



istituto zooprofilattico sperimentale

del Piemonte, Liguria e Valle d'Aosta

All Together against the cancer

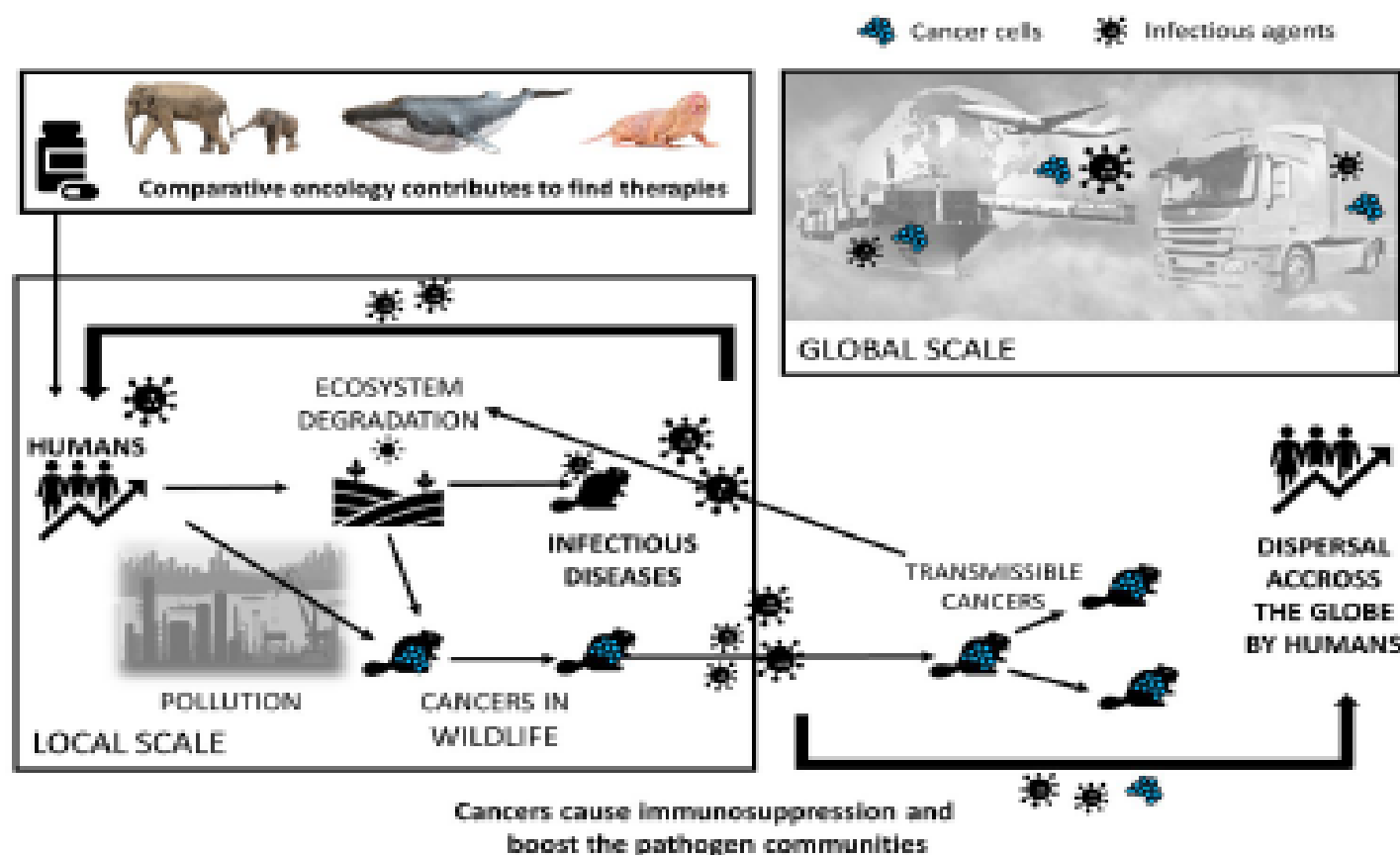
Dott.ssa Elisabetta Razzuoli



Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta
Centro di Referenza per l'Oncologia Veterinaria e Comparata (CEROVEC)

5 Novembre 2024

On the need for integrating cancer into the One Health perspective





N° tumori ↑ tra 2007 e 2017

2° posto per DALY dal 90' a 2017

Nel 2022, 20 mln nuovi casi (Tumore ai polmoni, mammella e CRC)

WHAT to do?

Pets come Sentinelle di Esposizioni Ambientali



Somiglianze con Tumori Umani

Sviluppo di tumori spontanei a carattere benigno e maligno

***Patogenesi, prognosi e manifestazioni cliniche,
simili ai casi riscontrati in umana***

Malattie metastatizzanti a distanza, recidivanti

Malattie con variabile sensibilità farmacologica



❑ *Alto grado di similitudine tra genoma umano e canino*

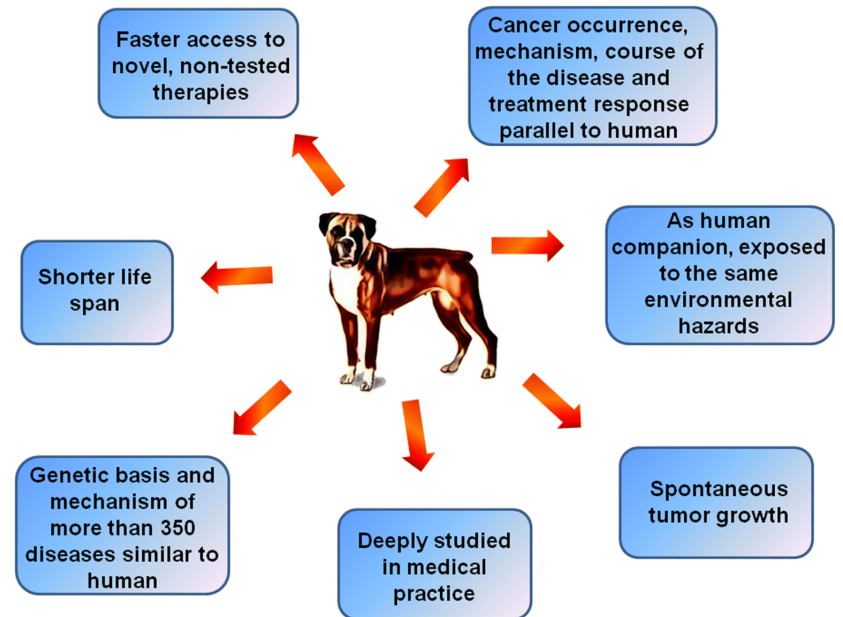
❑ *Esposizione a medesimi fattori di rischio*

❑ **Immunocompetenza**

❑ *Sviluppo spontaneo del cancro*

❑ *Progressione più rapida* → *Verifica più rapida degli effetti di un potenziale farmaco*

❑ *Mancanza di standard di cura* → *Proprietario più motivato nell'aderire a sperimentazioni clinica*

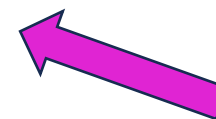


Bujak JK, et al. Acta Vet Scand. 2018

MEDICINA TRASLAZIONALE



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All Together

NUOVE PROSPETTIVE DI ONCOLOGIA
COMPARATA ANIMALE - UOMO



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All Together

NUOVE PROSPETTIVE DI ONCOLOGIA
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Lottare Insieme contro le infezioni da PVs

RC IZS PLV 15/18

RC IZS PLV 12/19

RC IZS PLV 10/21

Reg Liguria 22L03

Reg Liguria 23L03



CEROVEC
Centro di Referenza Nazionale
per l'Oncologia Veterinaria e Comparata



ECPV2

ECPV2





BPV1



BPV1



ECPV2

PAPILLOMAVIRUS ISOLATI NEL CAVALLO FINO AD OGGI

3 Bovine Papillomavirus
(BPV)

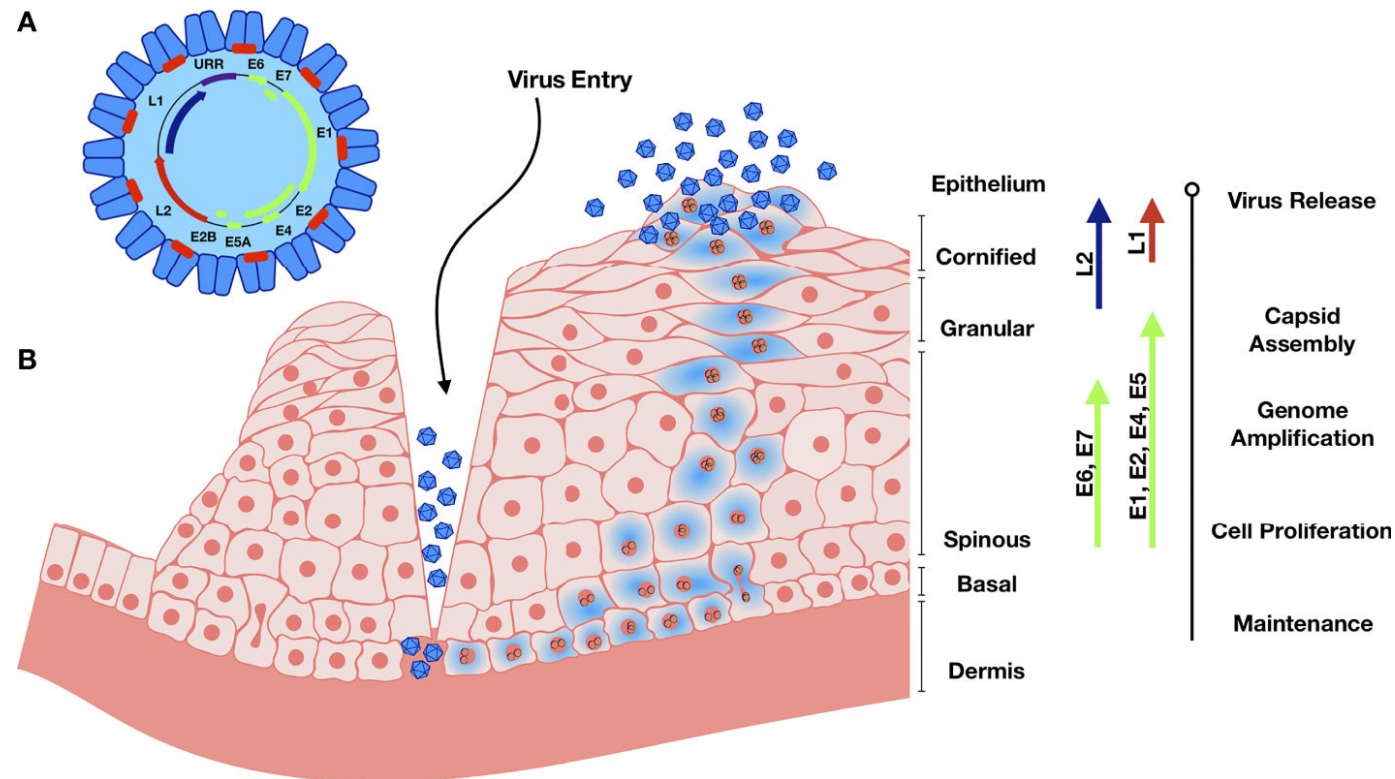
- ✓ **BPV1** (*Otten et al, 1993*)
- ✓ **BPV2** (*Otten et al, 1993*)
- ✓ **BPV13** (*Lunardi et al, 2013*)

associati all'insorgenza di sarcoidi



10 Equus Caballus
Papillomavirus (EcPV)

- ✓ **EcPV2** carcinomi a cellule squamose (CCS) di genitali esterni, stomaco, orofaringe (*Porcellato et al., 2020*)
- ✓ **EcPV1, 3-7** placche auricolari (*Mira et al., 2018*)
- ✓ **EcPV4** CCS auricolare (*Peters-Kennedy et al., 2020*)
- ✓ **EcPV8** papillomatosi cutanea diffusa (*Li et al, 2019*)
- ✓ **EcPV9** isolato dal seme di uno stallone con **papilloma penieno** (*Li et al., 2019*)
- ✓ **EcPV10** isolato da una cavalla ipofertile (*De Paolis et al., 2022*)



Frontiers in Cellular and Infection Microbiology **2022**, 10;12:814948 <https://doi.org/10.3389/fcimb.2022.8149>

PAPILLOMAVIRUS

l'esposizione a PVs infezioni asintomatiche esito variabile:

- ✓ **Clearance del virus ad opera del sistema immunitario**
- ✓ **Infezioni persistenti che possono esitare in cancro invasivo**



Article

Detection of Equus Caballus Papillomavirus Type-2 in Asymptomatic Italian Horses

Katia Cappelli ¹, Chiara Grazia De Ciucis ^{2,*}, Samanta Mecocci ^{1,*}, Tiziana Nervo ³, Maria Ines Crescio ², Marco Pepe ¹, Rodolfo Gialletti ¹, Daniele Pietrucci ⁴, Laura Federica Migone ², Silvia Turco ⁵, Luca Mechelli ¹, Fabrizio Passamonti ¹, Carlo Drago ⁶, Gian Guido Donato ³, Katia Varello ², Paola Modesto ², Giovanni Chillemi ⁴, Alessandro Ghelardi ⁷ and Elisabetta Razzuoli ²

Viruses 2022, 14, 1696. <https://doi.org/10.3390/v14081696>

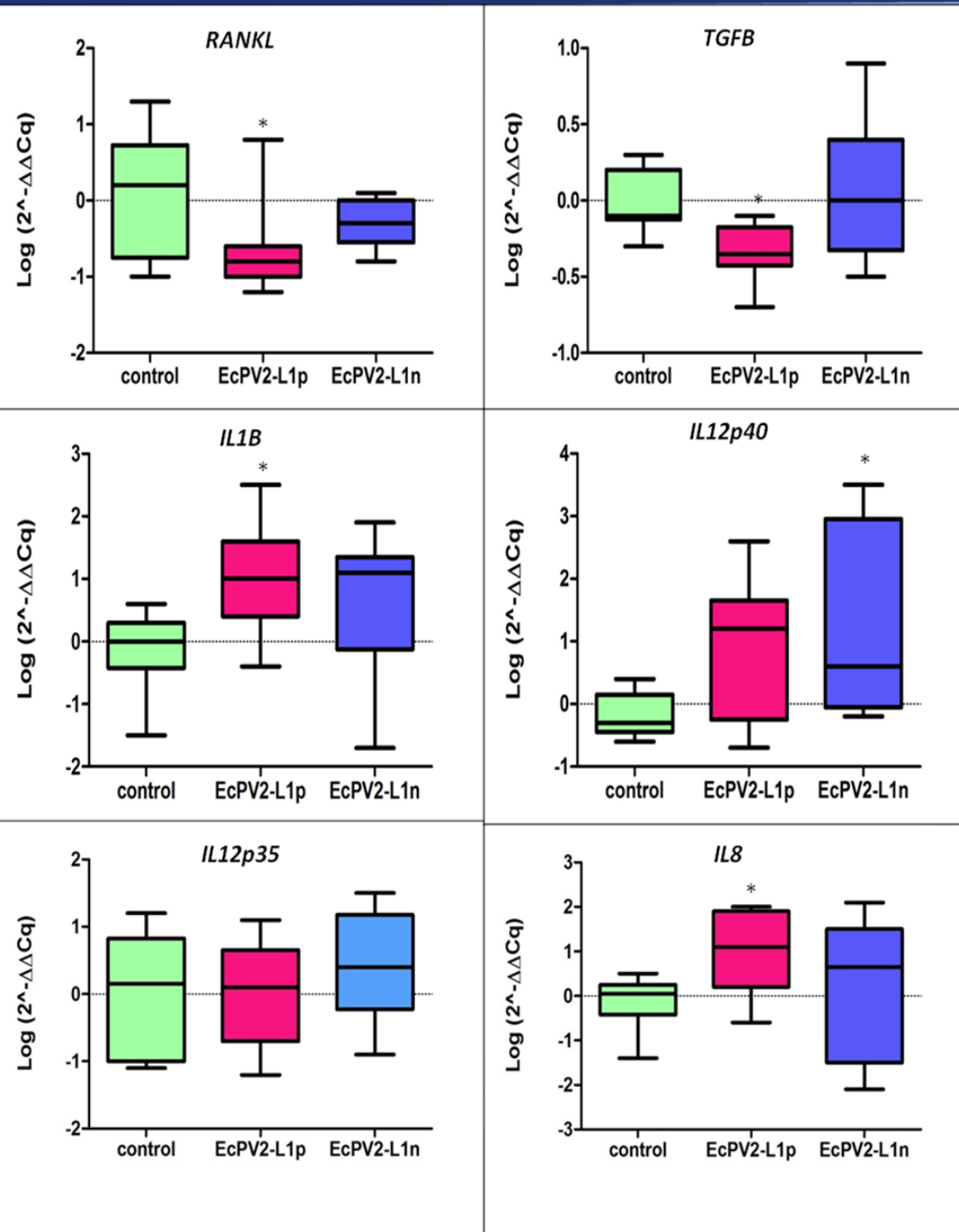
ESPRESSIONE GENICA

TGFB e RANKL down regolati

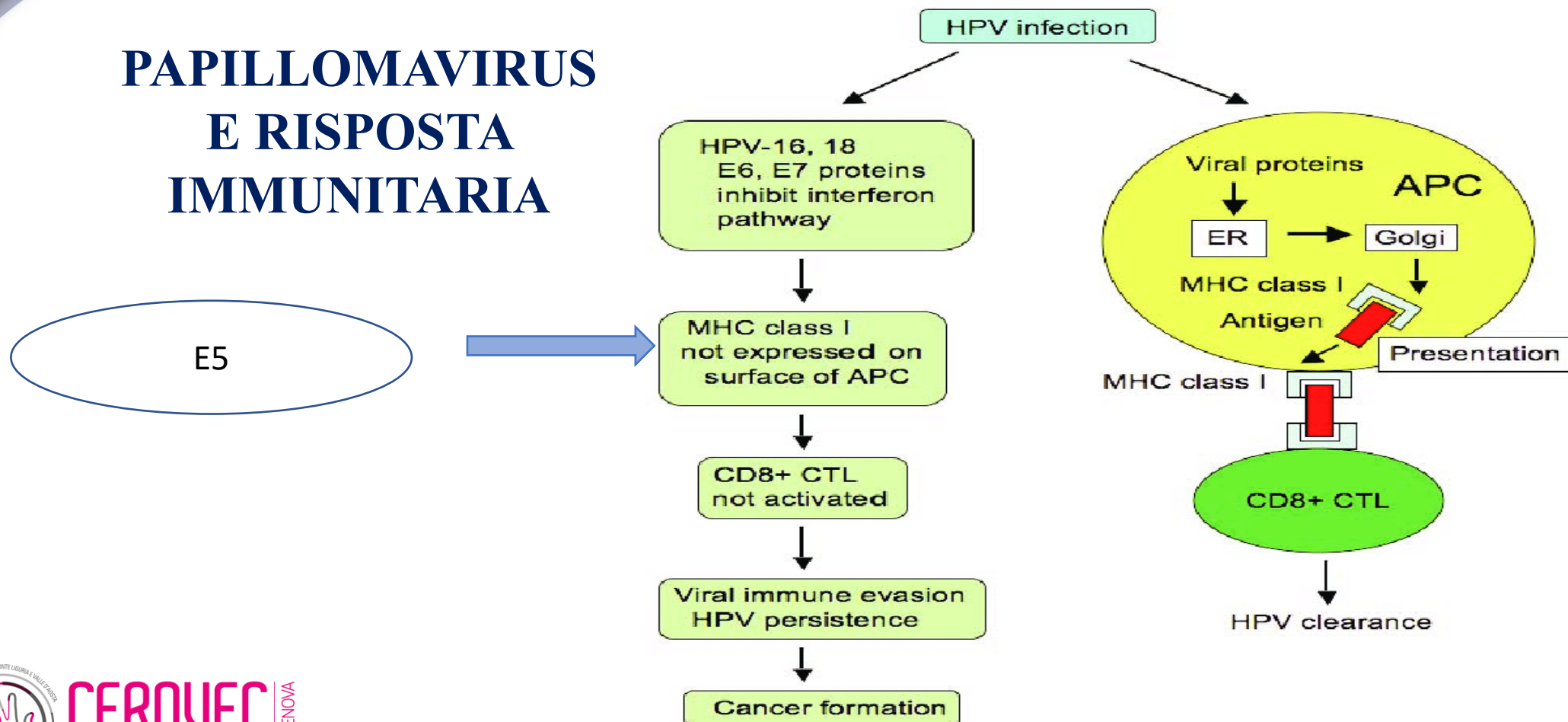
IL8 ed IL1B up-regolati

IL12p40 up-regolato nei EcPV2-L1n

IL12p35 no significativo



PAPILLOMAVIRUS E RISPOSTA IMMUNITARIA



ARTICLE

Translational Therapeutics

Baseline immunity and impact of chemotherapy on immune microenvironment in cervical cancer

Yi Zhang^{1,2}, Minhua Yu^{1,2}, Ying Jing^{1,2}, Jiejun Cheng³, Caiyan Zhang⁴, Lin Cheng^{1,2}, Haijiao Lu^{1,2}, Mei-Chun Cai⁵, Jie Wu⁵, Wenjing Wang^{1,2}, Weihua Lou^{1,2}, Lihua Qiu^{1,2}, Li Tan⁶, Huaiwu Lu⁷, Xia Yin^{1,2}, Guanglei Zhuang^{1,2} and Wen Di^{1,2}

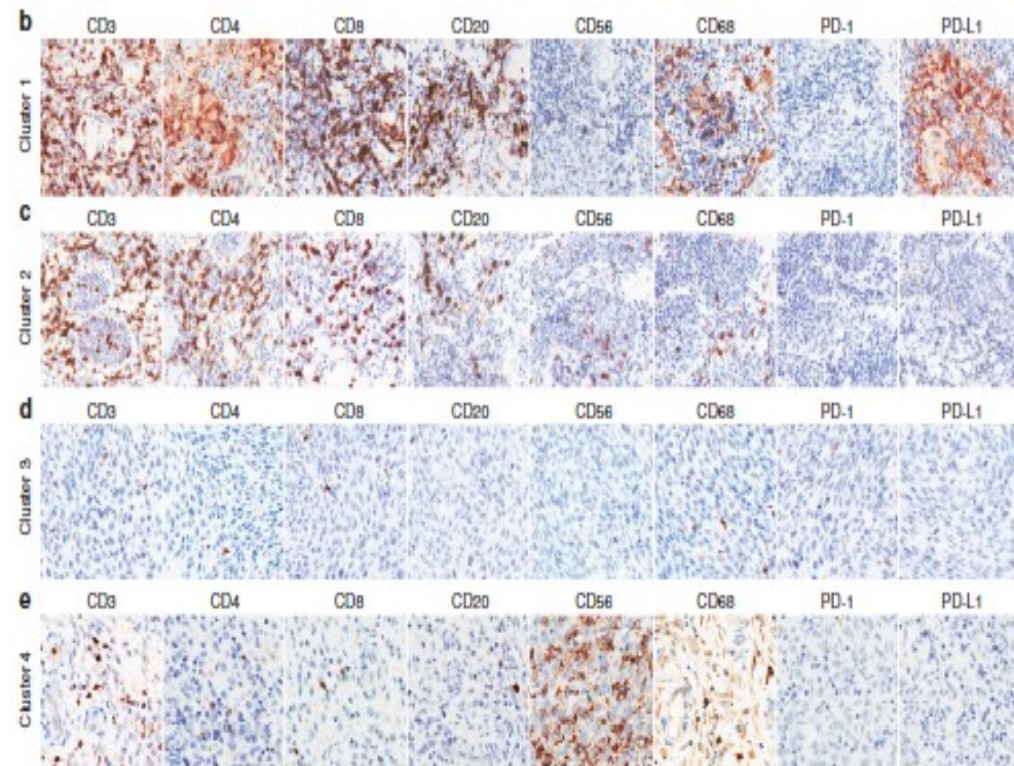
BACKGROUND: We aimed to comprehensively evaluate the immunologic landscape at baseline and upon chemotherapy in cervical cancer. The information should aid ongoing clinical investigations of checkpoint blockade immunotherapies in this disease setting.

METHODS: A series of 109 cervical carcinoma patients was retrospectively assayed before and after neoadjuvant chemotherapy. Tumour-infiltrating immune markers (CD3, CD4, CD8, CD20, CD56, CD68, PD-1, PD-L1) were assessed by immunohistochemistry. RNA sequencing analysis was performed on matched pre- and post-treatment fresh-frozen tissues.

RESULTS: At diagnosis, diverse immune cell types including CD20+ B cells, CD3+ T cells, CD56+ natural killer (NK) cells, and CD68+ macrophages were detected in different proportions of cervical carcinoma. Unsupervised hierarchical clustering evidently showed that CD4+ and CD8+ T cell abundance correlated with PD-L1 expression. Based on the immune infiltration patterns, the patients could be stratified into four groups with prognostic relevance, namely, 'immuno-active', 'immuno-medial', 'immuno-NK', and 'immuno-deficient'. Neoadjuvant chemotherapy was associated with increased CD4, CD8, CD20, and CD56 signals, most prominently in good responders. Transcriptomic data corroborated the improved anticancer immunity and identified immunosuppressive CD200 upregulation following chemotherapeutic intervention.

CONCLUSIONS: A subset of cervical cancer harbours active immune microenvironment, and chemotherapy treatment may further exert locoregional immunostimulation. Immune checkpoint inhibitors as combination or maintenance therapies warrant future exploration in clinic.

British Journal of Cancer (2021) 124:414–424; <https://doi.org/10.1038/s41416-020-01123-w>



1-Associazione dell'infiltrato con la prognosi

2-Effetto chemioterapia su infiltrato

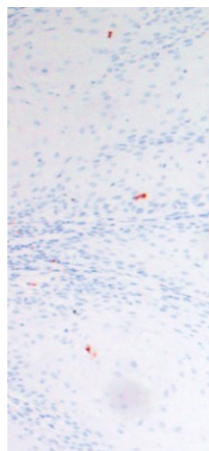
Oncology – Original Article

Vulvo-vaginal epithelial tumors in mares: A preliminary investigation on epithelial-mesenchymal transition and tumor-immune microenvironment

Federico Armando^{1,*} , Ilaria Porcellato^{2,*} , Livia de Paolis^{2,3} , Samanta Mecocci², Benedetta Passeri⁴ , Małgorzata Ciurkiewicz¹, Luca Mechelli², Chiara Grazia De Ciucis^{3,5}, Marzia Pezzolato³, Floriana Fruscione³ , Chiara Brachelente² , Vittoria Montemuri¹, Katia Cappelli², Christina Puff¹ , Wolfgang Baumgärtner¹, Alessandro Ghelardi⁶, and Elisabetta Razzuoli³

Occasional cells FOXP3+ infiltrating CCS

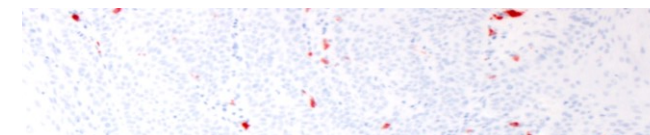
Occasional cells CD 204 infiltrating papilloma



Veterinary Pathology
2024, Vol. 61(3) 366–381
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DOI: 10.1177/03009858231207025
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[INFILTRATO



Article

Equine Penile Squamous Cell Carcinomas as a Model for Human Disease: A Preliminary Investigation on Tumor Immune Microenvironment

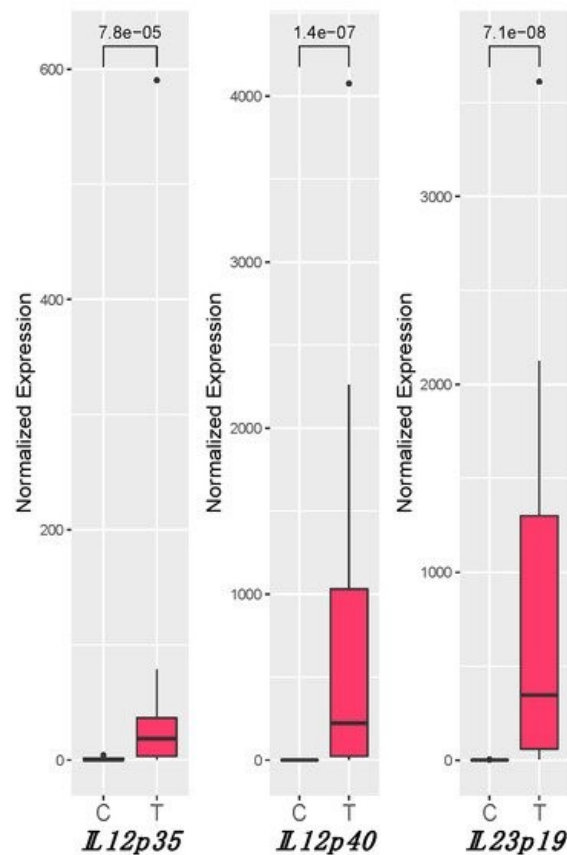
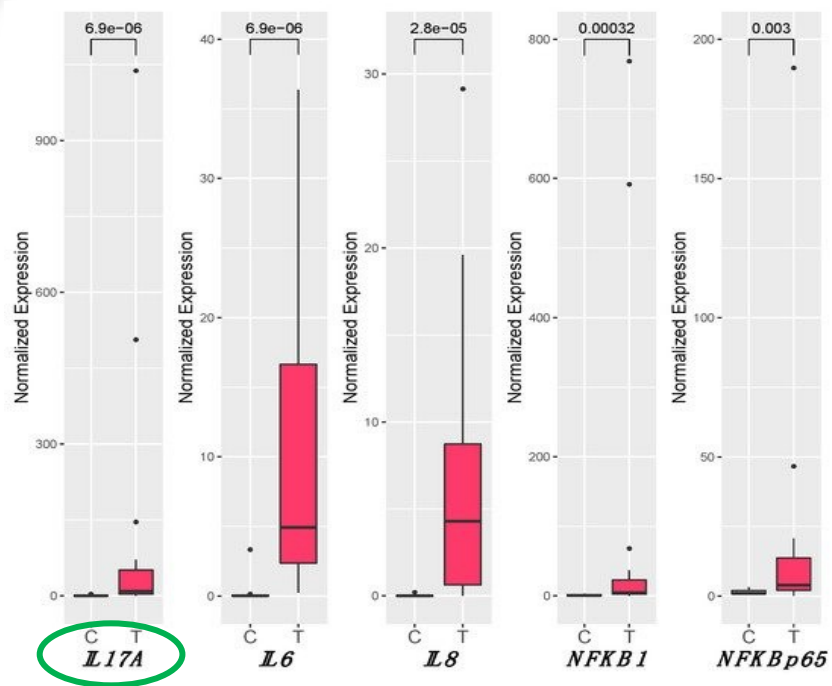
Ilaria Porcellato¹ , Samanta Mecocci¹ , Luca Mechelli^{1,*}, Katia Cappelli^{1,2,*} , Chiara Brachelente¹ , Marco Pepe^{1,2}, Margherita Orlandi¹, Rodolfo Gialletti^{1,2}, Benedetta Passeri³, Angelo Ferrari⁴, Paola Modesto⁴, Alessandro Ghelardi^{5,*} , and Elisabetta Razzuoli⁴ 

- ¹ Department of Veterinary Medicine, University of Perugia, 06126 Perugia, Italy; ilariaporcellatodvm@gmail.com (I.P.); samanta.mecocci@studenti.unipg.it (S.M.); chiara.brachelente@unipg.it (C.B.); marco.pepe@unipg.it (M.P.); margherita.orlandi94@gmail.com (M.O.); rodolfo.gialletti@unipg.it (R.G.)
- ² Centro di Ricerca sul Cavallo Sportivo, University of Perugia, 06126 Perugia, Italy
- ³ Department of Veterinary Science, University of Parma, 43126 Parma, Italy; benedetta.passeri@unipr.it
- ⁴ Zooprophyllactic Institute of Piemonte, Liguria and Valle d'Aosta, 16129 Genova, Italy; angelo.ferrari@izsto.it (A.F.); paola.modesto@izsto.it (P.M.); elisabetta.razzuoli@izsto.it (E.R.)
- ⁵ Azienda Usl Toscana Nord-Ovest, UOC Ostetricia e Ginecologia, Ospedale Apuane, 54100 Massa, Italy
- * Correspondence: luca.mechelli@unipg.it (L.M.); katia.cappelli@unipg.it (K.C.); ghelardi.alessandro@gmail.com (A.G.)

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Citochine pro-infiammatorie e fattori di trascrizione



IL12 superfamily

- IL12
- IL23
- IL27
- IL35

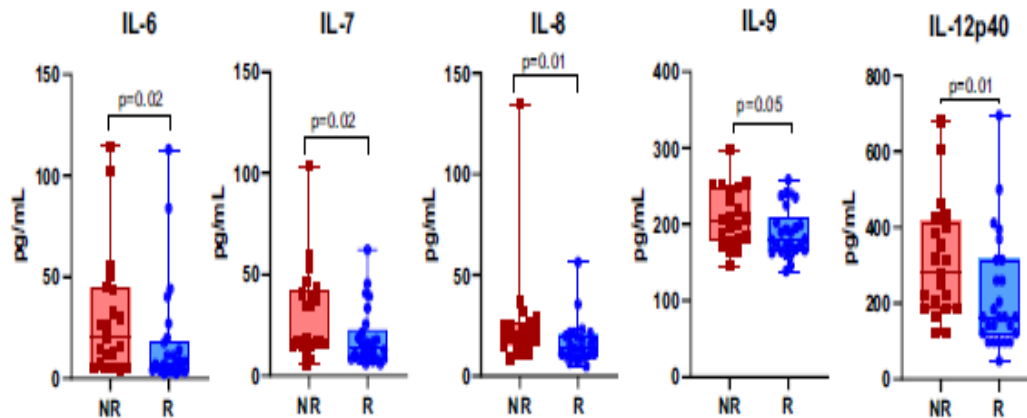


scientific reports

Check for updates

OPEN Linking tumor immune infiltrate and systemic immune mediators to treatment response and prognosis in advanced cervical cancer

Patrícia Rocha Martins^{1,2,9}, Kátia Luciano Pereira Morais^{3,4,9},
Nayane Alves de Lima Galdino^{3,4}, Adriana Jacauna¹, Sálua O. C. Paula²,
Wagner C. S. Magalhães^{2,5,6}, Luciana W. Zuccherato^{2,7}, Larissa S. Campos²,
Paulo Guilherme O. Salles^{2,5,6} & Kenneth J. Gollob^{2,3,4,8,10}



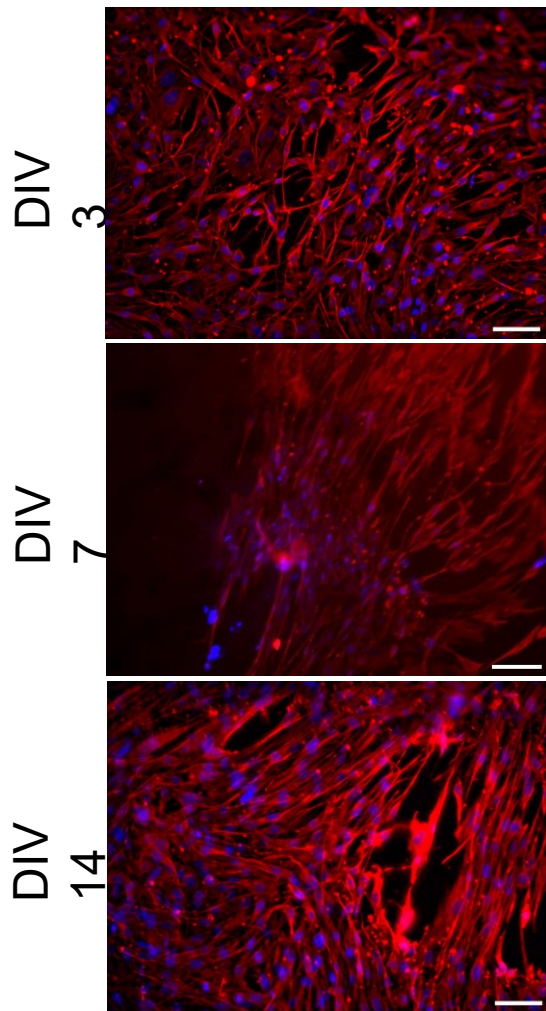
NR = pazienti che non rispondono alla radio-chemioterapia

R = pazienti che rispondono alla radio-chemioterapia

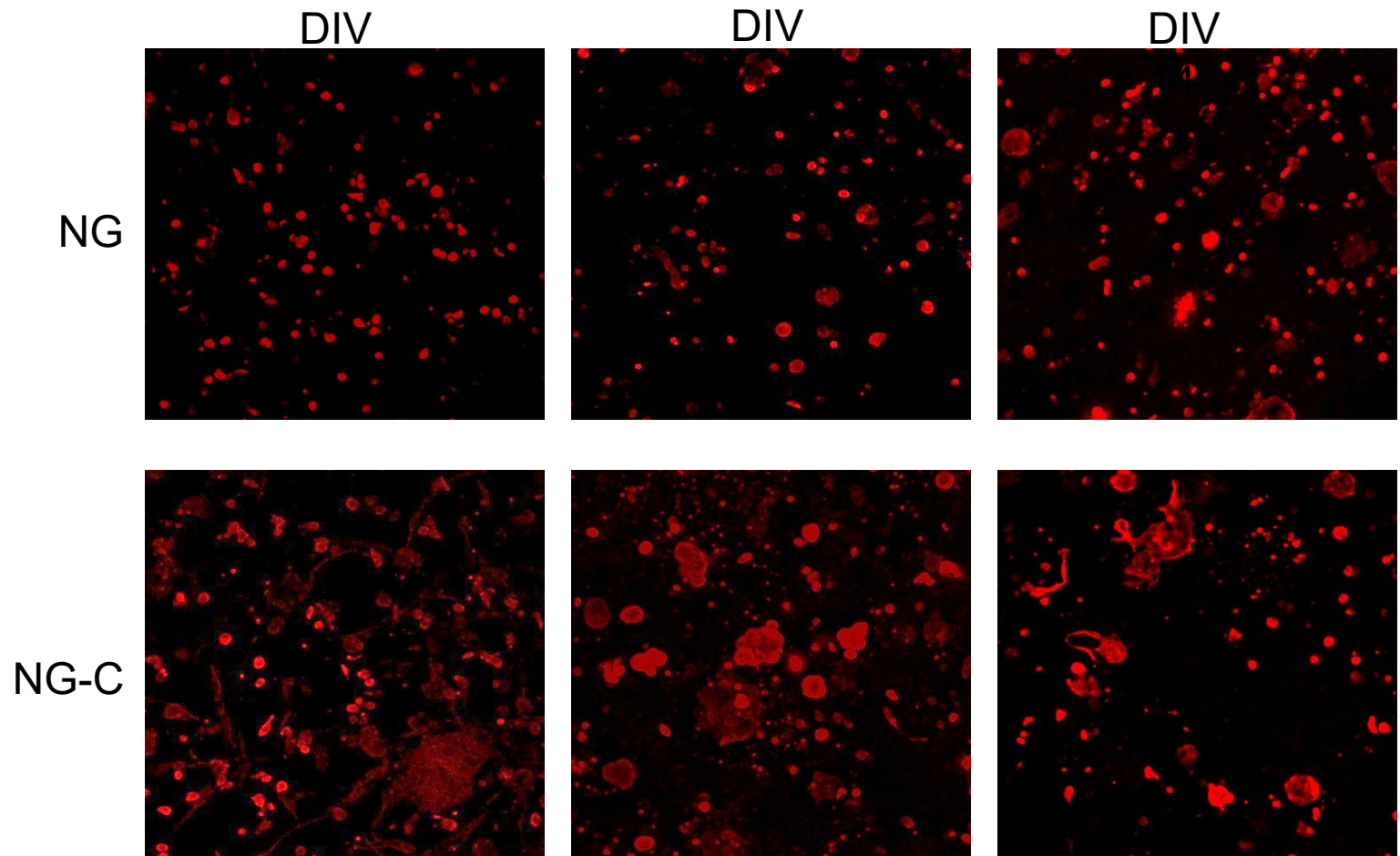
Il cavallo in aiuto dell'uomo. Test ex vivo



Coltura 2D

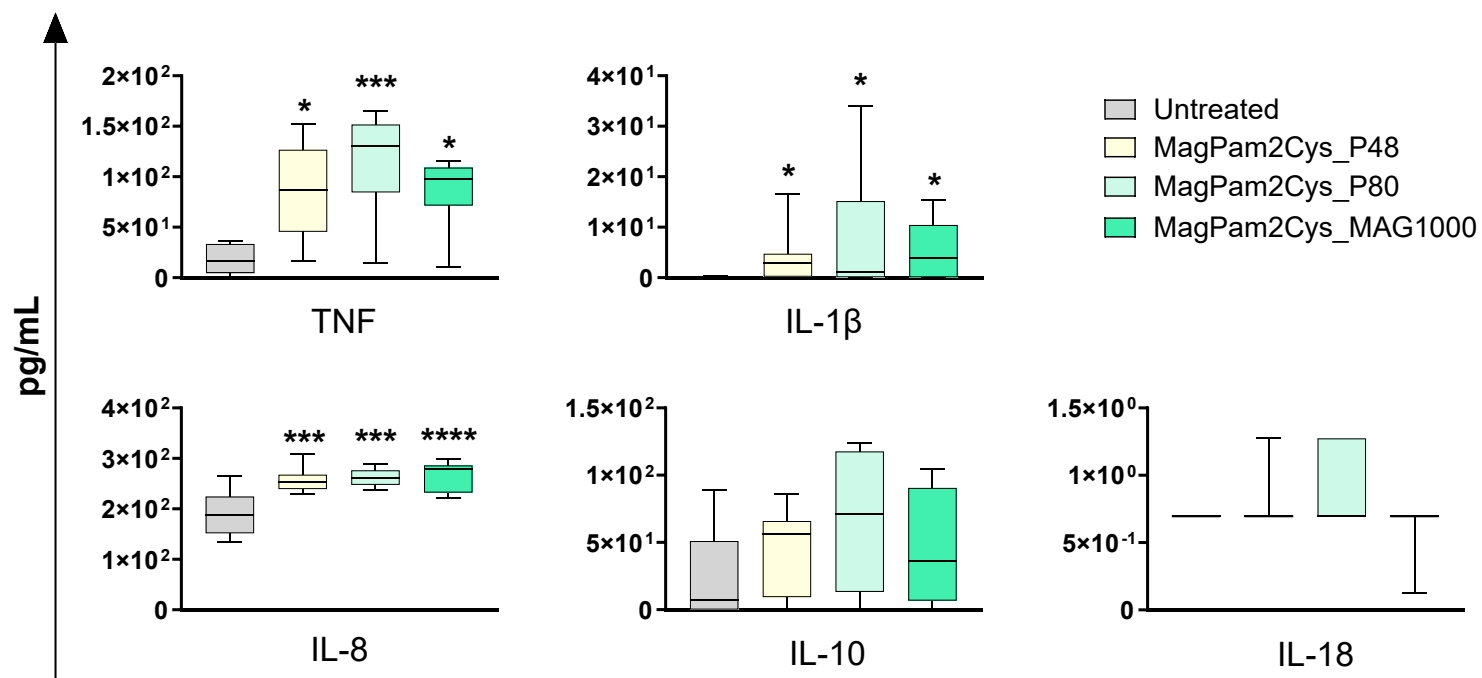


Coltura 3D



Coltura 2D: Immagini acquisite con microscopio ottico a fluorescenza, obiettivo 20X.
Coltura 3D: Max projection con microscopio confocale, obiettivo 20x.
Marcatura con anti-vimentina (rosso) e DAPI (blu).

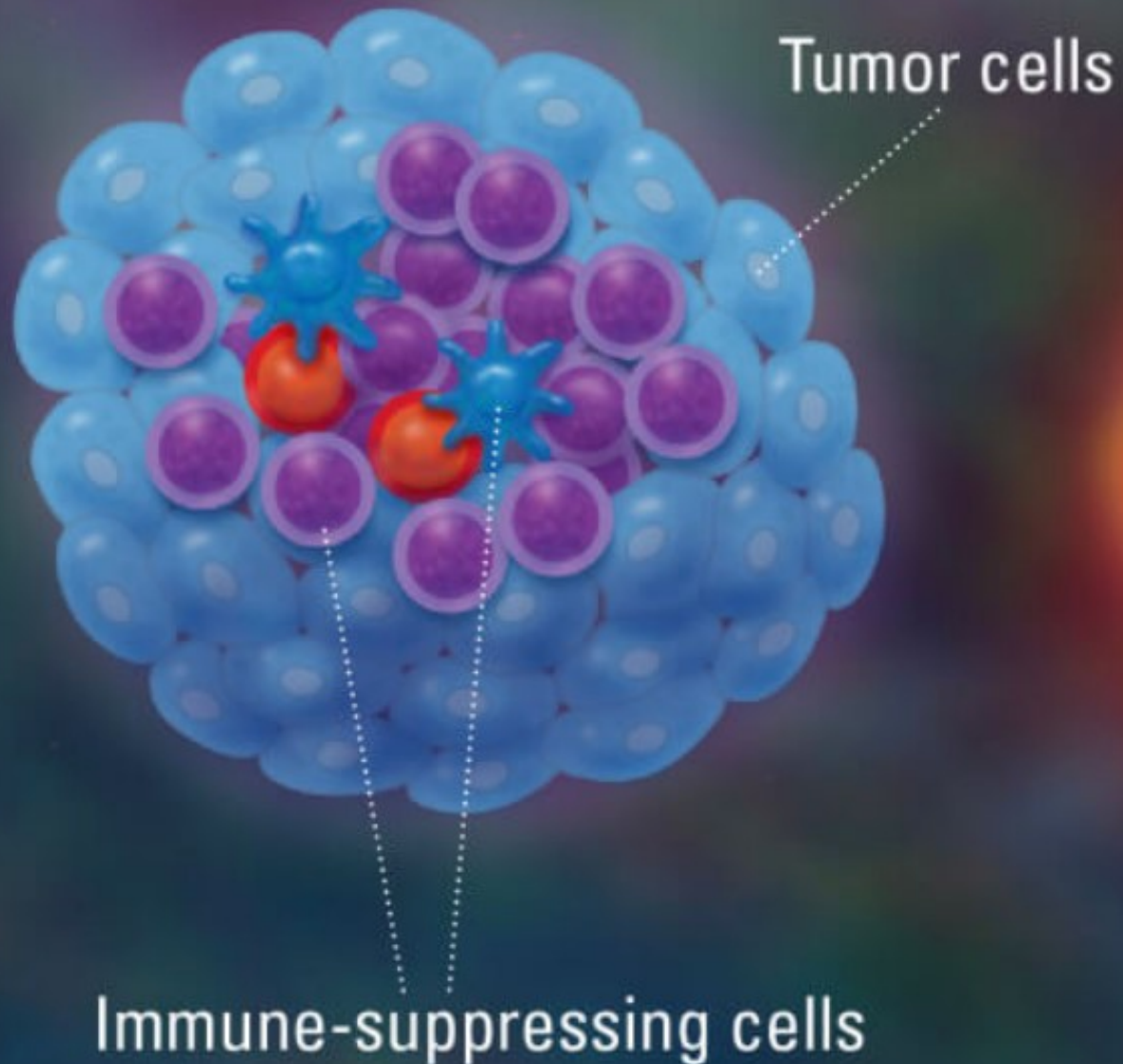
Agonisti TLRs in veterinaria



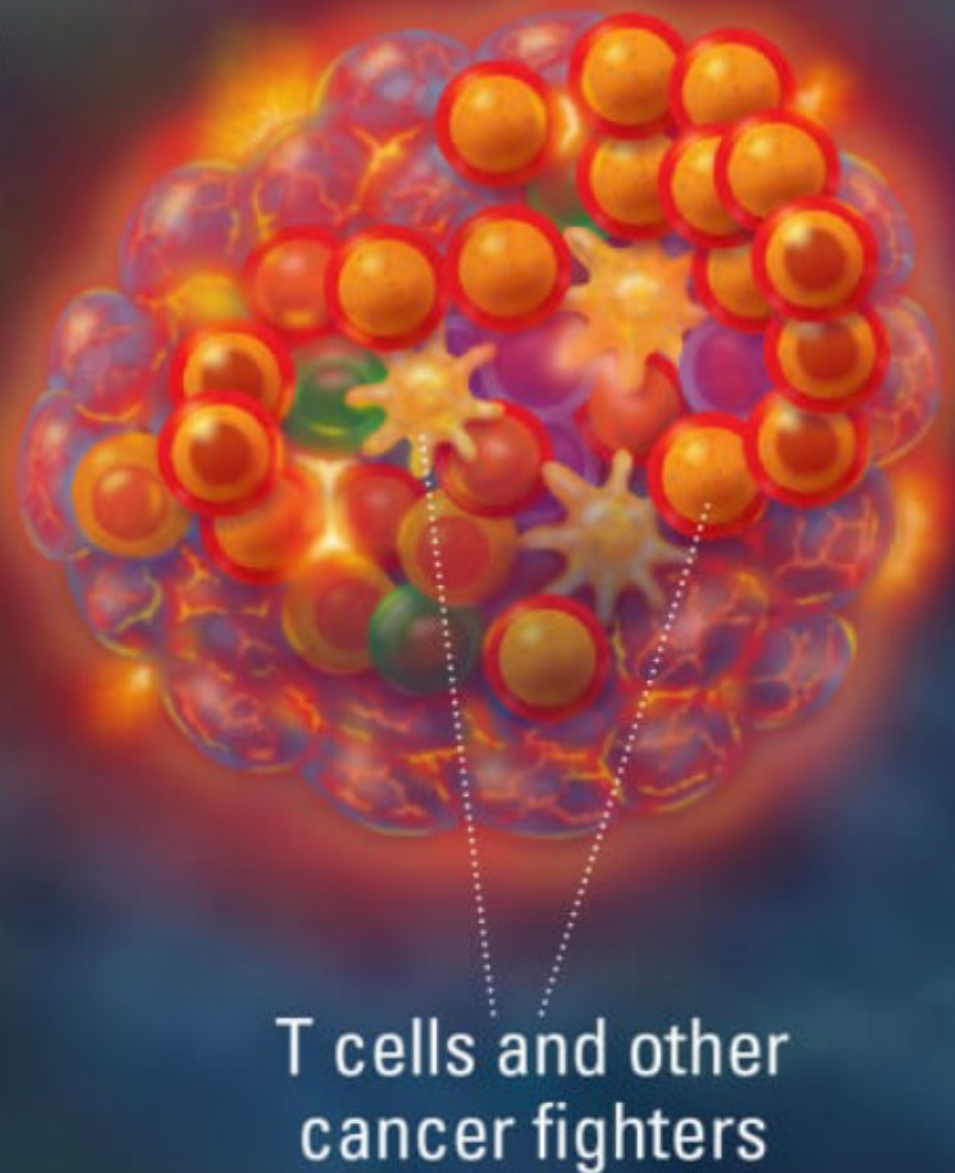
Agonisti TLR2 polarizzano M1

HOT'N COLD

Cold Tumor



Hot Tumor



ANALISI PROSPETTICA CAMPIONAMENTO

52 pazienti

Vaccino



38

Placebo



14



T0

Arruolamento/
Vaccinazione

T1

7 gg da T0

T2

60 gg da T0

T3

6 mesi da T0

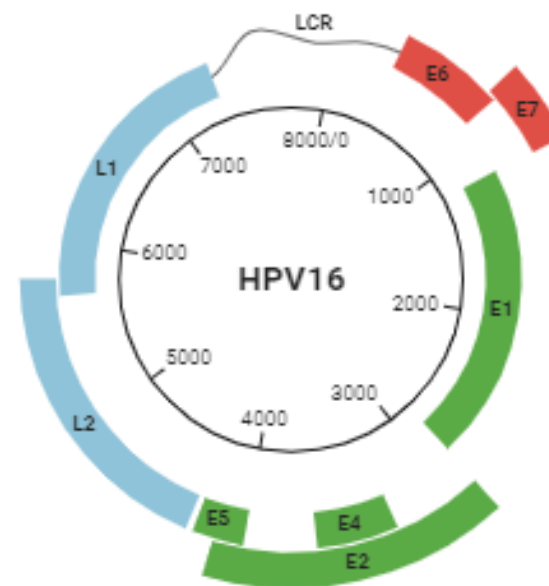
T4

12 mesi da T0

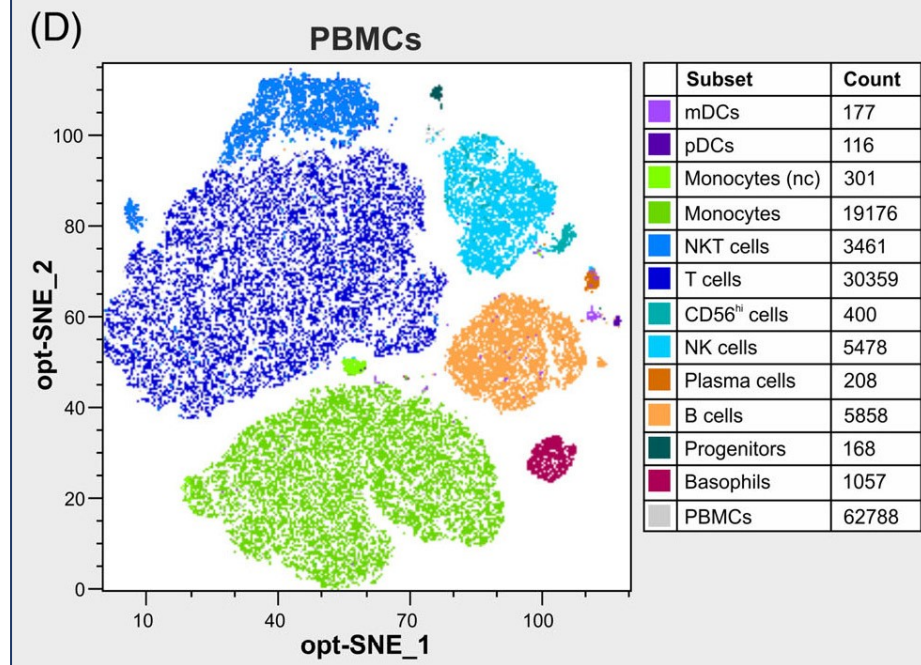
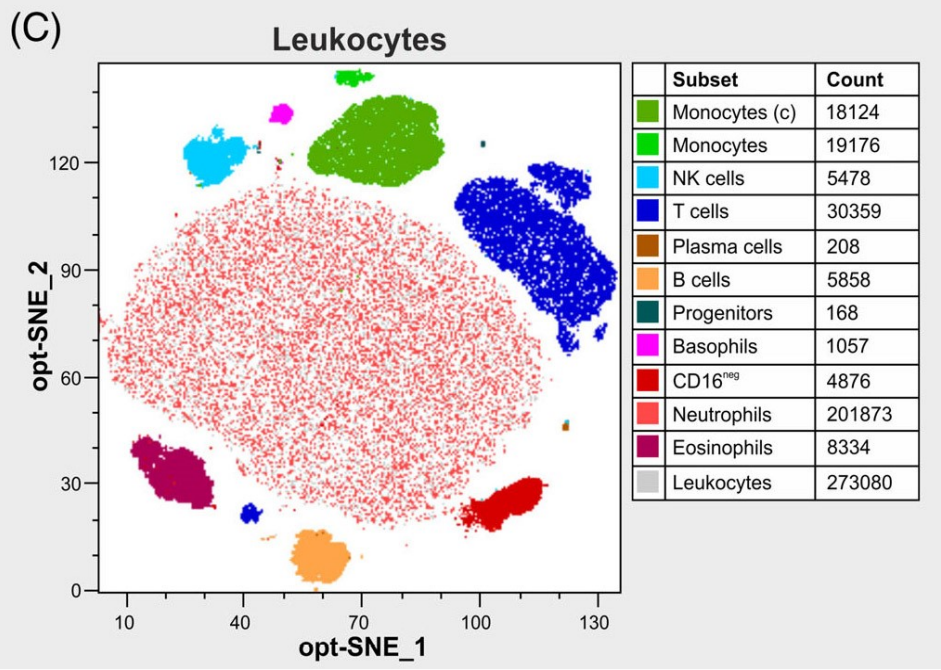
HOPE9

Progetto regione Liguria 22L03

Diagnosi istologica	N° pazienti
Adenocarcinoma	1
Carcinoma in situ	5
CIN1	3
CIN2	7
CIN 3	22
LSIL	1
In corso	13
Totale	52



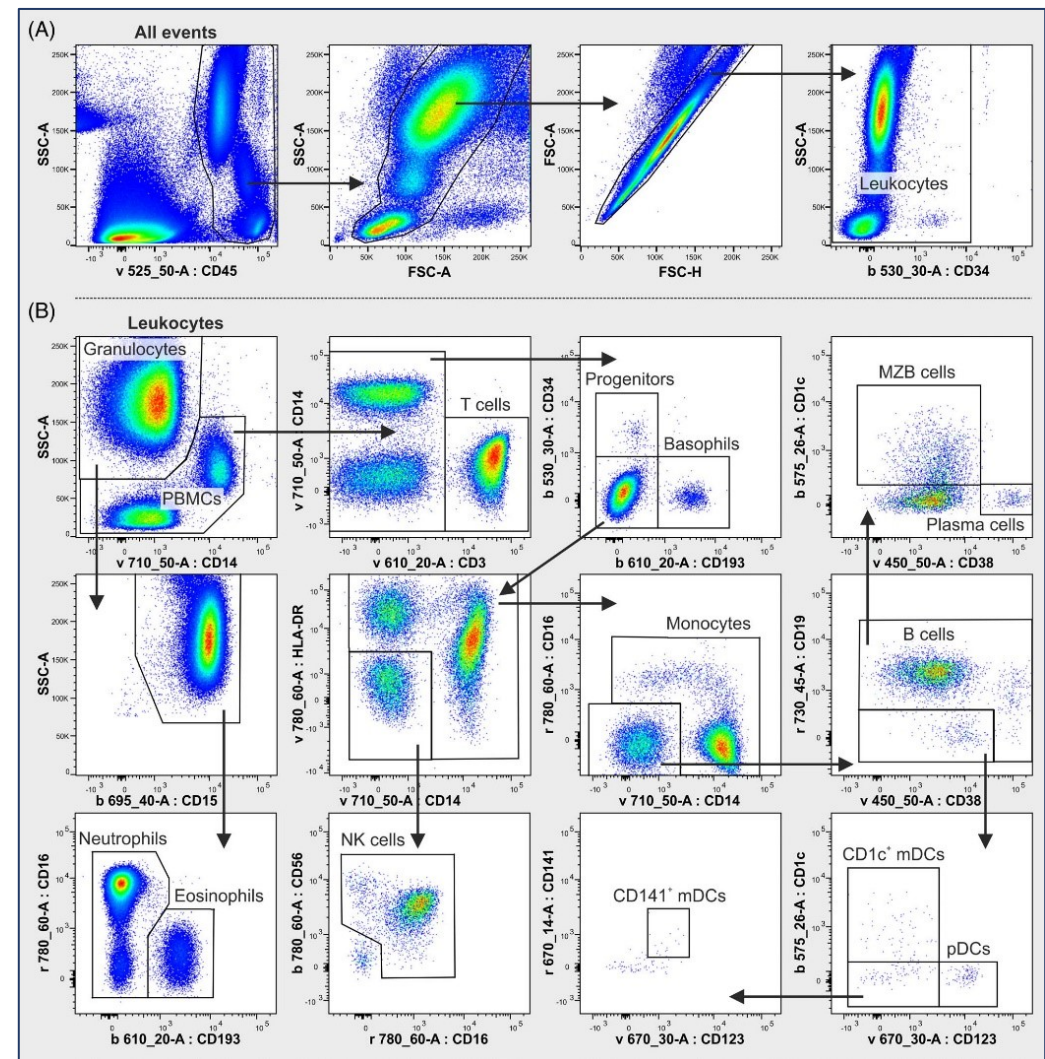
Sottotipi maggiormente rappresentati nelle pazienti: **HPV-16, -18**



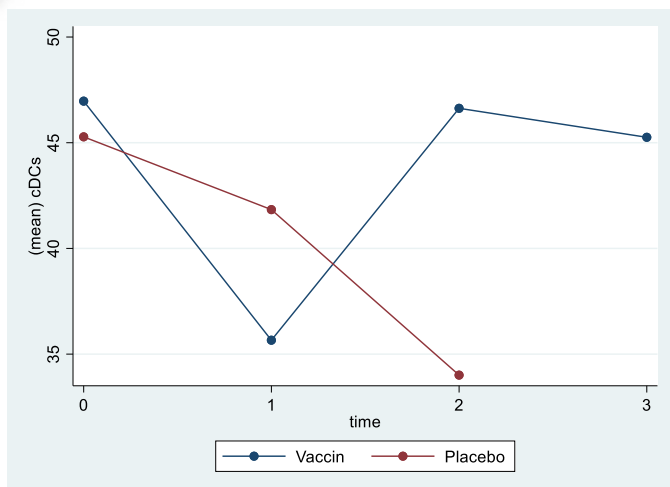
OMIP 077: Definition of all principal human leukocyte populations using a broadly applicable 14-color panel

Cytometry. 2021;1-6.

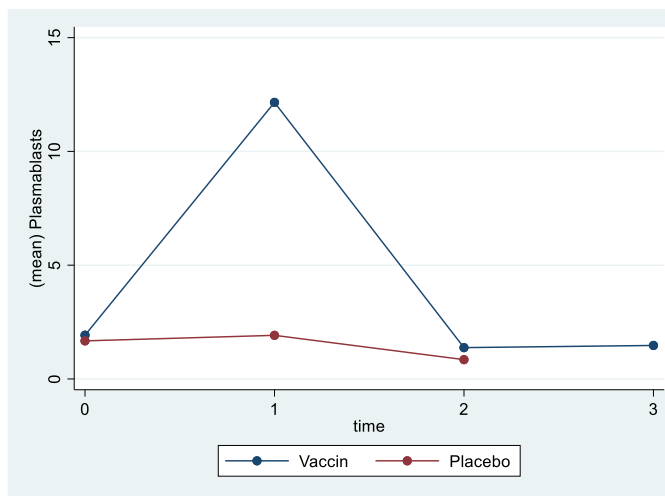
DOI: 10.1002/cyto.a.24481



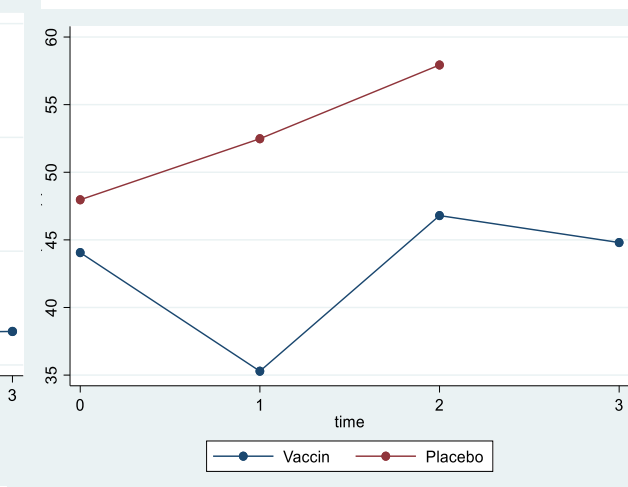
Cosa determina la vaccinazione??



T1V vs T2V=0.008
cDCs



T1V vs T1P=0.000
Plasmacellule



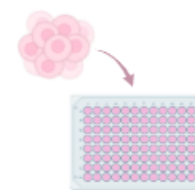
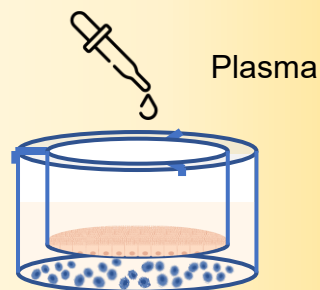
T1V vs T2V=0.003
pDCs

Nelle vaccinate movimento cellulare diverso rispetto alle non vaccinate a 2 mesi dalla vaccinazione

Studi *In vitro*

- HeLa and PBMCs (trattate/non trattate) (T0, T2, T3, T4) cell co-culture
- HeLa and plasma cell co-culture (trattate/non trattate)

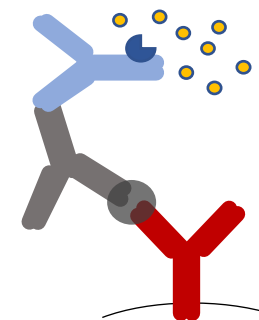
HeLa+PBMCs cell co-culture



MTT

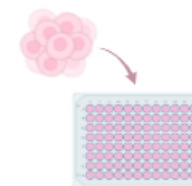
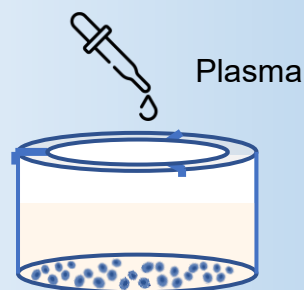


HeLa and PBMCs
RNA extraction



ELISA on
supernatants

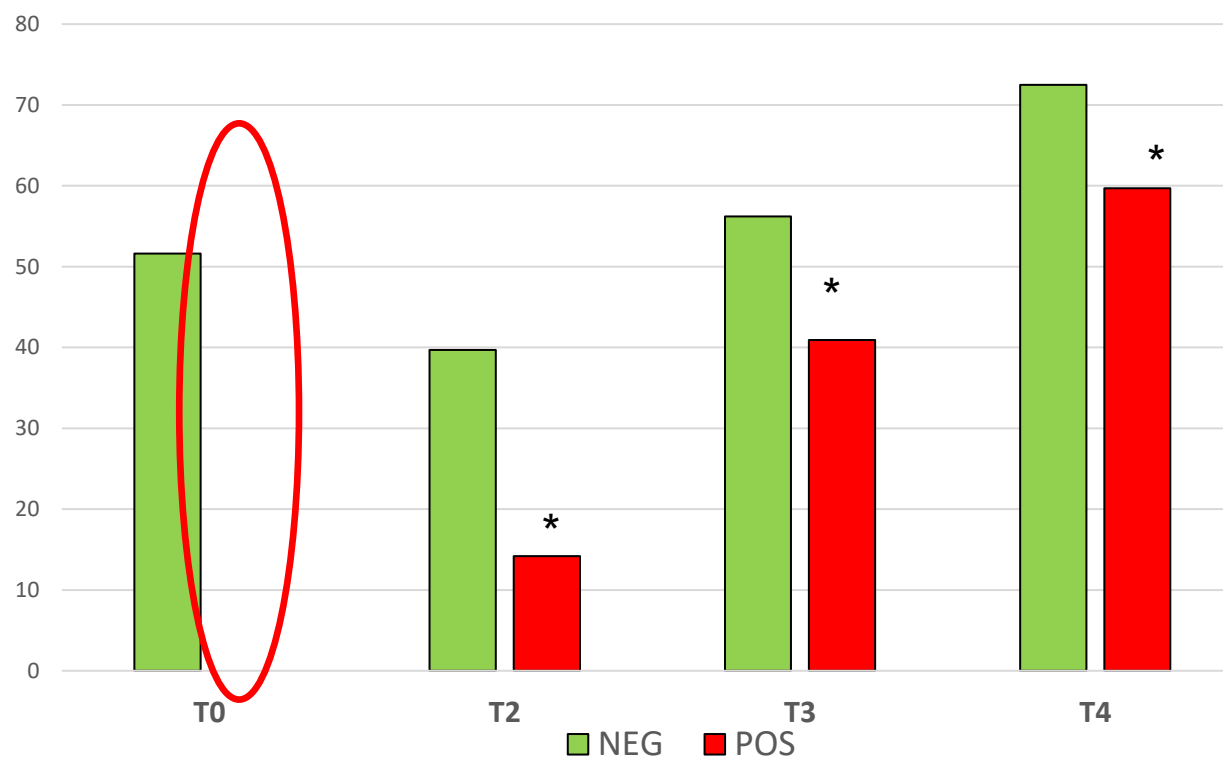
HeLa+Plasma cell



MTT

Effetto diretto del plasma su cellule tumorali

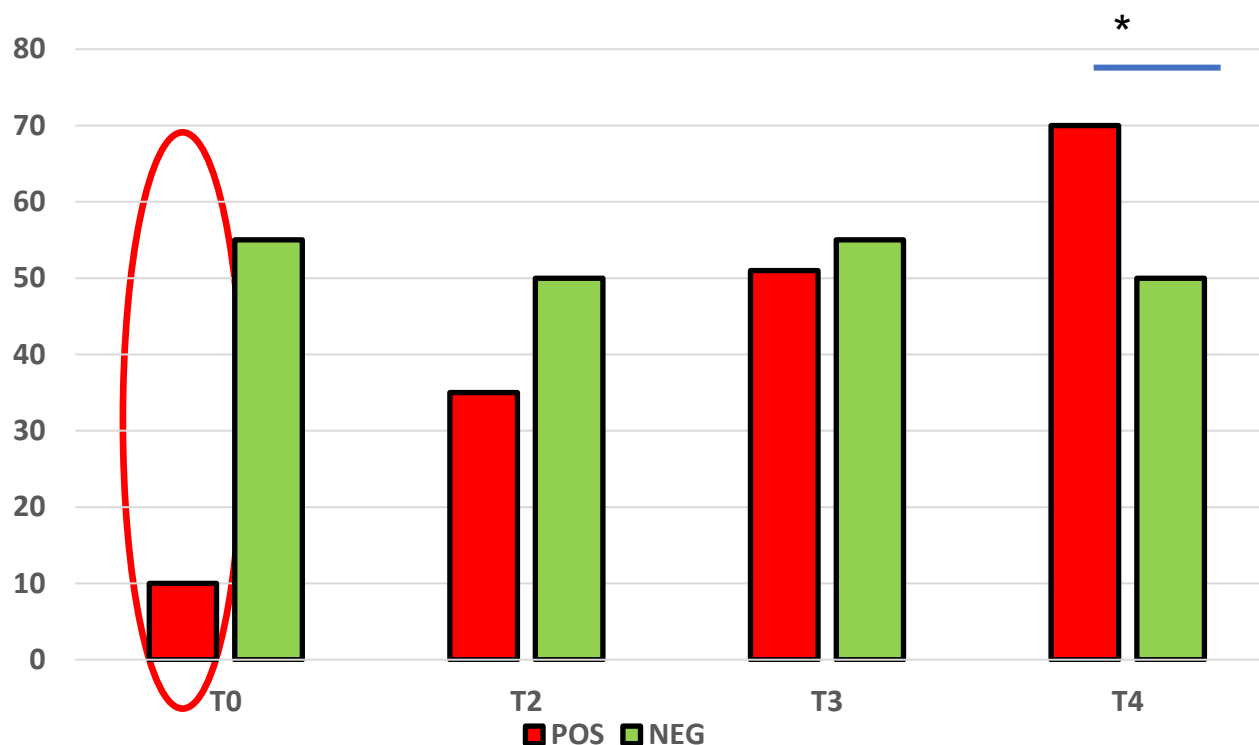
% cellule vive



Tempi di Prelievo

Effetto diretto del PBMC su cellule tumorali

% cellule vive



Tempi di Prelievo



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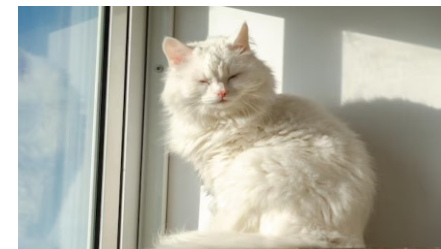
All Together

NUOVE PROSPETTIVE DI ONCOLOGIA
COMPARATA ANIMALE - UOMO

IL PROGETTO G.U.A.Co.Ca

IZS PLV 10/21





SCC rappresenta il **10,4% dei tumori cutanei** nei gatti.

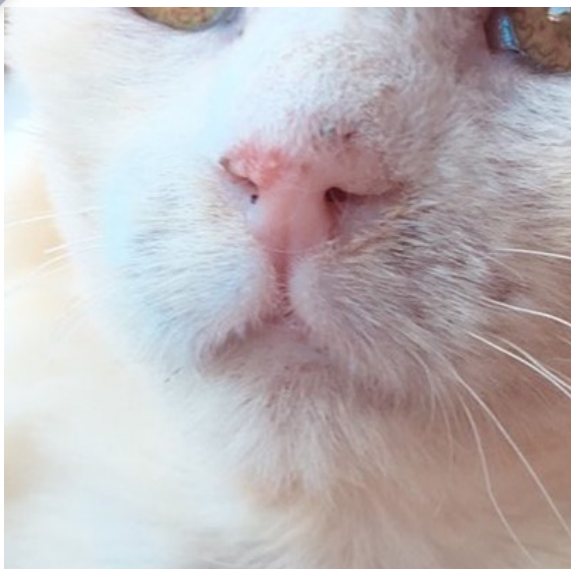
Testa e collo (planum nasale, orecchie, palpebre).

Fattori di rischio

Esposizione cronica ai raggi UV, cute depigmentata, manto bianco.

Presenza PVs??

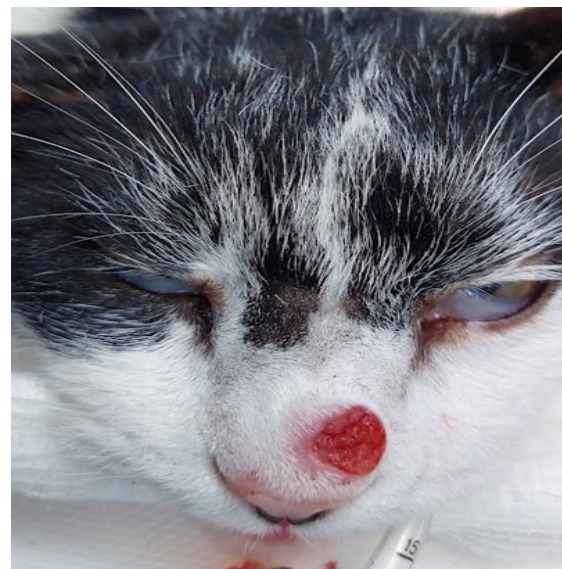
Evoluzione



cheratosi attinica



carcinoma in situ



scc invasivo

Cosa fare se l'intervento non è eseguibile???



37 gatti

21 trattati con ECT

16 eutanasia

criteri di inclusione:

- assenza di metastasi
- diagnosi di SCC citologica/istologica
- elettrochemioterapia come unico trattamento



segnalamento:

- 14/21 F 7/21 M
- 1/21 indoor 20/21 indoor-outdoor
- 4/21 recidiva
- dimensioni lesioni da 0,6 cm x 1 cm a 2,2 cm x 3 cm



1. **Protocollo di trattamento**

2. L'elettroporazione è stata effettuata in anestesia generale utilizzando l'elettroporatore "Electrovet EZ - LEROY Biotech".
3. La bleomicina somministrata alla dose standard di 15.000 UI/m², per via endovenosa
4. Dopo otto minuti dalla somministrazione del farmaco, applicati impulsi elettrici mediante elettrodi ad aghi o a piastra



Valutazione delle infezioni virali

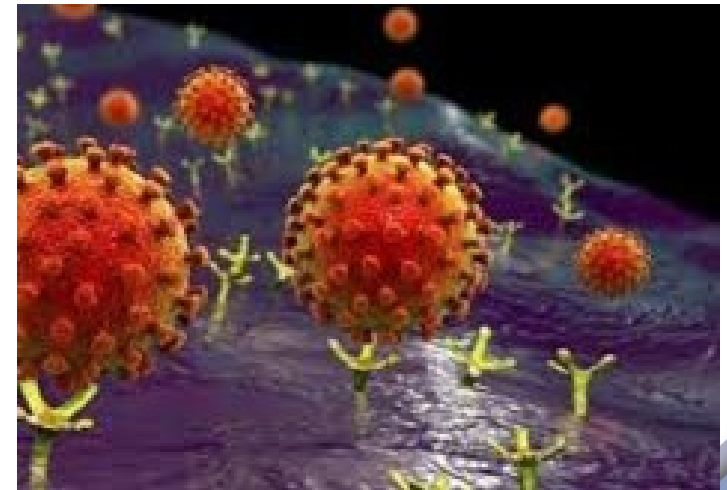
Test per FIV e FELV (16 campioni analizzati)

Risultati:

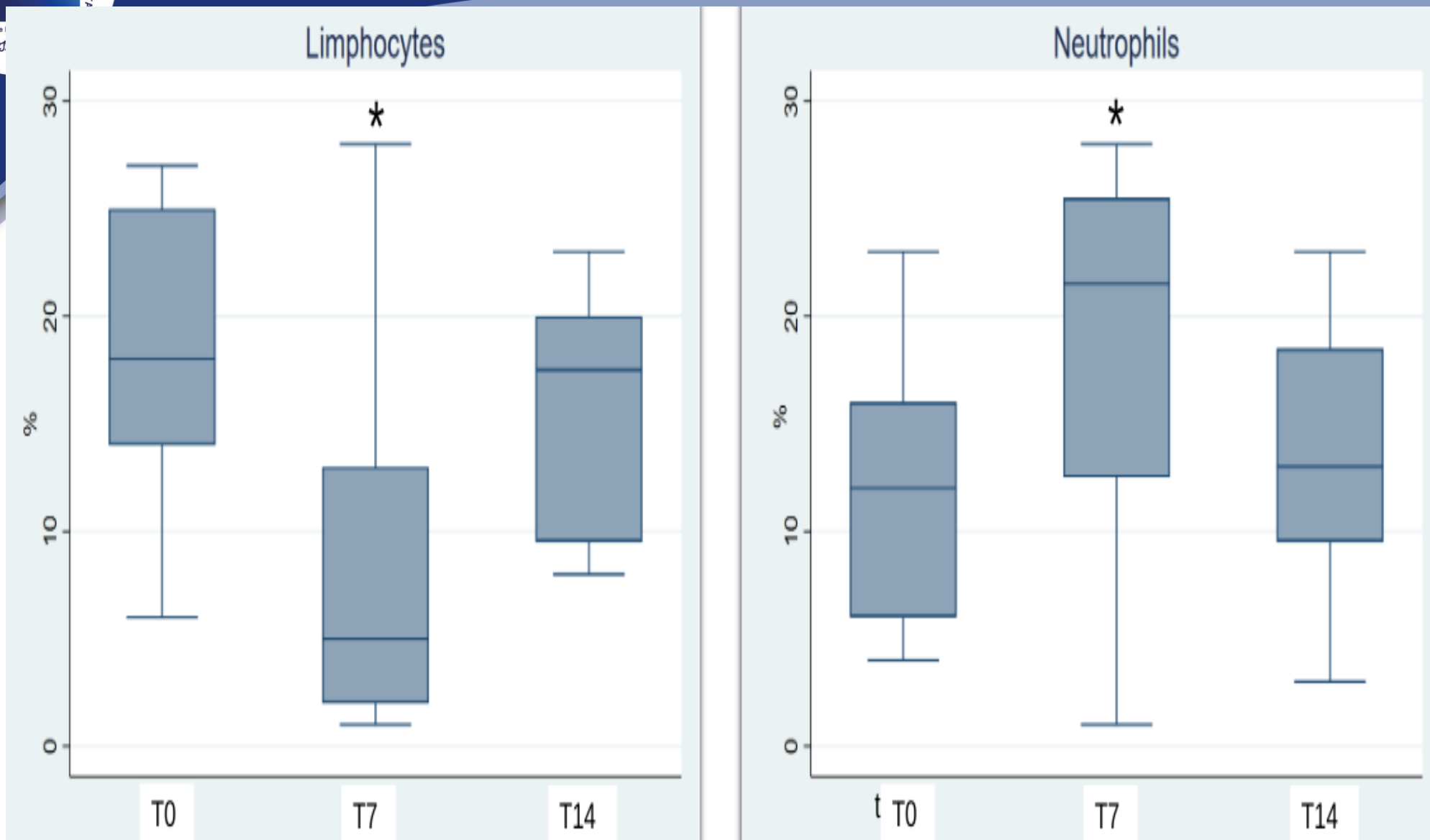
- 3/21 positivi a FELV
- 2/21 positivi a FIV
- 1 gatto positivo a FIV/FELV
- 10 gatti negativi a FIV/FELV
- 5 soggetti con campione insufficiente per il test

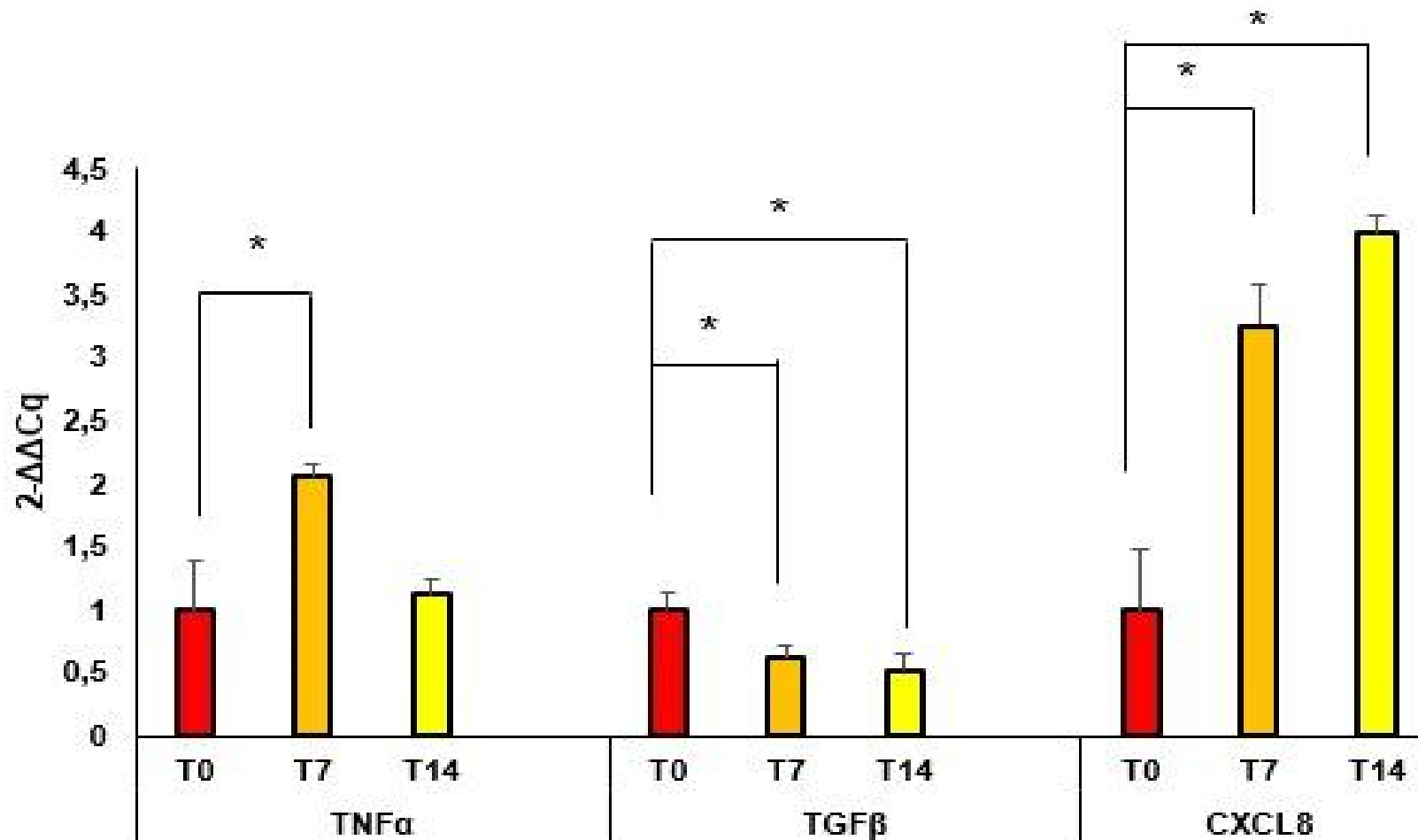
Valutazione FcaPVs (21 campioni analizzati)

- **Positività a FcaPVs su tessuto neoplastico in fisiologica: 15/21 (71% positivi a FcaPVs)**
 - Distribuzione delle Varianti:
 - FcaPV2: 71%
 - FcaPV3: 20%
 - FcaPV4: 33%
 - FcaPV5: 6%
 - FcaPV1 e FcaPV6: 0%
- **Co-infezioni: 4 casi**
 - Dettagli su co-infezioni:
 - 2: FcaPV2 + FcaPV3
 - 1: FcaPV3 + FcaPV4
 - 1: FcaPV4 + FcaPV5
- **Espressione Oncogeni: tutti i campioni positivi mostrano espressione di E6 ed E7 (100%).**
- **Valutazione del margine sano: solo 1 caso positivo (FcaPV2).**
- **Genoma virale in circolo sanguigno: nessun DNA virale rilevato nel sangue (100% negativo).**



REPLICAZIONE VIRALE!!!





Esiti Clinici

Remissione Completa: 11/21 (52%) con remissione fino alla data di studio

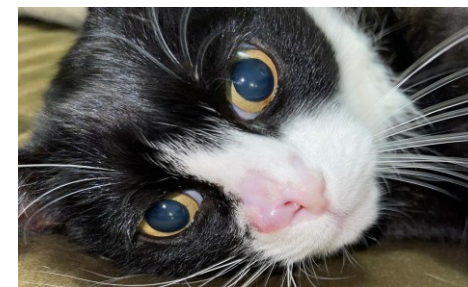
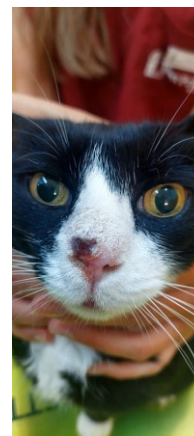
Eutanasia: 4/21 (19%) a causa di peggioramento e metastasi.

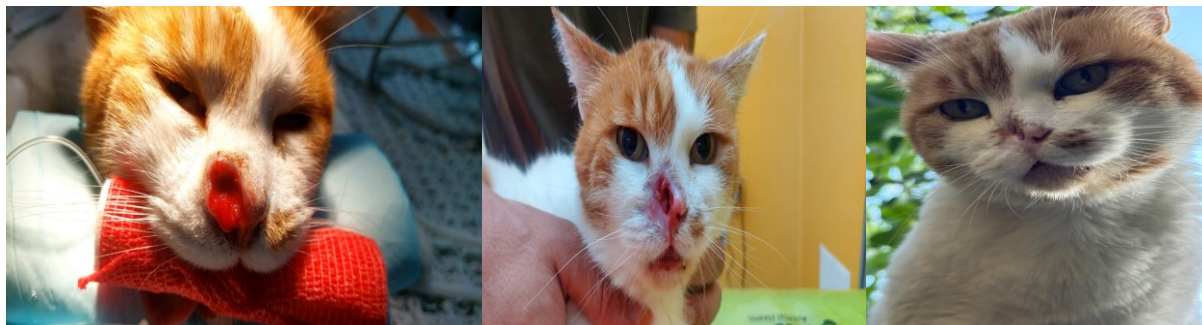
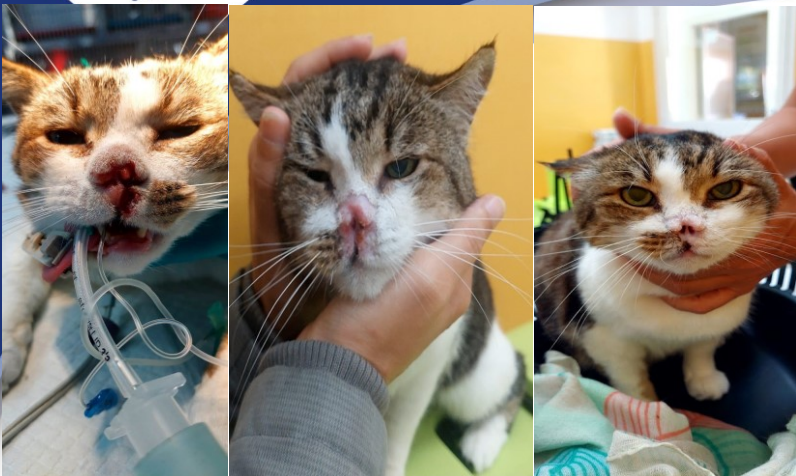
Recidive Locali: 3/21 (14%) hanno sviluppato recidive e sono stati sottoposti a un secondo trattamento di ECT.

Analisi FcaPVs

- **Gatti in Remissione Completa:**
 - Positivi a FcaPVs: 7/11 (63%)
 - Negativi a FcaPVs: 3/11 (14%)
- **Gatti con Eutanasia/Recidiva:**
 - Positivi a FcaPVs: 6/7 (85%)
 - Negativi a FcaPVs: 1/7 (14%)

Dominanza di varianti FcaPV2 (2/7) e FcaPV3 (1/7) FcaPv2/FcaPV3 (1/7)







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NUOVE PROSPETTIVE DI ONCOLOGIA
COMPARATA ANIMALE - UOMO



IL NEFROBLASTOMA SUINO

modello per una **MALATTIA RARA:**

IL TUMORE DI WILMS



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per l'Oncologia Veterinaria e Comparata



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Decreto Dirigenziale n. 3434/2022**



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dell'Università
e della Ricerca**



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DI RIPRESA E RESILIENZA

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ISTRUZIONE
RICERCA**

PIANO NAZIONALE DI RIPRESA E RESILIENZA MISSIONE 4 BANDO PRIN 2022

TITOLO PROGETTO: «Comparative characterization of Wilms tumor in humans and pigs: in search of the optimal disease model»

CODICE PROGETTO: 20227FX7KM, **CODICE CUP:** D53D23001710006

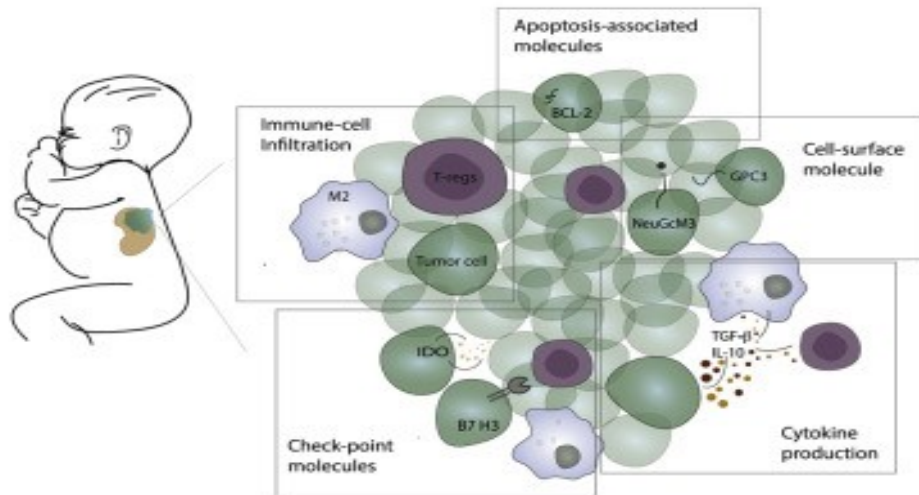


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Wilms Cancer

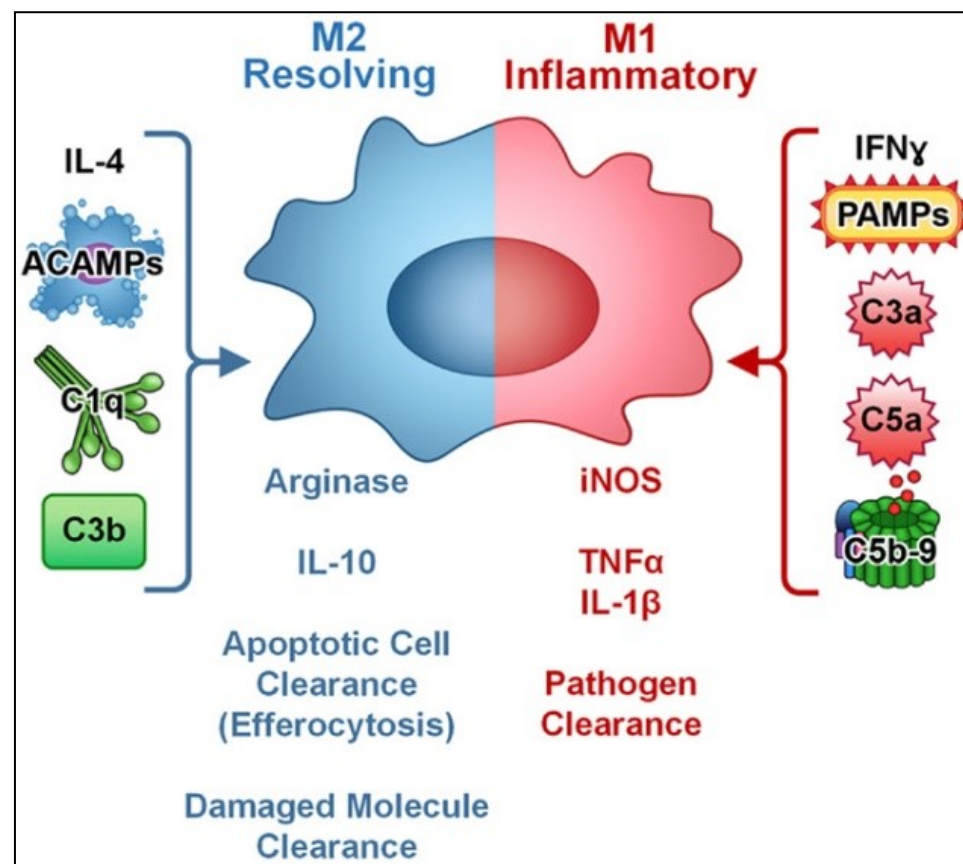
1. Tumore raro incidenza 1/10,000
2. 2 forme: sporadica e congenita
3. Terapia asportazione lesione prima o dopo chemio



ambiente infiammatorio importate

Macrofagi fattore di prognosi negativo

Polarizzazione M1/M2



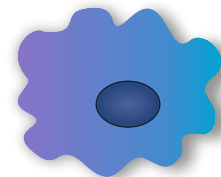
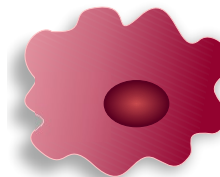


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Macrophages and monocytes mediated activation of oxidative phosphorylation implicated the prognosis and clinical therapeutic strategy of Wilms tumour

Jialin Meng^{a,b,c,1}, Yonghao Chen^{d,1}, Xiaofan Lu^{e,f,1}, Qintao Ge^{a,b,c}, Feixiang Yao^{a,b,c,*}, Chaozhao Liang^{a,b,c,*}, Juan Du^{g,*}

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Article

Wilms' Tumor Primary Cells Display Potent Immunoregulatory Properties on NK Cells and Macrophages

ONCOIMMUNOLOGY
2021, VOL. 10, NO. 1, e1879530 (12 pages)
<https://doi.org/10.1080/2162402X.2021.1879530>



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iana⁴^{ID}, Vito Pistoia¹, Lorenzo Moretta^{1,*} and Bruno Azzarone^{1,*}^{ID}

ORIGINAL RESEARCH

OPEN ACCESS 

Stromal-like Wilms tumor cells induce human Natural Killer cell degranulation and display immunomodulatory properties towards NK cells

Claudia Cantoni^{a,b,§}, Martina Serra^{a,§}, Erica Parisi^c, Bruno Azzarone^d, Angela Rita Sementa^e, Luigi Aurelio Nasto^f, Lorenzo Moretta^d, Giovanni Candiano^g, Cristina Bottino^{a,c}, Gian Marco Ghiggeri^{g,h}, and Grazia Maria Spaggiari^b

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^cDepartment of Experimental Medicine (DIME), University of Genoa, Genoa, Italy; ^dDepartment of Immunology, IRCCS Bambino Gesù Children's Hospital, Rome, Italy; ^ePathology Unit, IRCCS Giannina Gaslini Institute, Genoa, Italy; ^fDepartment of Paediatric Orthopaedics, IRCCS Giannina Gaslini Institute, Genoa, Italy; ^gLaboratory of Molecular Nephrology, IRCCS Giannina Gaslini Institute, Genoa, Italy; ^hDivision of Nephrology, Dialysis & Transplantation, IRCCS Giannina Gaslini Institute, Genoa, Italy

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Suino possibile modello

Similitudini anatomiche, fisiologiche ed immunitarie con l'uomo [1,2]

Modello predittivo migliore rispetto ai topi negli studi preclinici [2]

Nefroblastoma 1/10,000

Reperto macellazione

Risposta immunitaria del suino molte similitudini con uomo [3-6].



Journal of Comparative Pathology
Volume 134, Issues 2-3, February-April 2006, Pages 143-151



Journal of Comparative Pathology
Volume 96, Issue 1, January 1986, Pages 35-46



Histopathological classification of nephroblastomas in slaughtered swine

M. Hayashi, H. Tsuda, M. Okumura, M. Hirose, N. Ito

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[https://doi.org/10.1016/0021-9975\(86\)90021-6](https://doi.org/10.1016/0021-9975(86)90021-6)

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Immunohistochemical Study of Porcine Nephroblastoma

V. Grieco, E. Riccardi, S. Belotti, E. Scanziani

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Article

Heterogeneity of Phenotypic and Functional Changes to Porcine Monocyte-Derived Macrophages Triggered by Diverse Polarizing Factors In Vitro

Giulia Franzoni ^{1,*}, Lorena Mura ^{1,2}, Elisabetta Razzuoli ³, Chiara Grazia De Ciucis ³, Floriana Fruscione ³, Filippo Dell'Anno ³, Susanna Zinellu ¹, Tania Carta ^{1,4}, Antonio G. Anfossi ⁴, Silvia Dei Giudici ¹, Simon P. Graham ⁵ and  Frontiers | Frontiers in Immunology

TYPE Original Research
PUBLISHED 16 June 2023
DOI 10.3389/fimmu.2023.1209898

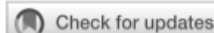


animals

Article

Comparative Phenotype of IL-10 or TGF- β on Porcine Macrophages

Tania Carta ^{1,2}, Elisabetta Razzuoli ³, Floriana Fruscione ³, Susanna Zine Antonio Anfossi ², Bernardo Chessa ², Silvia Dei Giudici ¹, Simon P. Gra and Giulia Franzoni ^{1,*}



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senior authorship

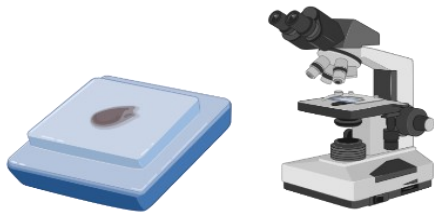
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- * Correspondence: annalisa.oggianno@izs-sardegna.it (A.)

Goat milk extracellular vesicles: immuno-modulation effects on porcine monocyte-derived macrophages *in vitro*

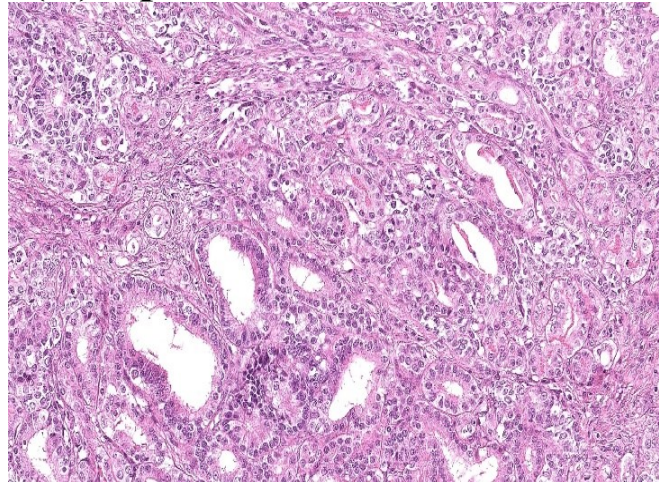
Giulia Franzoni^{1*}, Samanta Mecocci^{2*}, Chiara Grazia De Ciucis³, Lorena Mura^{1,4}, Filippo Dell'Anno³, Susanna Zinellu¹, Floriana Fruscione³, Livia De Paolis³, Tania Carta^{1,5}, Antonio G. Anfossi⁵, Silvia Dei Giudici¹, Elisabetta Chiaradia², Luisa Pascucci², Annalisa Oggiano¹, Katia Cappelli^{2†} and Elisabetta Razzuoli^{3†}

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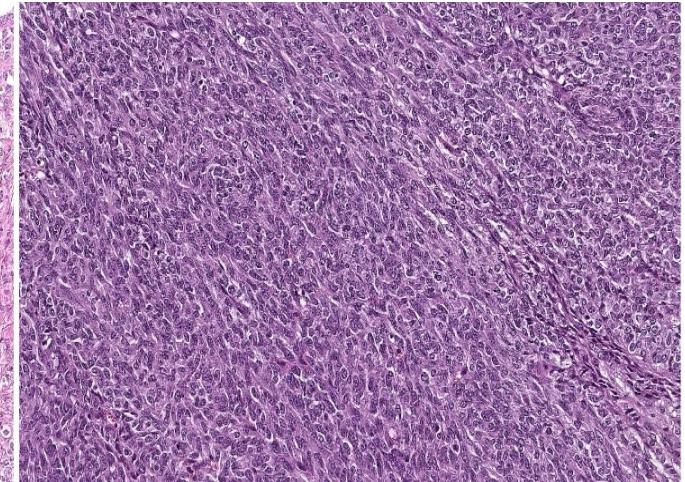


I tumori con componente
mesenchimale aggressivi
87% della casistica

(A) Epithelial

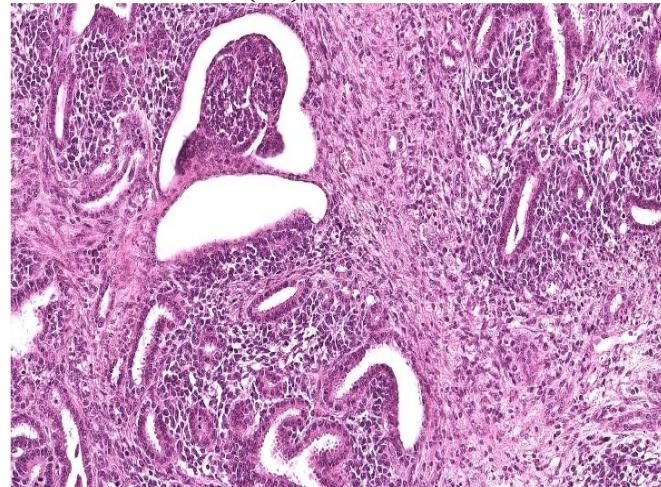


(B) Blastemic

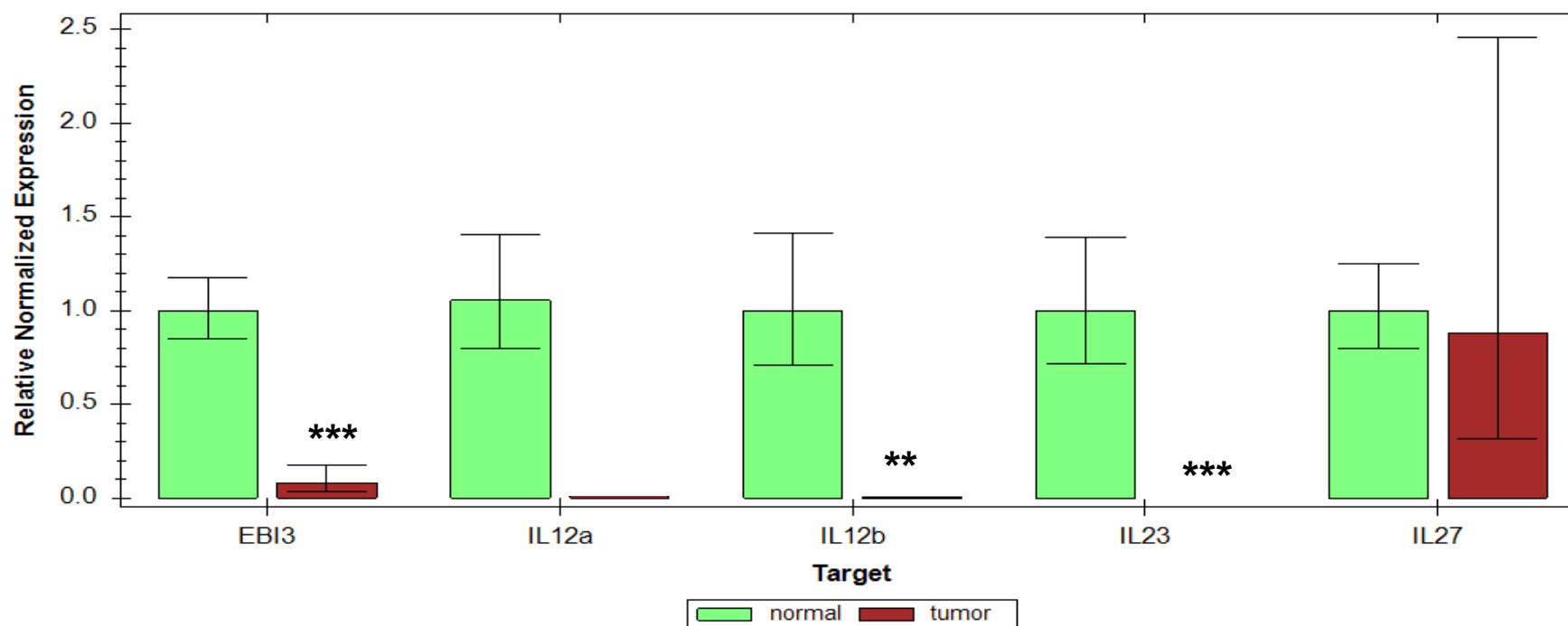


(C) Mixed

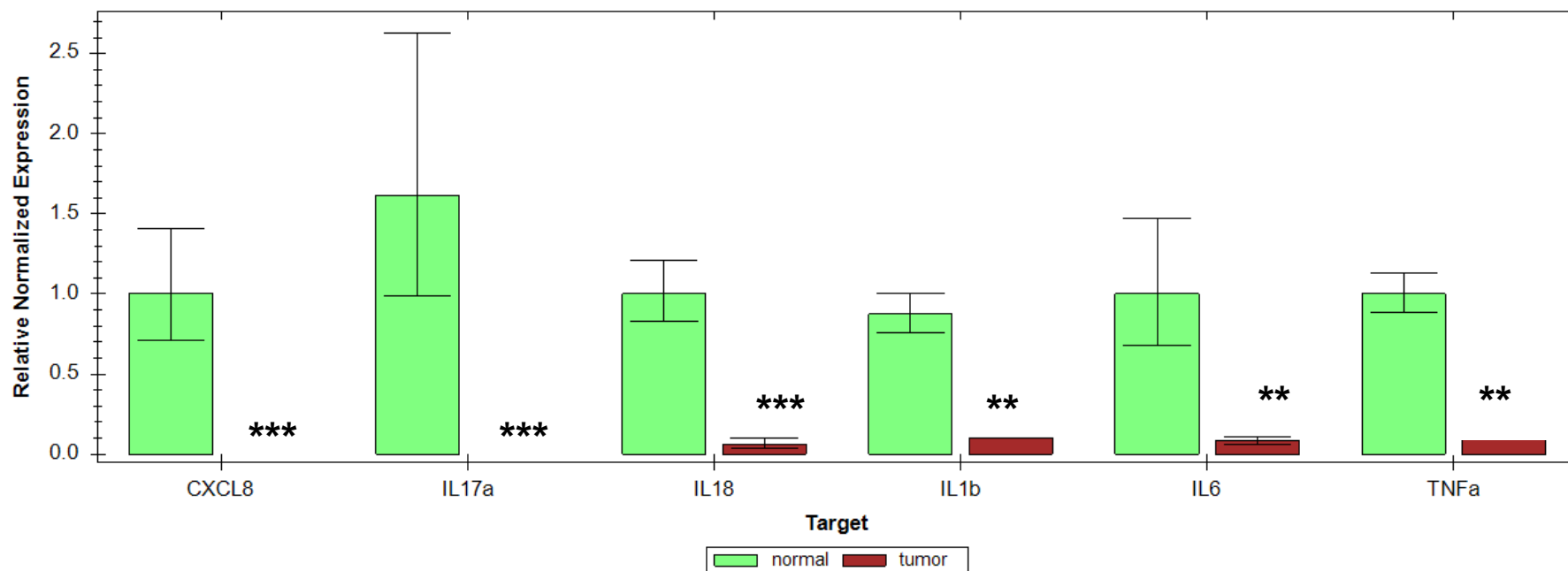
H & E staining. Magnification 200x.



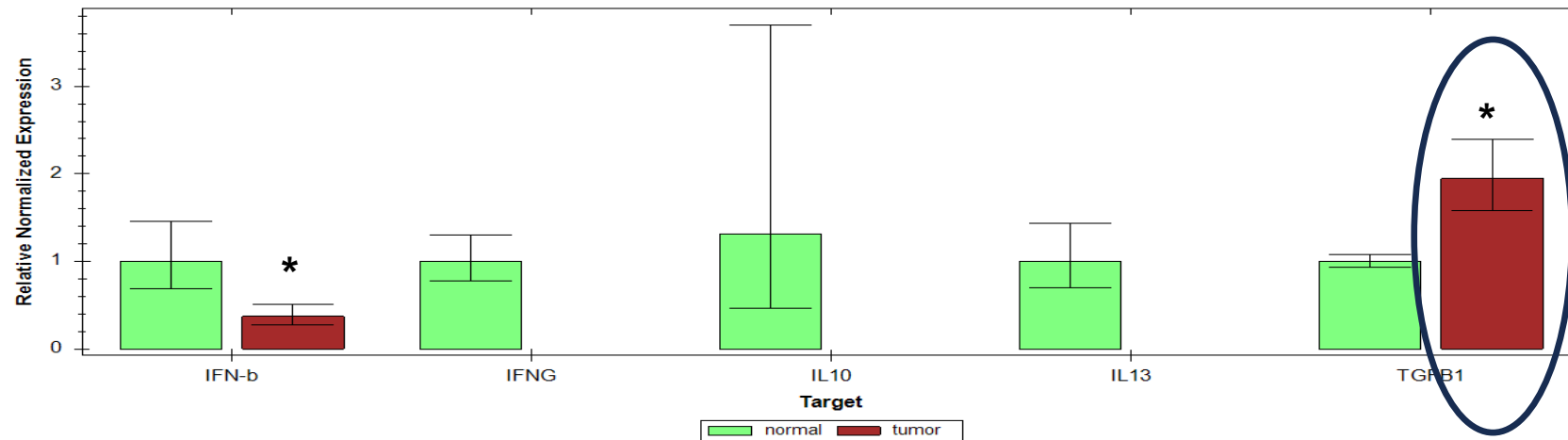
IL12 superfamily



Pro-inflammatory Cytokines



Altre citochine



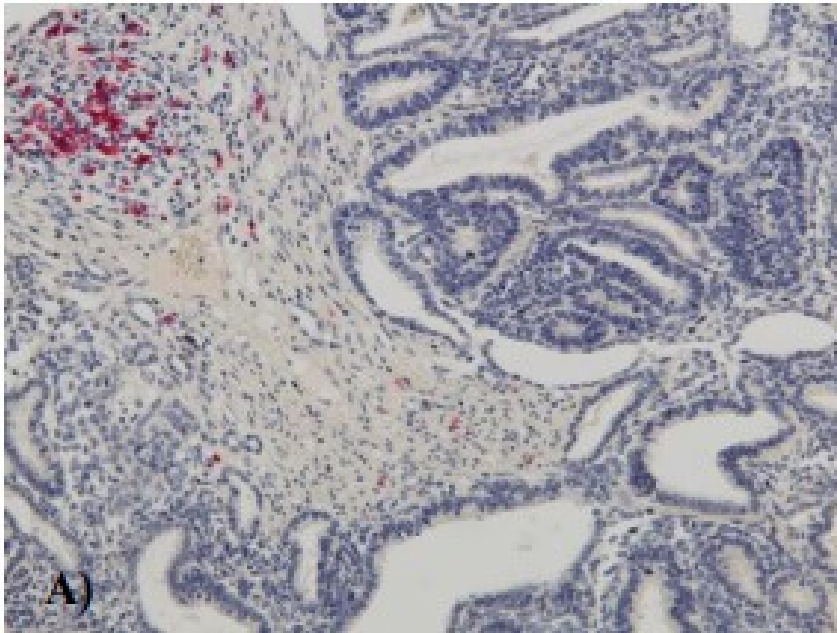
Journal of Pediatric Urology
Volume 10, Issue 5, October 2014, Pages 962-968



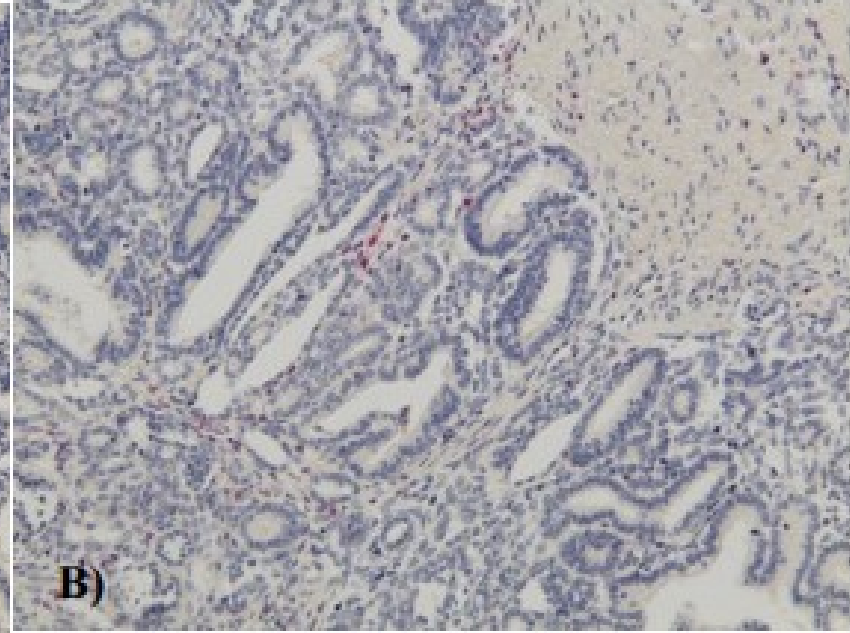
Expression of TGF- β 1 in Wilms' tumor was associated with invasiveness and disease progression

Lijuan Zhang^a, Wei Liu^a, Yejun Qin^b, Rongde Wu^a

CD20

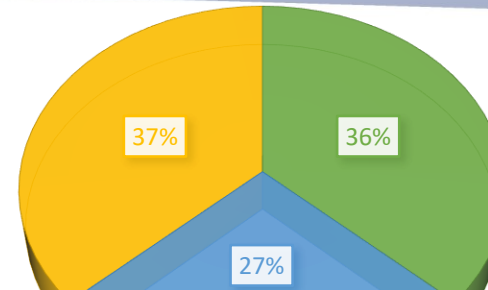


CD3



IHC of swine nephroblastoma - Section of swine nephroblastoma. (A) Immunohistochemistry for *CD20* (T cells). (B) Immunohistochemistry for *CD3* (B cells). Magnification 400x.

DOPPI NEGATIVI



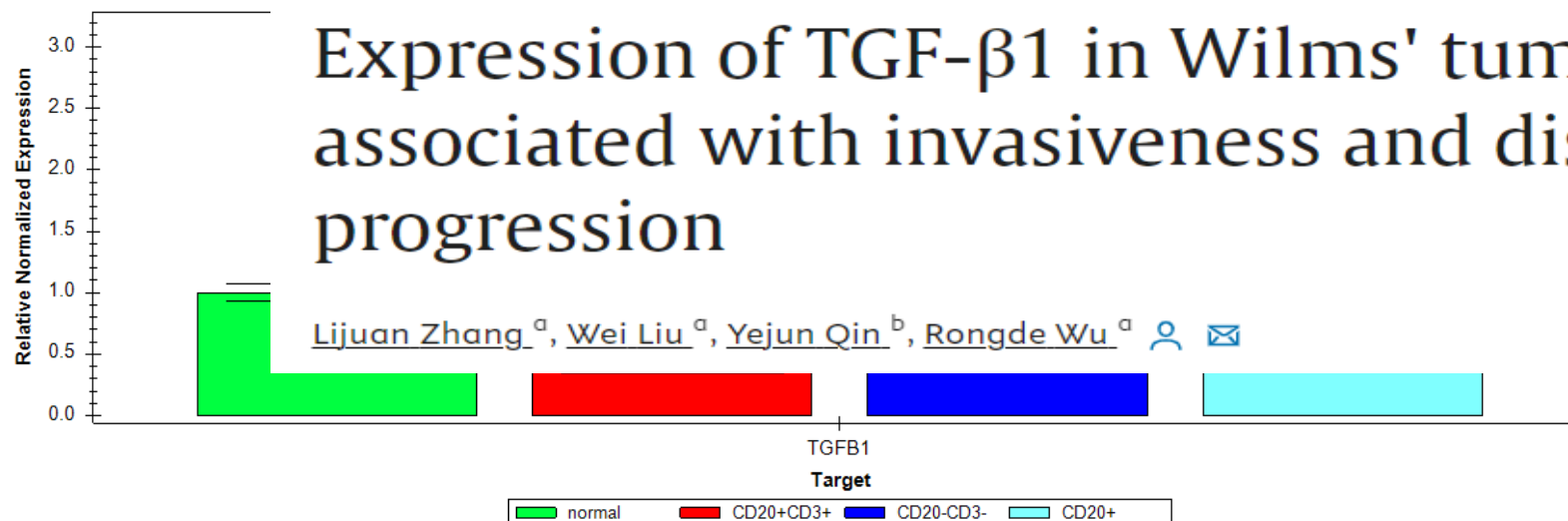
■ CD20+ CD3+
■ CD20-CD3-
■ CD 20+

M



Journal of Pediatric Urology

Volume 10, Issue 5, October 2014, Pages 962-968



Expression of TGF- β 1 in Wilms' tumor was associated with invasiveness and disease progression

Lijuan Zhang^a, Wei Liu^a, Yejun Qin^b, Rongde Wu^a  



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COMPARATA ANIMALE - UOMO

POSSIAMO IMPARARE GLI UNI DAGLI ALTRI
ED INSIEME SCONFIGGERE I TUMORI



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