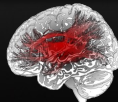
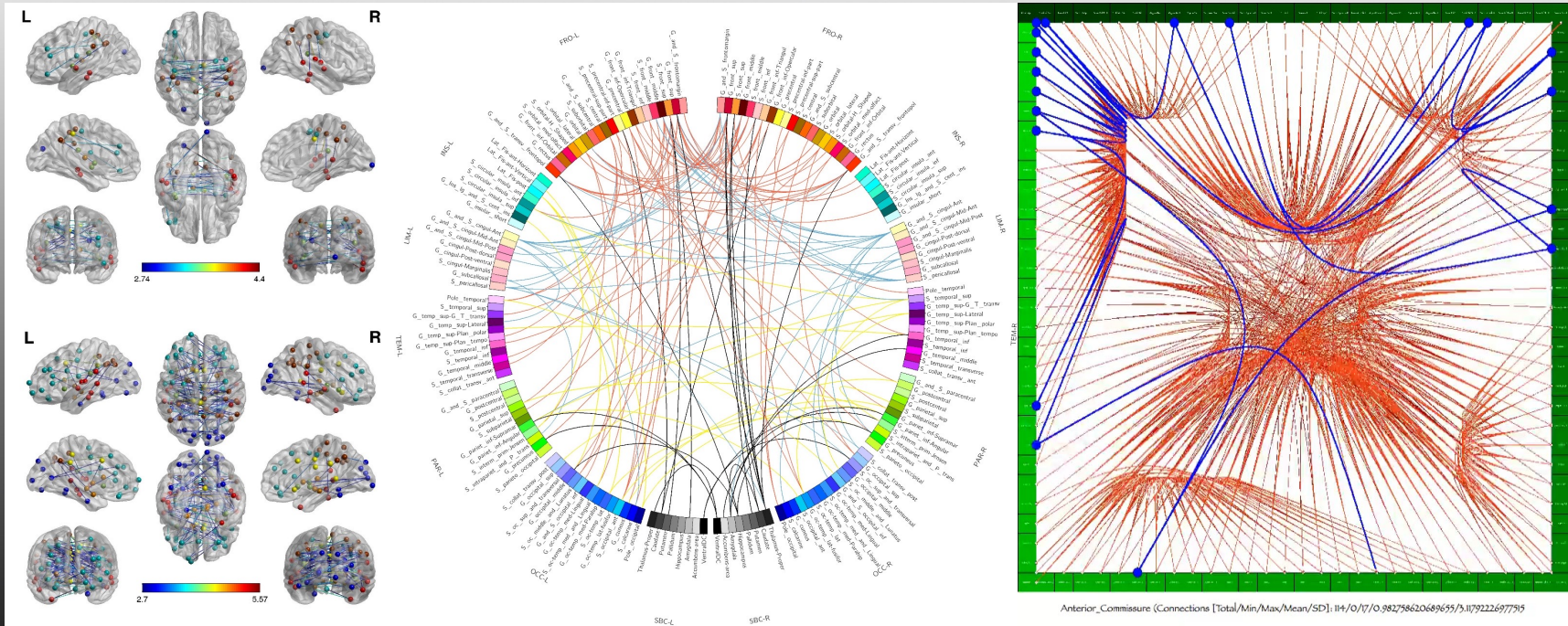
Connectomique



BRAINANALYZE

To Analyze the Brain in Function

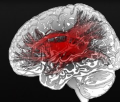
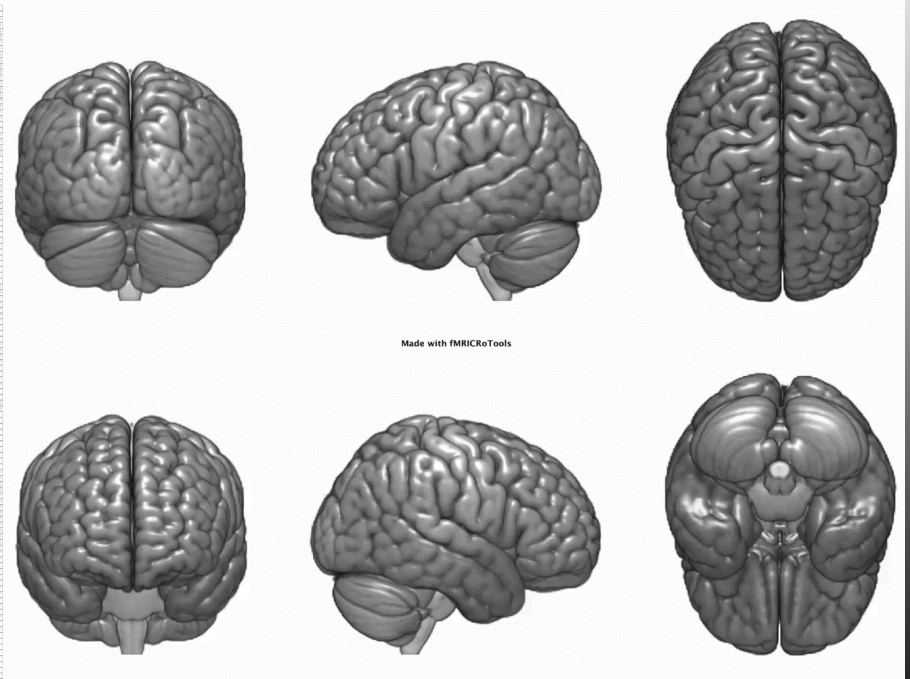
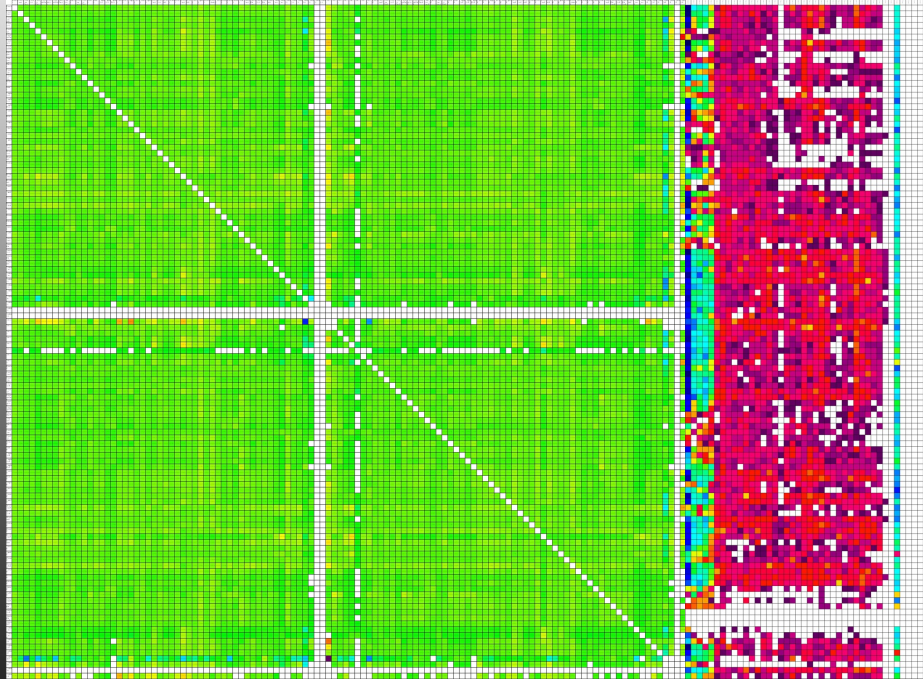
Connectomique Structurelle



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To Analyze the Brain in Function

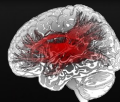
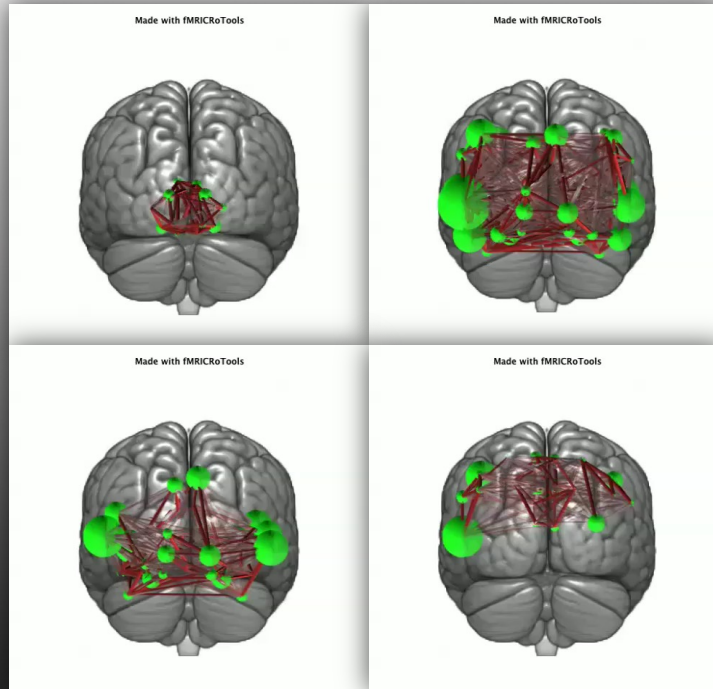
Connectomique Fonctionnelle



BRAINANALYZE

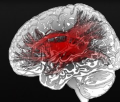
To Analyze the Brain in Function

Connectomique Effective



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Intelligence Artificielle



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Identification des Lésions

28.0x-11.0x10.0=1513.000 227.000 value: 16

File I/O Color/Contrast Image Tools MPR/3D Display Overlays

Extracted Lesions Locations & Volumetries:

Total Extracted Lesions (>0.3 cm3) (Number / Volume): 13 / 8.585 cm3

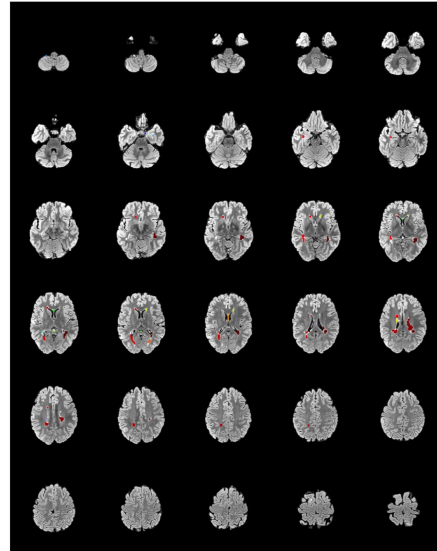
Lesion [1] Total Volume: 3.217 cm3
(Involved Structure: Volume)
Corpus_Callosum: 1.976 cm3
Inferior_Fronto_Occipital_R: 0.349 cm3
Uncinate_fasciculus_R: 0.314 cm3
Calcarine_R: 0.308 cm3
Superior_corona_radiata_R: 0.146 cm3
Posterior limb_of_internal_capsule_R: 0.104 cm3

Lesion [2] Total Volume: 2.912 cm3
(Involved Structure: Volume)
Inferior_Fronto_Occipital_L: 0.782 cm3
Tapetum_L: 0.631 cm3

DataBase Connectopedia Program Sequencer Series Processing

Lesions Map:

(Normalized Results Provided for Research Purposes Only, neither for Clinical nor Diagnostic Use)



Extracted Lesions Locations & Volumetries:

(Normalized Results Provided for Research Purposes Only, neither for Clinical nor Diagnostic Use)

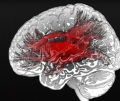
Total Extracted Lesions (>0.3 cm3) (Number / Volume): 15 / 8.984 cm3

Lesion [1] Total Volume: 2.797 cm3
(Involved Structure: Volume)
Inferior_Fronto_Occipital_L: 0.770 cm3
Tapetum_L: 0.595 cm3
Uncinate_fasciculus_L: 0.424 cm3
Corpus_Callosum: 0.248 cm3
Posterior limb_of_internal_capsule_L: 0.184 cm3
Stria_terminalis_L: 0.168 cm3
Superior_corona_radiata_L: 0.159 cm3
Posterior_thalamic_radiation_L: 0.119 cm3
Spino_Thalamic_L: 0.066 cm3
Sagittal_stratum_L: 0.032 cm3
Posterior_corona_radiata_L: 0.032 cm3

Lesion [2] Total Volume: 1.416 cm3
(Involved Structure: Volume)
Superior_corona_radiata_L: 0.809 cm3
Anterior_corona_radiata_L: 0.210 cm3
Corpus_Callosum: 0.166 cm3
Sagittal_stratum_L: 0.137 cm3
Posterior limb_of_internal_capsule_L: 0.056 cm3
Caudate_L: 0.038 cm3

Lesion [3] Total Volume: 1.121 cm3
(Involved Structure: Volume)
Corpus_Callosum: 0.938 cm3
Superior_corona_radiata_R: 0.137 cm3
Uncinate_fasciculus_R: 0.046 cm3

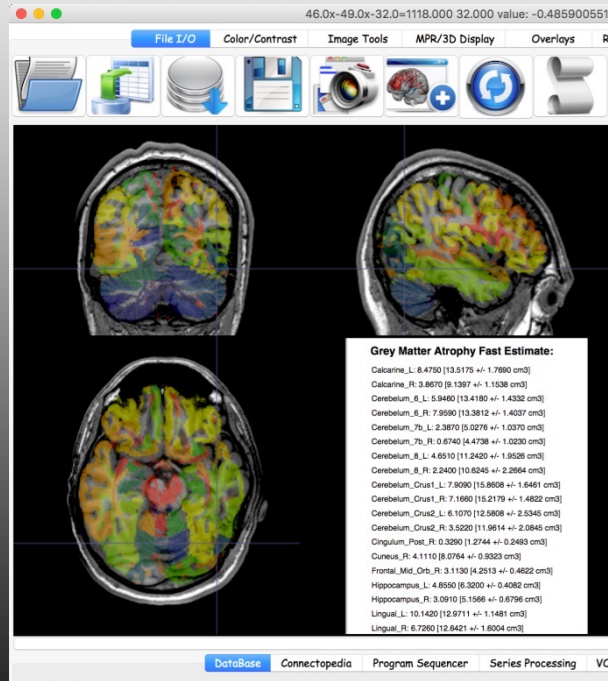
Lesion [4] Total Volume: 1.239 cm3
(Involved Structure: Volume)



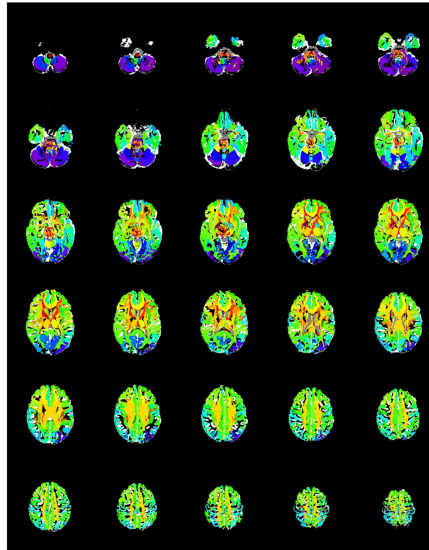
BRAINANALYZE

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Quantification de l'Atrophie

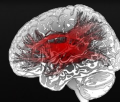


VBM Map:
(Normalized Results Provided for Research Purposes Only, neither for Clinical nor Diagnostic Use)



Grey Matter Structures Volumetry:
(Normalized Results Provided for Research Purposes Only, neither for Clinical nor Diagnostic Use)

Amygdala_L/Amygdala_R	114.8227 %
Amygdala_L	1.6190 cm3 [Nal: 0.9941 +/- 0.5165 / v%: 62.8636]
Amygdala_R	1.4100 cm3 [Nal: 0.7054 +/- 0.2526 / v%: 99.8819]
Angular_L/Angular_R	68.1596 %
Angular_L	4.8850 cm3 [Nal: 5.7553 +/- 0.9168 / v%: -15.1222]
Angular_R	7.1670 cm3 [Nal: 7.0807 +/- 1.1578 / v%: 1.2193]
Calcarine_L/Calcarine_R	130.0846 %
Calcarine_L	6.4600 cm3 [Nal: 10.5464 +/- 1.2239 / v%: -38.7470]
Calcarine_R	4.9660 cm3 [Nal: 7.2296 +/- 0.9193 / v%: -31.3100]
Caudate_L/Caudate_R	111.7722 %
Caudate_L	4.3980 cm3 [Nal: 2.3373 +/- 0.7144 / v%: 88.0843]
Caudate_R	3.9230 cm3 [Nal: 2.8188 +/- 0.7420 / v%: 39.4763]
Cerebellum_10_L/Cerebellum_10_R	116.4875 %
Cerebellum_10_L	0.3250 cm3 [Nal: 0.1589 +/- 0.1327 / v%: 104.5097]
Cerebellum_10_R	0.2790 cm3 [Nal: 0.1760 +/- 0.1632 / v%: 56.5227]
Cerebellum_3_L/Cerebellum_3_R	62.6896 %
Cerebellum_3_L	0.5040 cm3 [Nal: 0.3025 +/- 0.1420 / v%: 66.6116]
Cerebellum_3_R	0.8040 cm3 [Nal: 0.4140 +/- 0.2547 / v%: 94.2029]
Cerebellum_4_5_L/Cerebellum_4_5_R	81.5744 %
Cerebellum_4_5_L	3.7720 cm3 [Nal: 2.8772 +/- 1.3902 / v%: 31.0974]
Cerebellum_4_5_R	4.6240 cm3 [Nal: 2.7106 +/- 1.3668 / v%: 70.5906]
Cerebellum_6_L/Cerebellum_6_R	115.3884 %
Cerebellum_6_L	4.7090 cm3 [Nal: 9.7769 +/- 1.7066 / v%: -51.8355]
Cerebellum_6_R	4.0610 cm3 [Nal: 7.8409 +/- 2.3528 / v%: -47.9525]
Cerebellum_7b_L/Cerebellum_7b_R	82.4390 %
Cerebellum_7b_L	0.6760 cm3 [Nal: 0.0648 +/- 1.1532 / v%: -83.3695]
Cerebellum_7b_R	0.6200 cm3 [Nal: 2.8130 +/- 0.8968 / v%: -70.8496]
Cerebellum_8_L/Cerebellum_8_R	68.0928 %
Cerebellum_8_L	2.1500 cm3 [Nal: 8.0638 +/- 2.4290 / v%: -73.4037]
Cerebellum_8_R	3.2530 cm3 [Nal: 5.7013 +/- 1.7021 / v%: -42.9432]
Cerebellum_9_L/Cerebellum_9_R	74.3387 %
Cerebellum_9_L	1.6020 cm3 [Nal: 2.6482 +/- 0.6309 / v%: -39.5053]
Cerebellum_9_R	2.1550 cm3 [Nal: 1.9720 +/- 0.5620 / v%: 9.2799]
Cerebellum_Crus1_L/Cerebellum_Crus1_R	188.2313 %
Cerebellum_Crus1_L	5.5980 cm3 [Nal: 13.1318 +/- 1.6987 / v%: -57.3708]
Cerebellum_Crus1_R	2.9740 cm3 [Nal: 11.0696 +/- 2.2738 / v%: -73.1338]

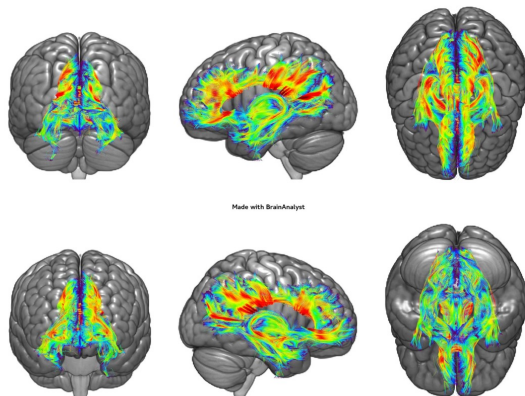


BRAINANALYZE

To Analyze the Brain in Function

Selected Fibers Bundles:

Limbic System:



Made with BrainAnalyst

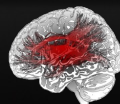
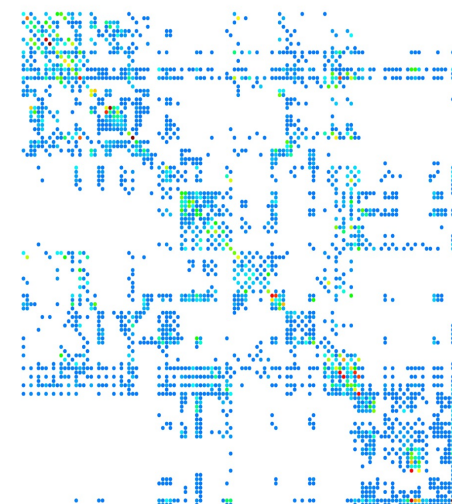
Bundle	Color	Area	Volume	Length	Mean FA	Max FA	Min FA	Mean MD	Max MD	Min MD
1	Blue	10	10	10	0.2	0.3	0.1	0.5	0.6	0.4
2	Green	10	10	10	0.2	0.3	0.1	0.5	0.6	0.4
3	Yellow	10	10	10	0.2	0.3	0.1	0.5	0.6	0.4
4	Orange	10	10	10	0.2	0.3	0.1	0.5	0.6	0.4
5	Red	10	10	10	0.2	0.3	0.1	0.5	0.6	0.4

Structural Connectom Bundles Connections:

Grey-to-Grey Connections:



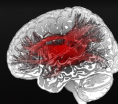
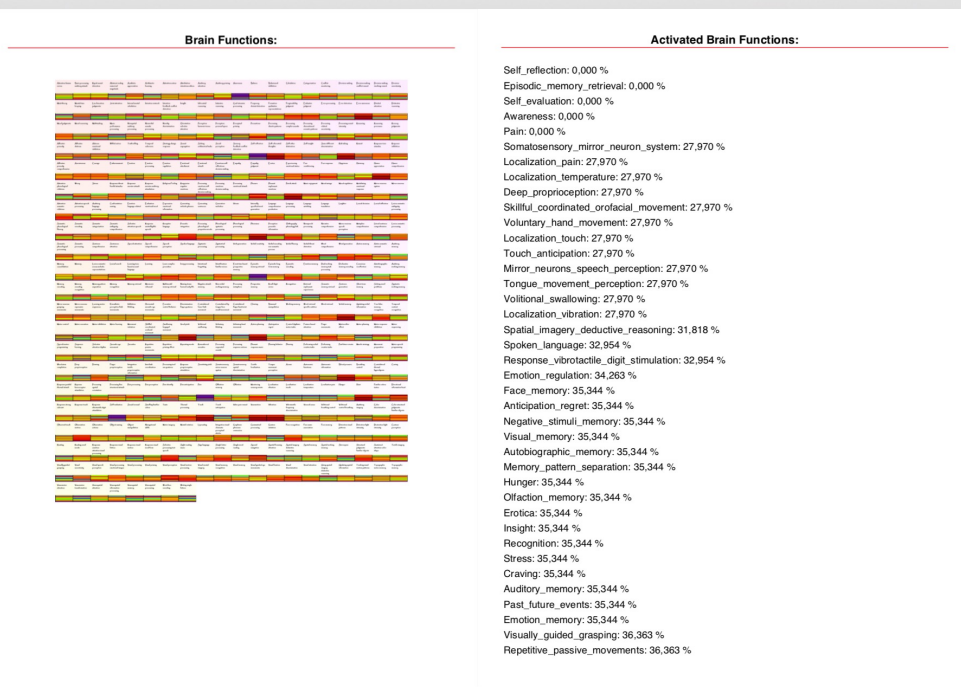
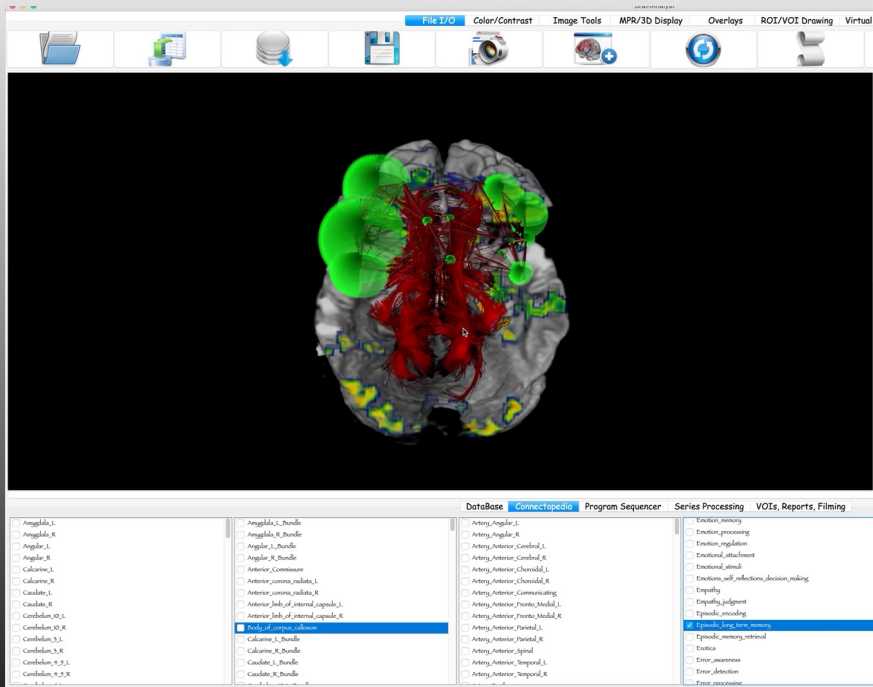
Structural Connectom Grey-to-Grey Connections Graph:



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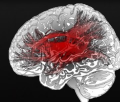
Quantification de la Fonction Cérébrale



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Conclusions

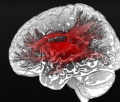
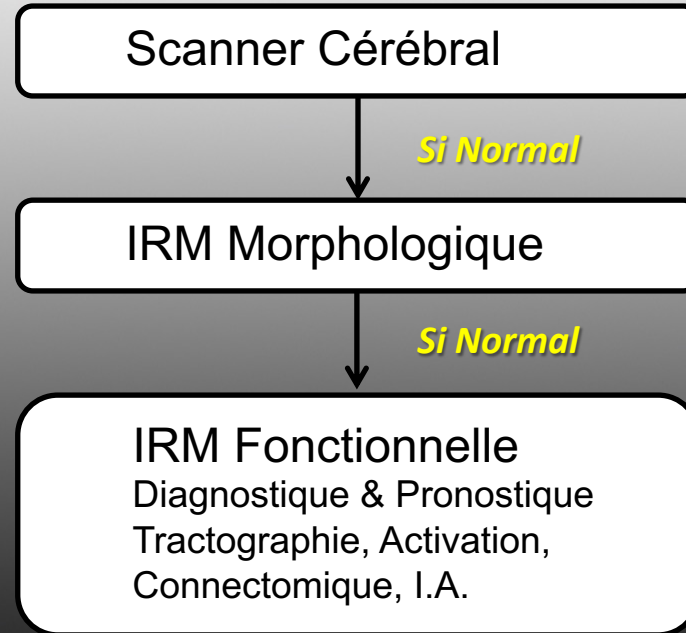


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Algorithme Décisionnel



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