



Etude en temps réel des effets cellulaires globaux des champs RF

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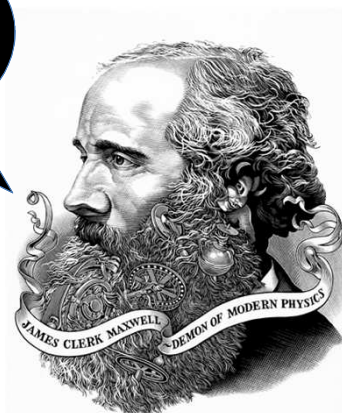


EFFETS BIOLOGIQUES ET SANITAIRES DES RAYONNEMENTS NON IONISANTS – 16 OCTOBRE 2014 – UNIVERSITÉ DE LIMOGES



Les équations de Maxwell sont à la base de l'électromagnétisme depuis bientôt 150 ans...

$$\begin{aligned}\nabla \cdot \mathbf{D} &= \rho \\ \nabla \cdot \mathbf{B} &= 0 \\ \nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} \\ \nabla \times \mathbf{H} &= \mathbf{j} + \frac{\partial \mathbf{D}}{\partial t}\end{aligned}$$



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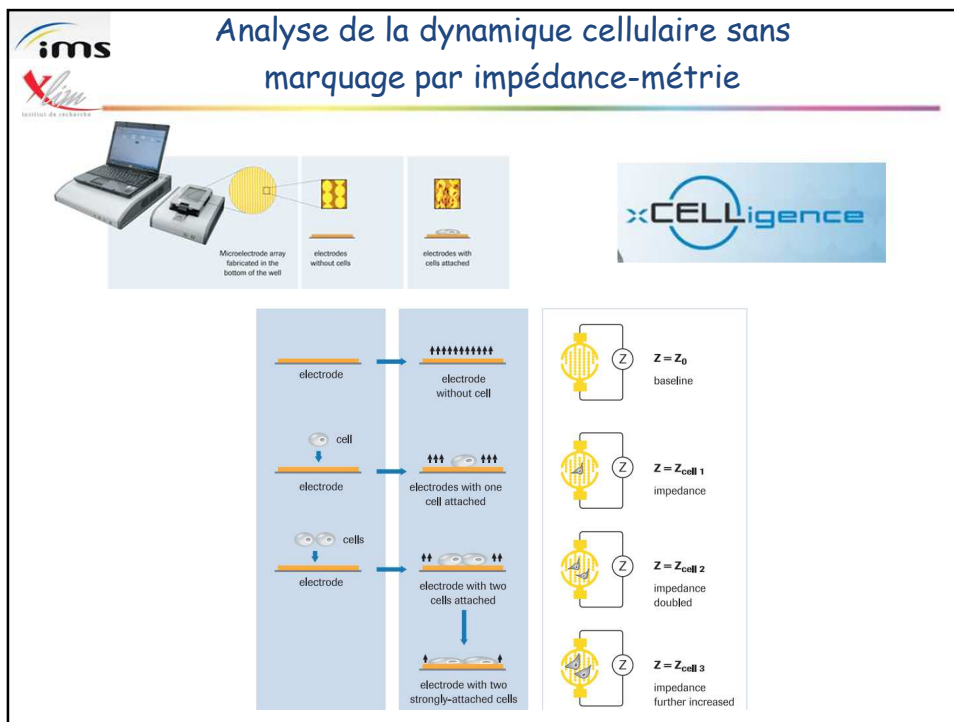
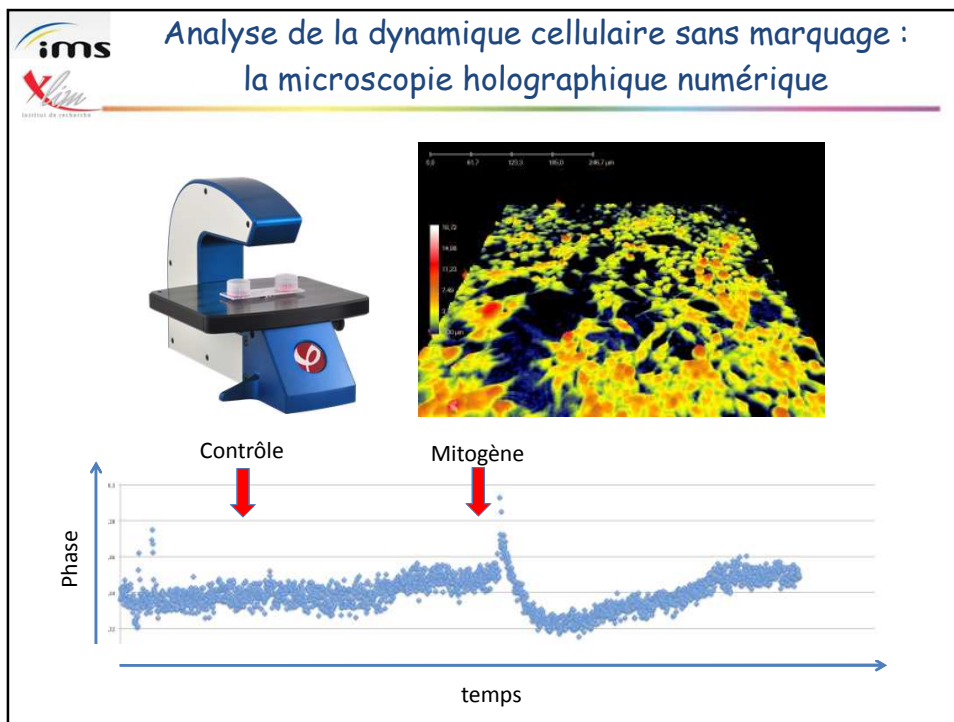
...Mais nous commençons à peine à comprendre le fonctionnement du vivant au niveau cellulaire

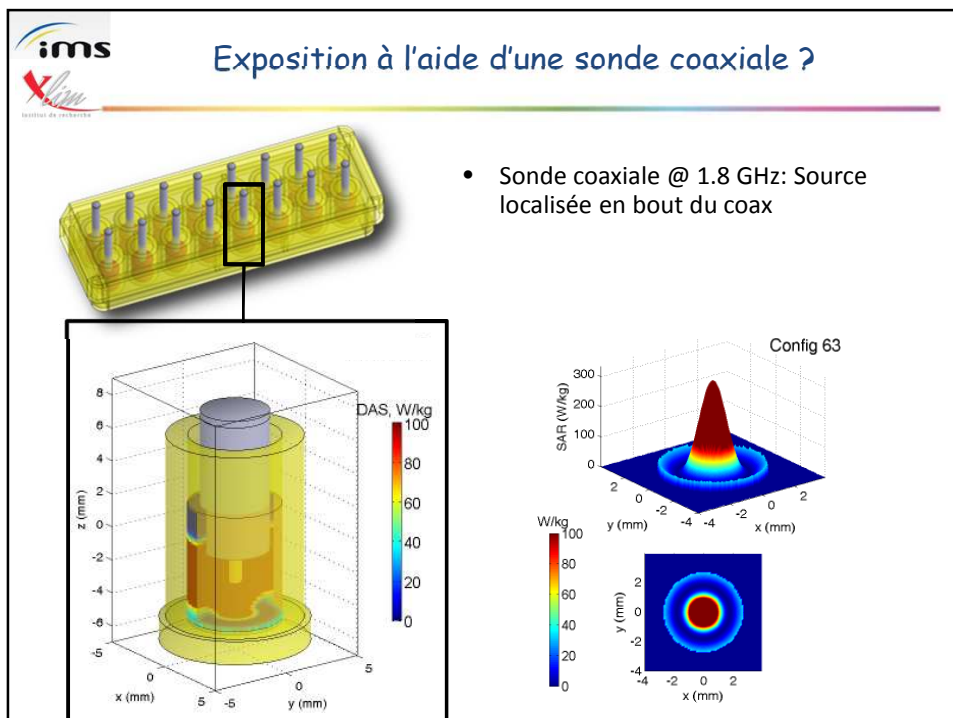
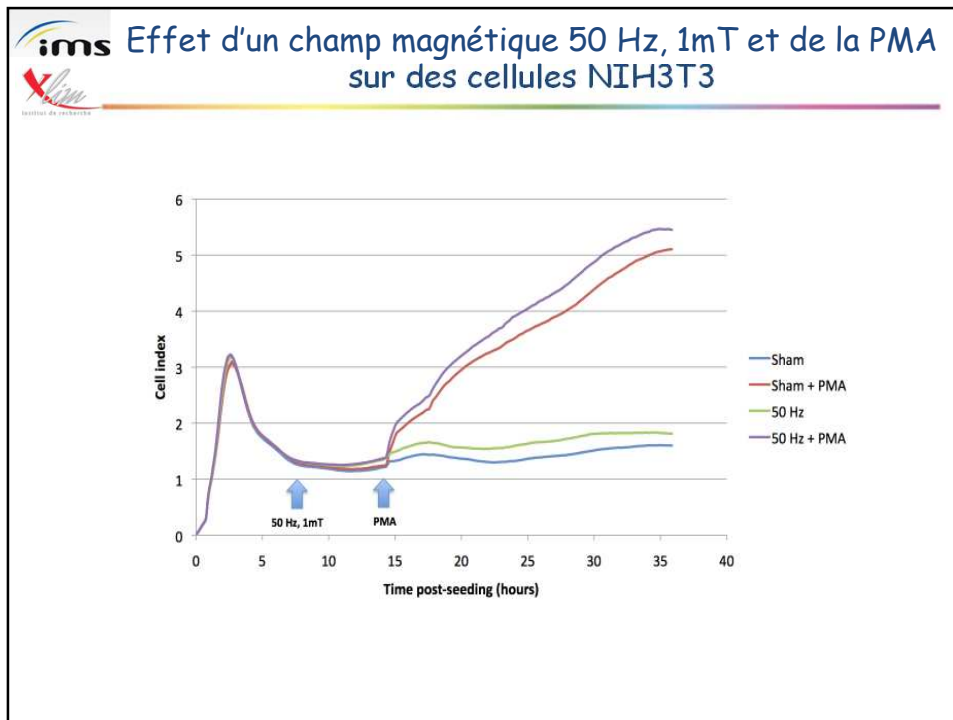
The diagram shows a cross-section of a cell with various organelles labeled: Microfilaments, Mitochondria, Lysosome, Peroxisome, Centrioles, Microtubules, Smooth Endoplasmic Reticulum, Golgi Apparatus, Cilia, Rough Endoplasmic Reticulum, Nucleus, Nuclear Pores, Plasma Membrane, Nuclear Envelope, Chromatin, and Ribosomes. A blue box highlights a complex signaling pathway inset, which includes components like PKC, PKA, PKB, PKG, PLC, PI3K, and others, illustrating the intricate molecular machinery within the cell.


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Le bioélectromagnétisme et la pêche à la ligne.




This diagram is identical to the one above, showing a cell with labeled organelles and a detailed signaling pathway inset. The addition of a cartoon fisherman in a hat and boots, sitting on a log and holding a fishing rod, is a metaphorical reference to the title 'Le bioélectromagnétisme et la pêche à la ligne' (Bioelectromagnetism and fishing with a line), suggesting the complexity and 'catchability' of the biological processes being discussed.





 Exposition à l'aide des électrodes au fond des plaques du xCELLigence

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- Electrodes
 - 2 x 25 lignes entrelacées (51 lignes)


 Exposition à l'aide des électrodes au fond des plaques du xCELLigence

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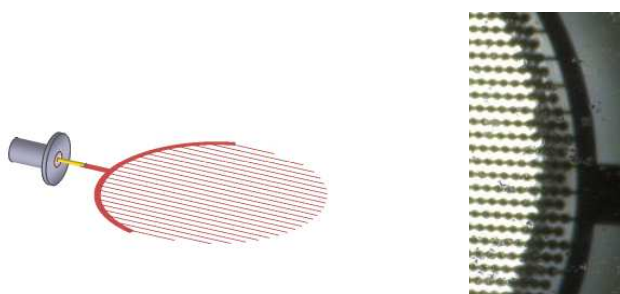
- Modélisation numérique FDTD
 - Excitation du peigne d'électrodes interdigitées : câble coaxial avec connecteurs




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Modélisation numérique

- Electrodes +
- Modèle équivalent

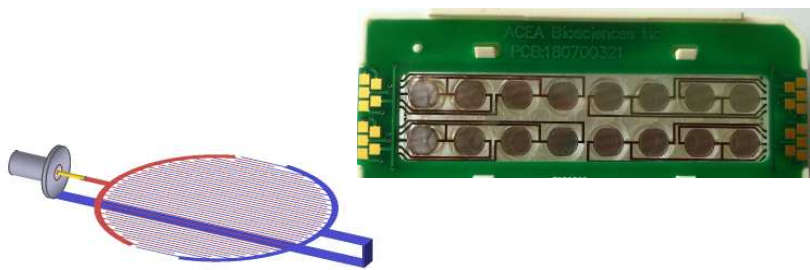


The slide shows a 3D model of a positive electrode on the left, which is a cylindrical base with a red mesh-like structure extending from it. To the right is a photograph of a microarray chip with a grid of small, dark, circular electrodes.

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Modélisation numérique

- Electrodes -
- Le réseau reliant les différents puits est simplifié

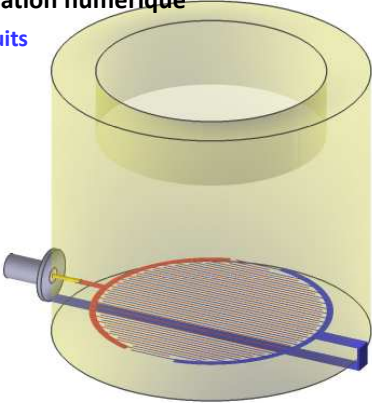


The slide shows a 3D model of a negative electrode on the left, which is a cylindrical base with a blue mesh-like structure extending from it. To the right is a photograph of a microarray chip with a grid of small, dark, circular electrodes. The chip is labeled 'ACEA Bioscience Inc' and 'PCB1807003m'.

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Modélisation numérique

- Le puits

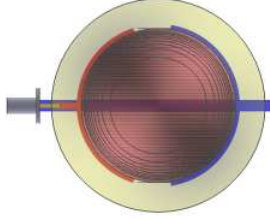
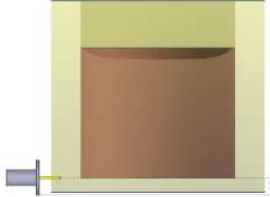
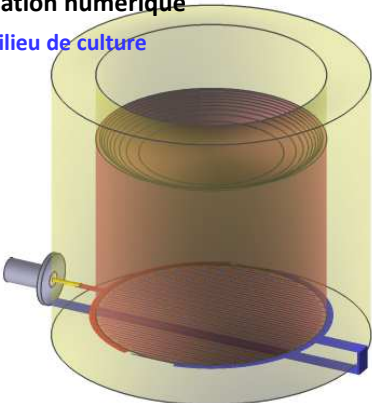


A 3D schematic diagram of a cylindrical well. At the bottom of the well, there is a circular mesh electrode. A blue rod is positioned horizontally across the well, passing through the center of the electrode. A red line highlights the path of the electrode. A grey cylindrical component is attached to the left side of the electrode assembly.

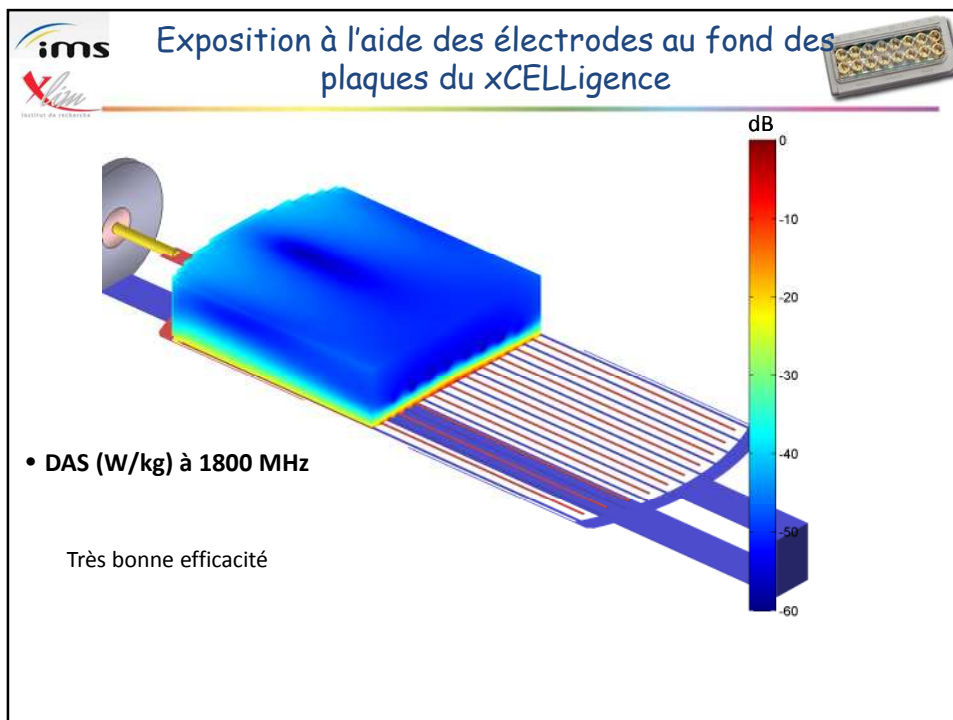
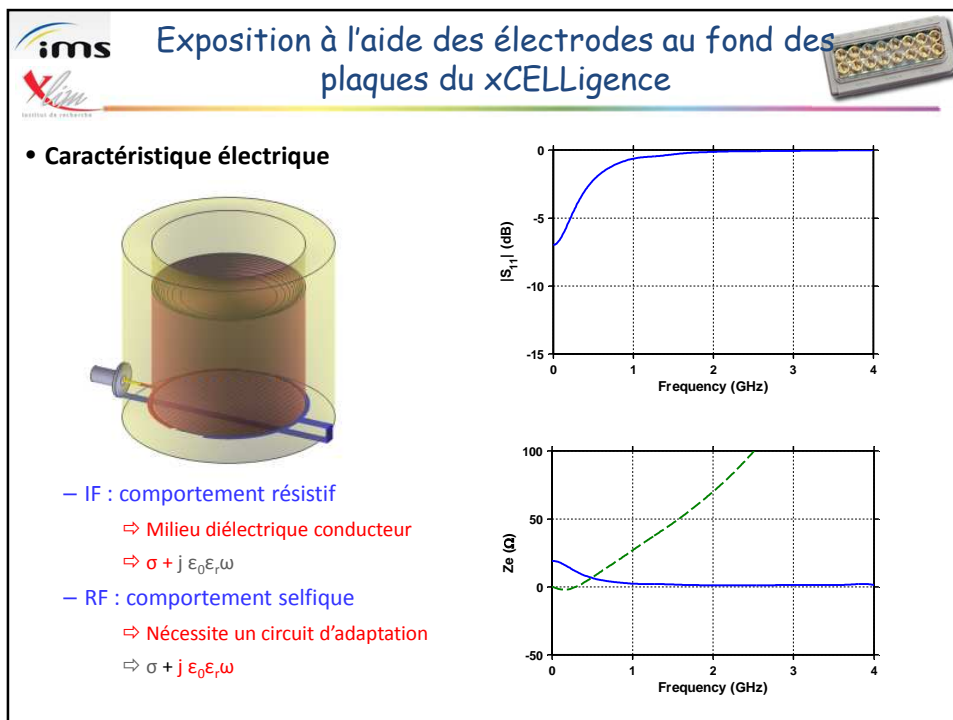
ims Exposition à l'aide des électrodes au fond des plaques du xCELLigence

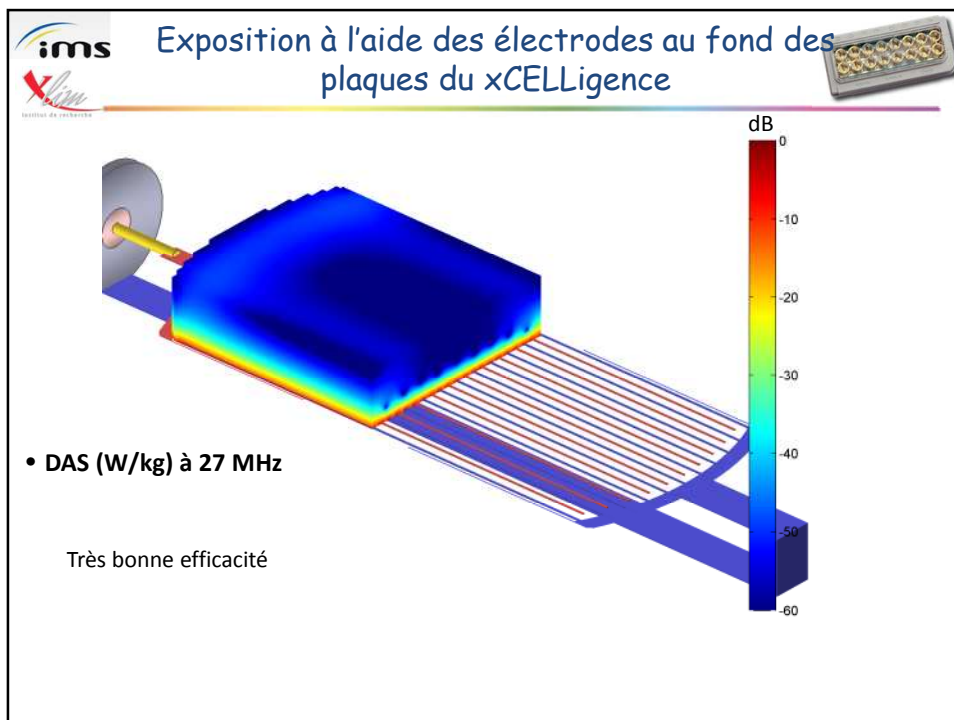
Modélisation numérique

- Le milieu de culture

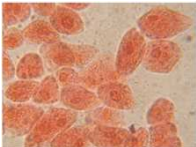
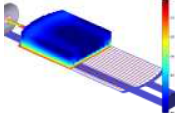
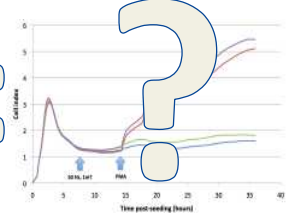


A 3D schematic diagram of a cylindrical well containing a brown liquid representing culture medium. At the bottom of the well, there is a circular mesh electrode. A blue rod is positioned horizontally across the well, passing through the center of the electrode. A red line highlights the path of the electrode. A grey cylindrical component is attached to the left side of the electrode assembly. To the right of the main diagram, there are two smaller diagrams: a cross-section of the well showing the liquid level, and a top-down view of the well showing the electrode and the rod.





Le programme GERoNiMO: tâche 5.2


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- Macrophages
- neutrophiles
- Neurones
- astrocytes
- Kératinocytes
- fibroblastes
- Lignées cellulaires

- RFID 13MHz
- GSM 1800
- UMTS
- Wi-Max
- LTE
- 0, 0.5, 1 et 2 W/kg
- 72h d'exposition par condition



IMS - UMR CNRS n°5218, Université de Bordeaux I

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- Bernard Veyret
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- Sophie Kohler
- Miguel Ángel García Fernández
- Delia Arnaud-Cormos



agence nationale de sécurité sanitaire
alimentation, environnement, travail
Projet n° 2013-195



cnrs
dépasser les frontières



GERoNiMO
Generalized EMF research using novel methods.
An integrated approach: from research to risk
assessment and support to risk management

