

Tri cellulaire informatisé en cytopathologie

SYNTHESE des 2 projets : VALTRICYT - OLOCYG

Projet VALTRICYT

ARCTIC - ANTARCTIC
2010-2013

Validation du Tri cellulaire Informatisé en Cytopathologie
Tumorale

Greyc site Manche Groupe de Recherche en Informatique, Image, automatique et Instrumentation de Caen - Site Manche
Pr.A.Elmoataz - M.Toutain

Service d'Anatomie et de Cytologie Pathologiques
CHPC Cherbourg-Octeville
Docteur Hubert Elie – Michel Lécluse

Service d'Anatomie et de Cytologie Pathologiques
CHRU Caen
Pr.F.Galateau-Sallé – Dr G.Planchard – T.Rousvoal

Projet OLOCYG

CytoProcessor
2013-2015

Optimisation Logicielle en Cytologie Gynécologique

Société DATEXIM
Caen
JH.Pruvot – A.Renouf

Service d'Anatomie et de Cytologie Pathologiques
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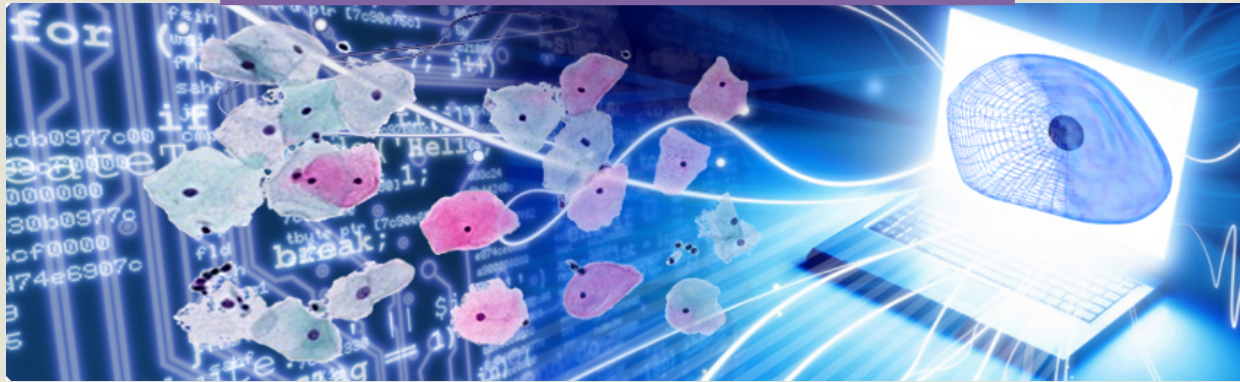
**Projet VALTRICYT
ARCTIC - ANTARCTIC
2010-2013**

Validation du Tri cellulaire Informatisé en
Cytopathologie Tumorale

MESOTHELIOME MALIN

- **98,5 % des tumeurs** (métastases d'adénocarcinome et mésothéliome malin)
Outil plus performant que la cytologie seule
80 % des MME vs 60 % : gain 20%
62 % des HMA évolutives vs < 30 % : gain + 30%
- ARCTIC est également un outil de détection des **éléments cellulaires rares**
- < 0,3 % des cellules sont détectées par le système.
- **3 % des cas négatifs** ont été reclassés comme suspects, voir positifs, par le pathologiste après lecture de la classification neuronale (4 cas / 135)

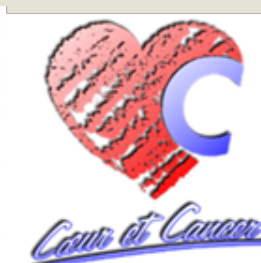
PROGRAMME DE RECHERCHE OLOCYG



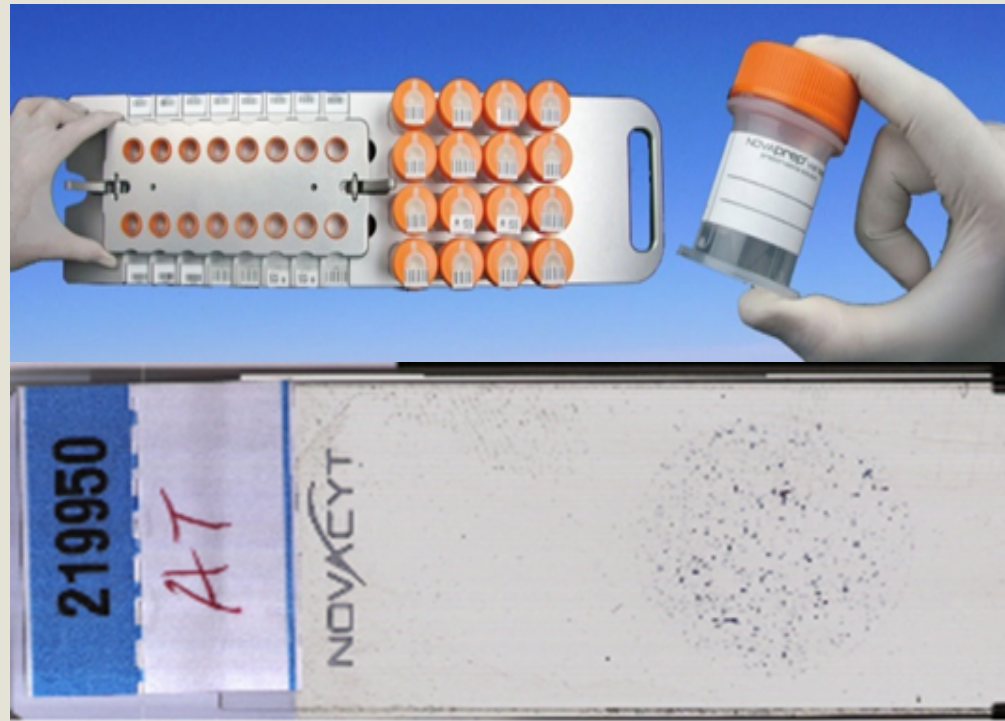
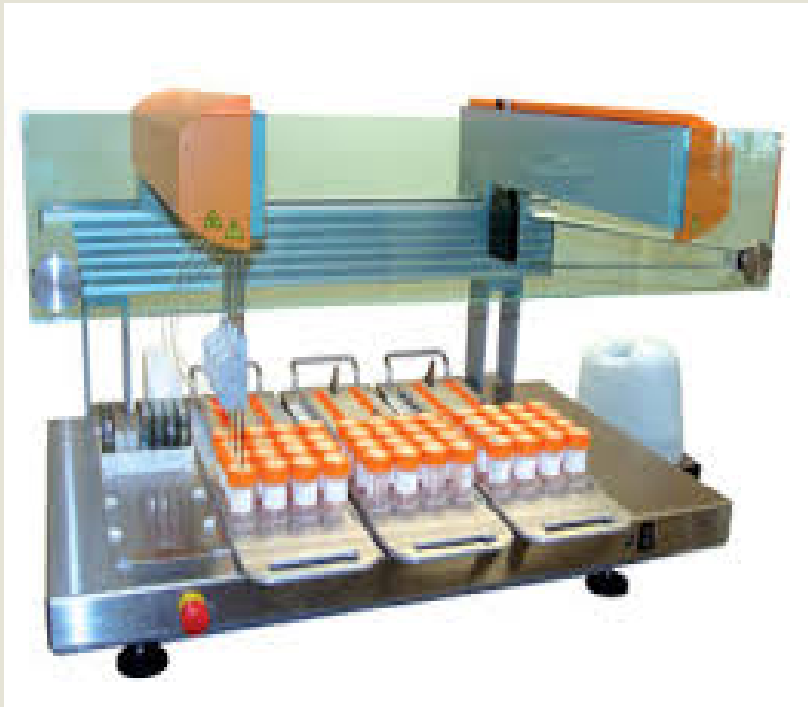
DATEXIM
Digital Pathology Future

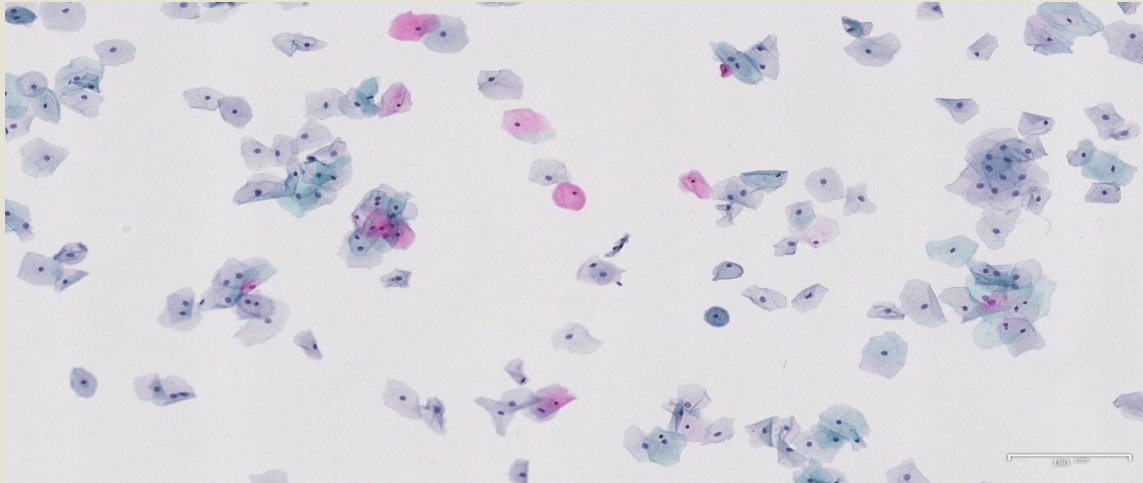


OLOCYG est un programme d'optimisation logicielle en cytologie gynécologique. Son but est de mettre à la disposition des pathologistes un outil informatique fiable, performant et ergonomique permettant la détection des cellules cancéreuses et précancéreuses dans le cadre du dépistage des lésions du col utérin.



OLOCYG a montré :
1 - IMPORTANCE DE LA CYTOLOGIE EN PHASE LIQUIDE
NPS 50 NOVACYT





2 – IMPORTANCE DE LA TELEPATHOLOGIE

Technologie « Full Web »

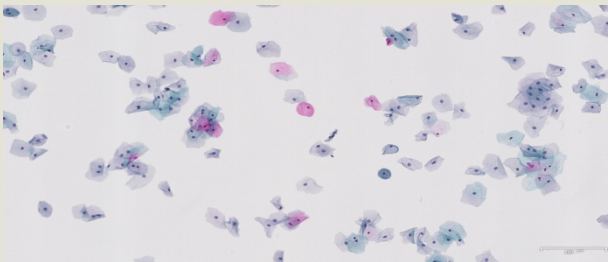


DATEXIM
Digital Pathology Future

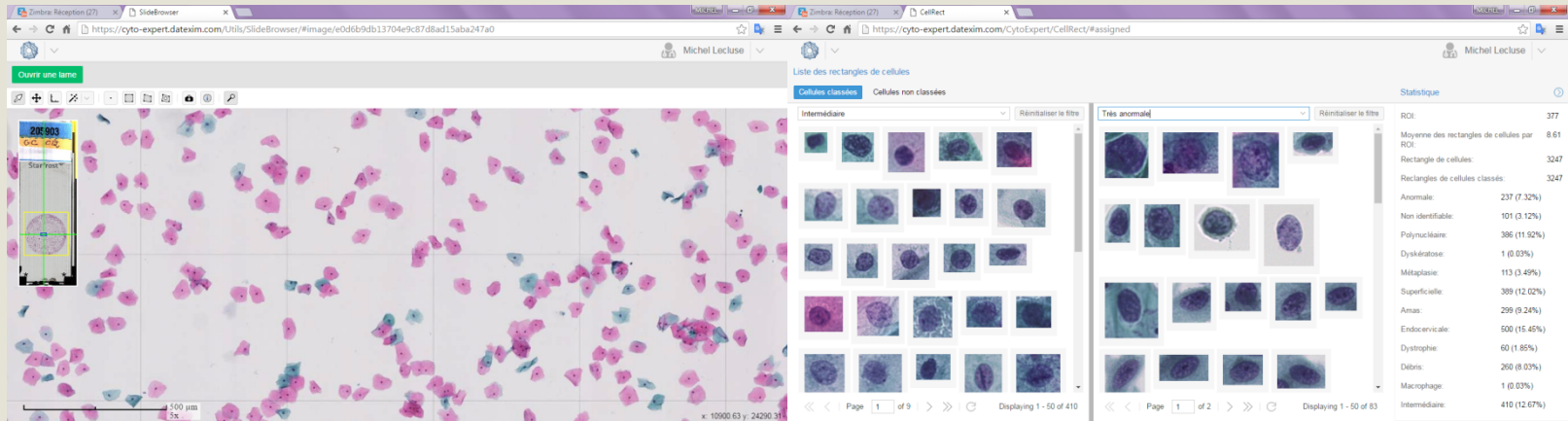
LinkedPath™



CHUCaen



3 - IMPORTANCE DU TRI INFORMATISE DES CELLULES



Un système de dépistage automatisé pour le cancer du col de l'utérus avec une sensibilité de plus de 97 %



DATEXIM



CytoProcessor™

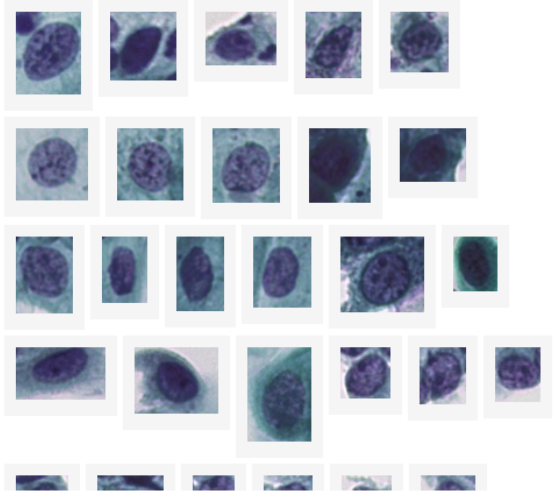




Liste des rectangles de cellules

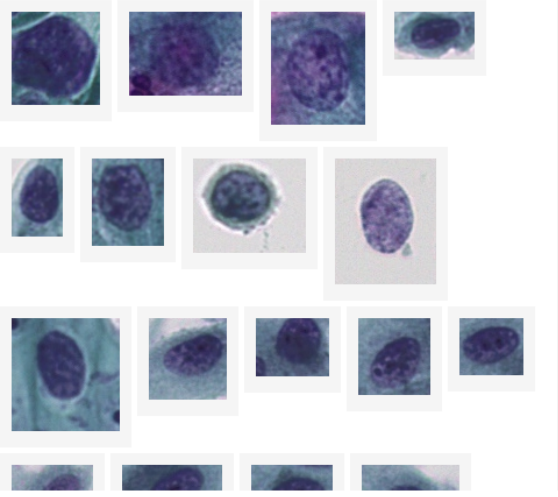
Cellules classées | Cellules non classées

Anormale | Réinitialiser le filtre



Page 1 of 5 | Displaying 1 - 50 of 237

Très anormale | Réinitialiser le filtre



Page 1 of 2 | Displaying 1 - 50 of 83

Statistique

ROI:	377
Moyenne des rectangles de cellules par ROI:	8.61
Rectangle de cellules:	3247
Reclngs de cellules classés:	3247
Anormale:	237 (7.32%)
Non identifiable:	101 (3.12%)
Polynucléaire:	386 (11.92%)
Dyskératose:	1 (0.03%)
Métaplasie:	113 (3.49%)
Superficielle:	389 (12.02%)
Amas:	299 (9.24%)
Endocervicale:	500 (15.45%)
Dystrophie:	60 (1.85%)
Débris:	260 (8.03%)
Macrophage:	1 (0.03%)

Afficher tous les téléchargements...

European Average² | CytoProcessor™ as an aid to efficient screening¹

SENSITIVITY 70%	SENSITIVITY 97%
SPECIFICITY 90%	SPECIFICITY 99.6%

GAIN DE 27%

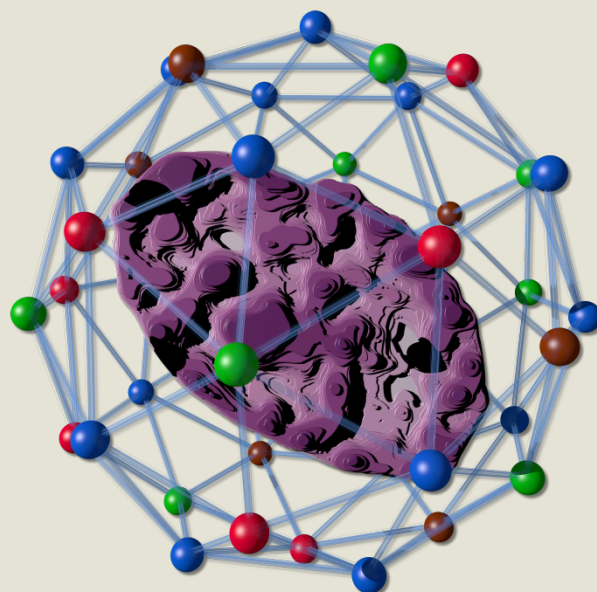
GAIN DE ~ 10%

PLANUCA

PLAteforme NUmérique de pathologie pour la prise en charge des CAncers



DATEXIM
Digital Pathology Future

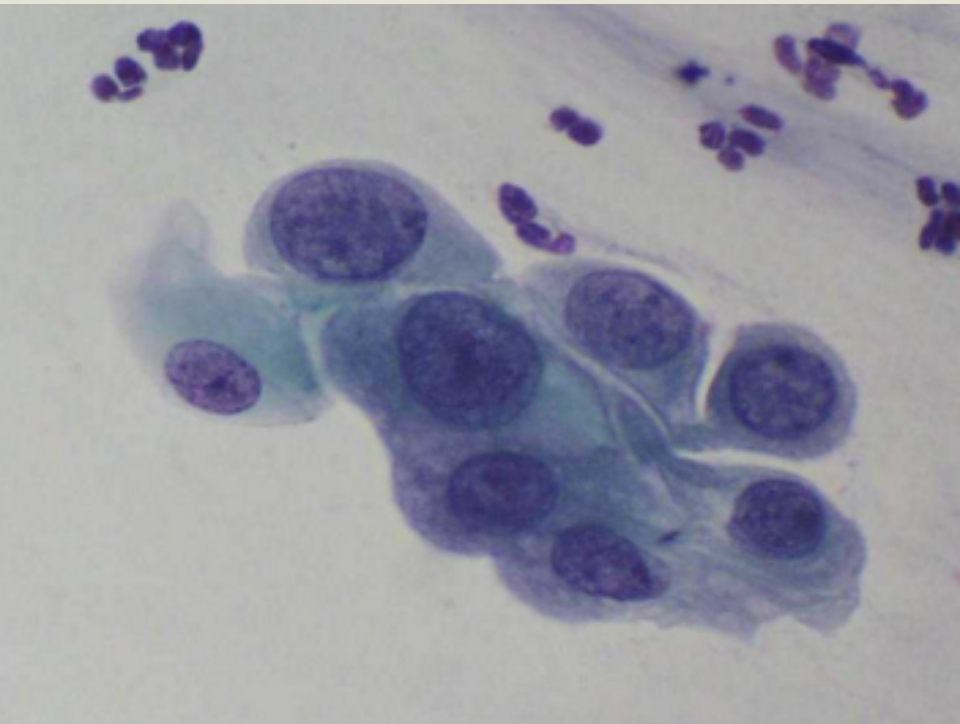


PLANUCA

ASCUS (ASC-US+ASC-H)

Atypical Squamous Cells of Undertermined Significance

- = atypies épithéliales malpighiennes de signification incertaine.
- = X 2,5 à x 3 taille cellule intermédiaire normale
- $60\mu^2 - 150\mu^2$ ASCUS
- = très discrètes irrégularités de la texture chromatinienne



KOILOCYTE

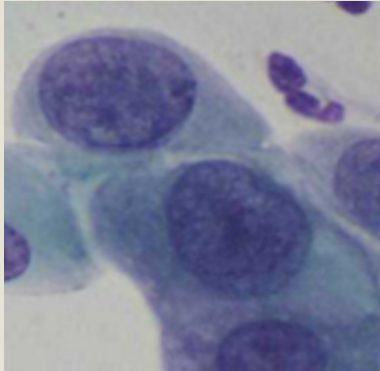
Signe le condylome
Grec : cellule avec trou

HPV = Human Papova Virus
16-18 biologie moléculaire



ASCUS : 10% de l'ensemble des frottis

10% de frottis ASCUS + : → + de 50 % régressent spontanément
→ 20-30 % restent à l'état ASCUS
→ 10% vont évoluer vers HSIL cancer



Pour 100.000 examens par an :
10 % ASCUS = 10.000 ASCUS
10% évoluent = 1000 LHG/an

L'importance capitale du dépistage des ASCUS

Cellule très facilement identifiable en cytométrie par analyse d'images

PATHOLOGY DIGITAL ASSOCIATION – USA BOSTON 2015

Automated digital pathology solution for rapid and reliable cervical cancer screening

PLANUCA PROJÉT

Digital pathology platform for the management of cancer

DPA BOSTON 2015

BACKGROUND
PLANUCA is a project funded by the ESC and Lower Normandy that aims at developing a telepathology web application, including an automated tool enabling computer-aided diagnosis for health professionals in the field of cervical cancer screening. Our application is designed for use by cytotechnologists, who furnish the slides to the pathologists for diagnosis. We present here the results of this research collaboration between the Cherbourg Public Hospital Center (CHPC), the GREYC (University of Caen), and the DATEXIM company.

Cytologic and scanning methods: For this study we examined 1882 women and 1642 worked on slides prepared with NovaCyt liquid-based technology, stained using the standard Papanicolaou protocol, and digitized using a Leica SCN400 scanner at 40x. The images generated were tested using a blur detection analysis software. Fewer than 5% of slides needed to be re-scanned due to focus problems.

IMAGE ANALYSIS METHODS:
Each virtual slide was processed in three steps: Image segmentation for nuclei extraction, feature computation on each nuclei and its periphery, and cell classification. First, the segmentation was validated using different types of cells manually delineated by pathologists. Then, pathologists labeled cell examples to train a classifier. Finally, a web application was developed to visualize the results of the classification. An intuitive interface was designed to enable rapid review of the most abnormal cells.

Novo, Architecture and Evaluation
The algorithm followed a study based on a hierarchical process in three main steps: First, image segmentation for nuclei extraction. Then, feature computation on each nuclei and its periphery. Finally, cell classification. The results are visualized in a web application.

CytoProcessor software displays thumbnails of each cell type. The cells are sorted starting with the most potentially abnormal first. The most pertinent cells are within the first 50 thumbnails. Presently, we read 25 cases per hour - and easily 150 per day.

CONCLUSION: The application proposes a simple and ergonomic design, permitting rapid decision-making as to whether the slide needs a pathologist's review (judgment of abnormality). Cytotechnologists need only view the gallery of abnormal cells, thus each slide can be evaluated in approximately one minute. Our next objective is to automatically sort the slides. To this end, the 1642 slides were diagnosed using light microscopy and the results were compared to automated classification.

Global sensitivity = 92.5% HSIL detection sensitivity = 100% LSIL detection sensitivity = 92.1% Global specificity = 99.2%

A broader validation study involving multiple pathology centers (PLANUCA) is planned to confirm these encouraging results.

MERCI DE VOTRE ATTENTION

MERCI À

