

30 ANOS
A DESCOBRIR O CANCRO

ipatim**up**

RELATÓRIO DE ATIVIDADE

2021

Introdução

O ano de 2021 foi o ano de concretização da gestão direta das atividades de investigação por parte do i3S – Instituto de Investigação e Inovação em Saúde da Universidade do Porto. Formalmente constituído em dezembro de 2019, os anos de 2020 e 2021 foram dedicados ao planeamento da estrutura de gestão do i3S, reforço das unidades de apoio transversal e harmonização de princípios de gestão científica.

Uma vez estabelecidas as condições técnicas, financeiras e organizacionais, o Ipatimup continuará a envolver-se ativamente no processo de transição das atividades, ativos e recursos previstos no **Plano de Transição** que foi assinado pela Universidade do Porto, i3S e Institutos Fundadores.

O **Laboratório Associado i3S** iniciou-se formalmente em 1 de janeiro de 2021, após avaliação com pontuação máxima.

Apesar da evolução da situação pandémica no início de 2021, foi possível manter o equilíbrio entre o dever de confinamento e a necessidade de assegurar a atividade regular da instituição.

A primeira série de ficção sobre educação para a Saúde feita em Portugal - **2’Minutos para mudar de vida** - produzida pelo Ipatimup em parceria com a Fundação Belmiro de Azevedo, venceu a 10ª edição do **Prémio Saúde Sustentável** na categoria “Promoção da saúde e prevenção da doença”. Este prémio resulta de uma iniciativa da Sanofi e do Jornal de Negócios, em parceria com a NTT Data e tem como missão contribuir para o reconhecimento e partilha do que de melhor se faz pela saúde nacional. O projeto também já tinha conquistado o Prémio Ciência Viva, em 2020, dois Telly Awards, o Prémio Especial do Juri Casa das Ciências 2020 e uma nomeação para o prémio principal dos MEDEA Awards 2020, tendo vencido o Prémio do público. Depois de já ter sido selecionado como um dos sete finalistas da 1.ª edição do Health for All Film Festival (2020), criado pela Organização Mundial de Saúde, em 2021 marcou presença no **Science Film Festival**, o maior festival de cinema científico do mundo, com a exibição de 3 episódios da série em Angola, Moçambique, Quênia, Tailândia e Indonésia, entre outubro e dezembro.

Atendendo ao balanço realizado em 2021 das consequências da pandemia sobre o diagnóstico e tratamento de outras doenças - um em cada cinco doentes oncológicos viu o seu tratamento ser atrasado e cerca de 100 milhões de rastreios foram cancelados em toda a Europa - o Ipatimup decidiu avançar com um ciclo de sessões sobre literacia de cancro, designado **“Tratar o cancro por tu”**, percorrendo seis municípios: Porto, Braga, Coimbra, Lisboa, Vila Real e Évora. Em cada uma das seis sessões, é abordado um cancro diferente - pulmão, mama, próstata, linfomas e leucemias, cólon e pele - e em cada uma dessas sessões participam alguns dos melhores especialistas em diferentes áreas médicas e cirúrgicas. O objetivo é discutir as terapias mais recentes no combate ao cancro, simplificar conceitos, alertar para a necessidade do diagnóstico precoce, e colocar os doentes no centro da discussão.

Com estas sessões, pretende-se chegar às pessoas e contribuir para a literacia no cancro, procurando também humanizar a forma como olhamos para esta doença e compreendê-la num sentido mais amplo. Por vezes, a ciência tem uma linguagem demasiado hermética e técnica, pelo que é precisa a aproximação às pessoas e simplificar as explicações sobre as várias abordagens da terapia. Cada sessão dá origem a um podcast que estará disponível nas principais plataformas de streaming, alargando, desta forma, a abrangência da iniciativa.

Com apoio financeiro do Norte 2020 de 15 milhões de euros, o projeto de investigação *TeamUp4Cancer* foi implementado na região Norte pelo **Porto Comprehensive Cancer Center (P.CCC)**, um consórcio entre o Instituto Português de Oncologia do Porto (IPO Porto) e o i3S, IBMC, INEB e Ipatimup. O **P.CCC - TeamUp4Cancer** pretende encurtar o ciclo de descoberta científica em cancro, aproximando a investigação

básica e a prática clínica, através da aplicação de tecnologia de ponta e exploração de ensaios clínicos de fase precoce, procurando benefícios concretos para o doente oncológico e o desenvolvimento mais célere de novas armas terapêuticas contra o cancro. Os parceiros visam desenvolver modelos experimentais *in vitro* para auxiliar no tratamento do doente, validar e explorar novos biomarcadores em tecidos tumorais, sangue e outras amostras de tecidos e acelerar estudos pré-clínicos, facilitando a transição para os estudos clínicos de fase inicial. O principal investimento deste projeto incide na aquisição de equipamentos de ponta, na contratação de recursos humanos altamente qualificados e na adequação de infraestruturas clínicas e laboratoriais para apoio à realização de ensaios clínicos de fase precoce. O programa prevê, ainda, incrementar o número de start-ups e spin-offs, contribuindo para a disseminação de tecnologia e retorno deste investimento, em especial na Região Norte. Alguns dos equipamentos ficarão no IPO Porto, nomeadamente para ensaios clínicos de Fase 1, e outros no i3S, principalmente os que permitirão o isolamento e a caracterização de células tumorais dos doentes e ainda o estudo do comportamento destas células em modelos animais.

Manuel Sobrinho Simões manteve as funções de presidente do **Conselho Nacional dos Centros Académicos Clínicos**. Criado por colaboração dos Ministérios da Ciência, Tecnologia e Ensino Superior e da Saúde, os Centros Académicos Clínicos definem uma estrutura integrada de assistência, ensino e investigação médica, associando escolas médicas a centros hospitalares e unidades de investigação, tendo como principal objetivo o avanço e a aplicação do conhecimento e da evidência científica para a melhoria da saúde. O Regime Jurídico dos Centros Académicos foi aprovado em junho, reconhecendo o Ministério da Saúde a oportunidade para valorizar o ensino e a investigação, para captar investimento internacional e de natureza privada e, sobretudo, para reter os melhores profissionais. Os Centros Académicos Clínicos, que associam unidades orgânicas de instituições de ensino superior a unidades prestadoras de cuidados de saúde e a unidades de investigação, têm como principal objetivo o avanço e a aplicação do conhecimento e da evidência científica para a melhoria da saúde através da investigação, do ensino e formação pré e pós-graduada, da criação de conhecimento e da sua aplicação na melhoria dos cuidados prestados à população.

Em 2021, Manuel Sobrinho Simões recebeu o título de **membro honorário da Ordem dos Biólogos** e a **Medalha de Ouro do Ministério da Ciência, Tecnologia e Ensino Superior**.

O Ipatimup acolheu 33 médicos e técnicos para **treino avançado em diagnóstico**, 3 dos quais de outros países da Europa e 3 do Brasil.

O Grupo de Trabalho dedicado ao Cancro Hereditário, da Sociedade Portuguesa de Oncologia (SPO), lançou o Programa Nacional de Genética e Cancro (PROGO) e um portal informativo e educativo sobre cancro hereditário em Portugal. Estas iniciativas resultam de uma colaboração com a **Rede Europeia de Referência sobre Síndromes Genéticas** ligados ao cancro (ERN-GENTURIS), coordenada em Portugal pela investigadora Carla Oliveira do i3S/Ipatimup. O PROGO tem como principal objetivo uniformizar a prática clínica do diagnóstico genético e garantir a universalidade dos cuidados a doentes e a portadores de síndromes hereditárias de cancro, nomeadamente através da publicação dos requisitos mínimos para teste genético, assim como das linhas orientadoras de atuação para cada síndrome hereditária. O programa terá também uma vertente de formação dirigida a médicos não geneticistas. O portal incluirá informação destinada a doentes e familiares com o intuito de aumentar a literacia da população em síndromes de predisposição familiar para o cancro e potenciar a capacidade de participação dos utentes no seu processo terapêutico. Este novo programa permitirá também uma melhor integração de Portugal na Rede de Referência Europeia.

O projeto *Hereditary Breast Ovarian Cancer – HBOC: Optimizing hereditary cancer pathways (saving costs and lives)*, liderado pela investigadora Carla Oliveira do i3S/Ipatimup conquistou o **Prémio de Investigação Alfredo da Silva**, na área de Sustentabilidade dos Sistemas de Saúde. Este prémio, promovido pela Fundação

Amélia de Mello, teve curadoria científica da Universidade NOVA de Lisboa/*NOVAhealth* e visa distinguir projetos desenvolvidos em instituições portuguesas nas áreas da sustentabilidade social, económica e política. O projeto premiado foca-se nas vantagens da prevenção em relação ao tratamento dos cancros hereditários da mama do ovário. Fazem parte do projeto Fátima Carneiro (Centro Hospitalar Universitário de São João), Fátima Vaz (IPO-Lisboa), Judite Gonçalves (Nova School of Business and Economics), Helena Canhão (NOVA Medical School) e Tamara Milagre (EVITA).

A descoberta de um biomarcador molecular para o Lúpus Eritematoso Sistémico valeu ao grupo liderado por Salomé Pinho, do i3S/Ipatimup, o **Prémio Nacional de Investigação em Autoimunidade**, atribuído pelo Núcleo de Estudos de Doenças Autoimunes (NEDA) da Sociedade Portuguesa de Medicina Interna (SPMI). Neste trabalho, a equipa de cientistas demonstra que os doentes com Lúpus Eritematoso Sistémico (LES) exibem à superfície das células do rim uma composição atípica de açúcares (glicanos) que se traduz numa assinatura molecular única. O grupo de investigadores, liderado por Salomé Pinho, do i3S, em colaboração com o Centro Hospitalar e Universitário do Porto (CHUP) e com o Centro Hospitalar e Universitário de Coimbra (CHUC), recorreu a amostras de rim de doentes com LES e que tinham o rim afetado (glomerulonefrite/nefrite lúpica) e identificou uma composição de estruturas de açúcares (glicanos) incomum.

A cientista Salomé Pinho foi também distinguida com o **Prémio Pfizer 2021** na categoria de investigação clínica pelo trabalho desenvolvido na área do Lúpus Eritematoso Sistémico (LES).

O investigador Henrique Duarte, do i3S/Ipatimup, foi o vencedor da terceira edição do **Prémio Francisco Augusto da Fonseca Dias e Maria José Melenas da Fonseca Dias para Jovens Investigadores**. O projeto distinguido tem como objetivo identificar novos marcadores moleculares de prognóstico em pacientes com cancro do estômago avançado e perceber se estes marcadores podem indicar como os doentes vão reagir à principal terapia existente. O Prémio Francisco Augusto da Fonseca Dias e Maria José Melenas da Fonseca Dias para Jovens Investigadores, resulta do legado da D. Maria José Alves Melenas Dias ao Ipatimup, com o objetivo de apoiar a investigação científica em Cancro e Doenças Pré-Cancerosas.

O projeto *Secretoma Tumoral: uma ferramenta inovadora para a identificação de biomarcadores preditivos de metastização em doentes com cancro da mama*, liderado pela investigadora Ana Sofia Ribeiro, do i3S/Ipatimup conquistou o **Prémio de Investigação Liga Inovação**, promovido pelo Núcleo Regional do Norte da Liga Portuguesa Contra o Cancro, em colaboração com a Bioportugal. O objetivo deste trabalho é conseguir prever precocemente o risco de desenvolvimento de metástases, para controlar melhor a doença, e encontrar novas terapias personalizadas. Este projeto é resultado da cooperação com o IPO-Porto, no âmbito do *P.CCC - Porto Comprehensive Cancer Centre*, com o objetivo de melhorar o diagnóstico e tratamento de doentes oncológicos e está a ser desenvolvido por uma equipa multidisciplinar composta por especialistas em áreas distintas, como biologia do cancro da mama, oncologia médica, biópsias líquidas, cultura de organoides derivados do paciente e bioinformática.

A investigadora Rita Barbosa-Matos foi distinguida pela Sociedade Portuguesa de Genética Humana, na sua 25ª Reunião Anual, com o **Prémio Prof. Amândio Tavares para Jovens Investigadores**. O projeto de Rita Barbosa-Matos, aluna do programa doutoral BiotechHealth a desenvolver investigação no grupo *Expression Regulation in Cancer*, foca-se no estudo de um conjunto de nove famílias com Síndrome de Cancro Gástrico Difuso Hereditário (HDGC) do distrito do Porto. Neste trabalho, foram identificadas e caracterizadas uma série de famílias portadoras da mesma variante patogénica no gene CDH1 que codifica a proteína E-Caderina (responsável por manter as células epiteliais ligadas umas às outras, impedindo que se dividam de forma descontrolada e que invadam outros tecidos e órgãos). Com recurso à análise de material genético de mais

de 100 pessoas destas famílias, comprovou-se que esta variante causadora de doença teve origem no distrito do Porto, já que todos os portadores testados derivam de um ancestral comum.

A investigadora Rita Barbosa-Matos recebeu ainda uma **Bolsa Fulbright** para desenvolver investigação durante seis meses no Centro de Medicina Regenerativa da Universidade de Boston.

Na **1ª Edição do Prémio Maria de Sousa**, foi distinguido um projeto de investigação da investigadora do i3S/Ipatimup Daniela Freitas. Denominado *Glicosilação de vesículas extracelulares de cancro gástrico: o seu impacto na comunicação intercelular em cancro e o seu potencial para a descoberta de novos biomarcadores*, o projeto liderado por Daniela Freitas, do grupo de investigação do i3S *Glycobiology in Cancer*, tem como principal objetivo encontrar novos biomarcadores não-invasivos para o cancro do estômago, assim como novos potenciais alvos terapêuticos, através de uma amostra de sangue. Devido à falta de bons biomarcadores, o cancro do estômago é frequentemente detetado em fases avançadas da doença, o que dificulta a eficácia das terapias atualmente disponíveis. Partindo de uma análise às vesículas celulares que circulam na corrente sanguínea, o projeto estuda o papel dos glicanos (estruturas de hidratos de carbono complexas) alterados no cancro do estômago na comunicação e reprogramação celular local e à distância com o objetivo de encontrar novos biomarcadores que possibilitem diagnosticar a doença mais cedo». Este trabalho é desenvolvido no âmbito de uma colaboração entre o i3S e a Weill Cornell Medicine em Nova Iorque.

O projeto liderado pelo investigador Nuno Rodrigues dos Santos, do i3S/Ipatimup foi o vencedor da **2ª Edição da Bolsa de Investigação em Leucemia Linfocítica Aguda (LLA)**, uma distinção da Associação Portuguesa Contra a Leucemia (APCL) e da Sociedade Portuguesa de Hematologia, com o apoio da Amgen Biofarmacêutica. Denominado *Mecanismos de infiltração no sistema nervoso central em leucemia aguda precursora de células B tipo cromossoma de Filadélfia (CENSIBALL)*, este projeto representa mais um passo na compreensão dos mecanismos e terapias que possam fazer frente à evolução das formas mais agressivas desta patologia. A equipa de investigação é multidisciplinar, contando com investigadores do Centro Hospitalar Universitário do Porto, do Instituto Português de Oncologia do Porto e do Centro Hospitalar Universitário de S. João e do Imperial College of London.

Em 2021, os investigadores do Ipatimup publicaram 226 **trabalhos em revistas internacionais indexadas**. Em termos de impacto, foram publicados 73 artigos em revistas com fator de impacto superior a 6 e 117 em revistas com fator de impacto entre 3 e 6.

Doutoraram-se 8 estudantes de pós-graduação e 28 concluíram as teses de mestrado.

Na **Assembleia Geral Extraordinária** realizada em 2 de dezembro de 2021, foram admitidos como associados efetivos do Ipatimup o *Health Cluster Portugal*, a Irmandade dos Clérigos, a EVITA – Associação de Apoio a Portadores de Alterações nos Genes Relacionados Com Cancro Hereditário, a Pulmonale – Associação Portuguesa de Luta Contra o Cancro do Pulmão e a Europacolón Portugal - Associação de Apoio ao Doente com Cancro Digestivo. A participação destas entidades contribuirá determinadamente para as áreas da investigação de translação e de transferência de tecnologia, bem como para o serviço à comunidade, através de ações promotoras de literacia para a saúde.

Na Assembleia Geral Extraordinária, foi ainda deliberado alterar a configuração do Conselho Científico-Técnico, permitindo que este seja constituído por 3 a 12 pessoas singulares ou coletivas, ou outras entidades ou organismos, de natureza pública ou privada, com ou sem personalidade jurídica, portuguesas ou estrangeiras, de reconhecido mérito técnico-científico, incluindo, sem limitar, pessoas coletivas de direito público, associações sem fins lucrativos ou unidades orgânicas sem personalidade jurídica, designadas pelo Reitor da Universidade do Porto por um período de três anos sob proposta da Direção.

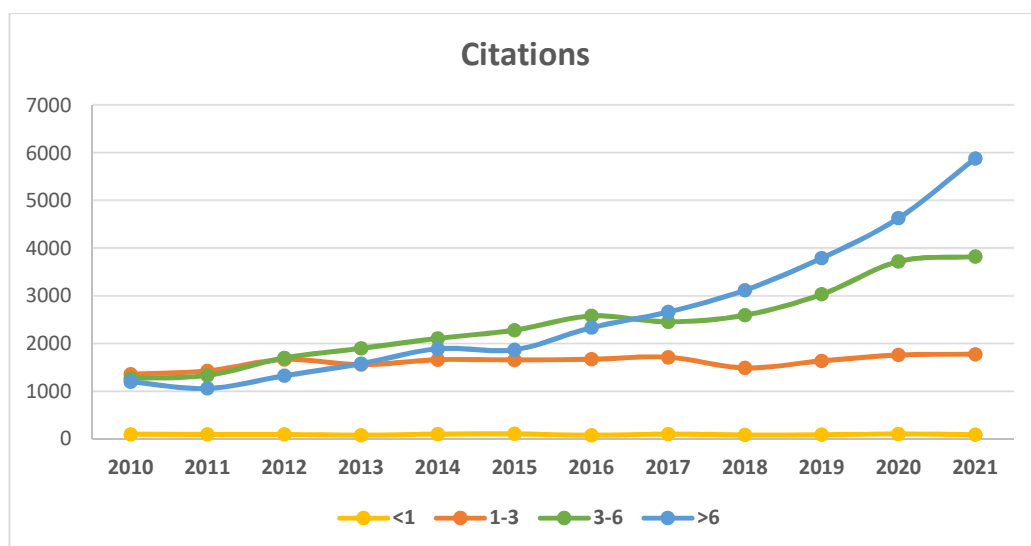
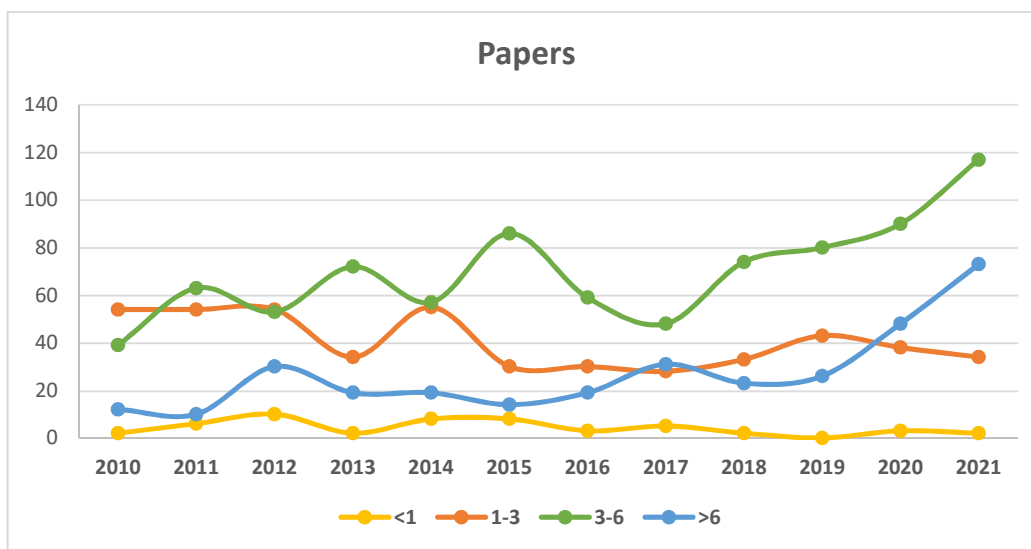
Tal como tem vindo a ser referido desde o relatório de 2016, a informação relativa à atividade científica do Ipatimup passa a constar, com detalhe, do Relatório de Atividades do Instituto de Inovação e Investigação em Saúde da Universidade do Porto (i3S).

Produção Científica

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No ano de 2021, o Ipatimup atingiu o número de 226 trabalhos publicados em revistas internacionais indexadas, 73 em revistas com Fator de Impacto (FI) superior a 6 e 117 em revistas com FI entre 3 e 6.

Os gráficos seguintes ilustram a evolução do número de artigos publicados e de citações desde 2010, de acordo com o Fator de Impacto das respetivas revistas:



Highlights

We demonstrated the impact of Extracellular Vesicles released by macrophages on pancreatic ductal adenocarcinoma (PDAC) cellular response to a chemotherapeutic agent. We also identified chitinase 3-like 1 and fibronectin as targets for pharmacological inhibition in PDAC. Furthermore, we found 2 anti-fibrotic drugs - inhibitors of those targets – which counteracted such resistance, suggesting the possibility of repurposing those drugs for PDAC adjuvant therapy. This resulted from collaboration between i3S and IPO-Porto (Cancer Lett. doi: 10.1016/j.canlet.2020.11.013).

We demonstrated, in collaboration with the group led by Bruno Costa, at ICVS – Minho University, that CDH3/P-cadherin expression is associated with aggressiveness features of glioblastoma (GBM) and poor patient prognosis, suggesting that it may be a novel therapeutic target for this deadly brain tumor (Mol Oncol. doi: 10.1002/1878-0261.13162)

We have shown that molecular markers may have a role in predicting PTC patients' outcome. Patients with BRAFmut/TERTpwt tumors were prone to present with local aggressiveness (recurrent/persistent disease), whereas patients with TERTpwt tumors have higher risk to present recurrent structural disease and disease specific mortality (Cancers (Basel). doi: 10.3390/cancers13092048).

We provide evidences that the use of logical computational models, combined with experimental validations, is an effective approach to identify cooperative mechanisms and therapeutic strategies in the context of cancer biology and identified novel synergistic behaviours involving inputs from the tumour microenvironment and gain of function mutations in NOTCH using our logical model of Epithelium to Mesenchymal Transition (Int. J. Mol. Sci. doi: 10.3390/ijms22094897).

We have demonstrated that MUC2 expression predicts response to adjuvant chemotherapy in stage II colorectal patients. Clinical decision for stage II CRC patients is often difficult as 15 to 30% of the patients develop disease relapse despite undergoing surgery with curative intent. The results we obtained advise inclusion of adjuvant chemotherapy for patients with loss of MUC2 expression, which significantly improves disease-free survival (BMC Cancer. DOI: 10.1186/s12885-021-08070-6).

We dissected a cascade of events occurring at the interface of cancer cells with the extracellular matrix. We found that E-cadherin mutations induce an abnormal interplay of cells with specific components of the ECM, which encompasses increased traction forces and Integrin β 1 activation. We proposed that Integrin β 1 can be used in the clinics as a biomarker of poor prognosis in gastric cancer (Gastric Cancer. doi: 10.1007/s10120-021-01239-9).

We conducted the first germline CTNNA1-associated genotype-phenotype study by systematically identifying variant carrier families worldwide, classifying clinical actionability of CTNNA1 germline variants, and collecting clinical phenotypes from probands and relatives. We gathered 150 phenotypes from 41 families and demonstrated that 2% of families fulfilling Hereditary Diffuse Gastric Cancer syndrome criteria carry actionable CTNNA1 variants. The main phenotype in these families was diffuse gastric cancer before age 40 (Eur J Med Genet. doi: 10.1016/j.ejmg.2021.104316).

We conducted the first in vitro coinfection assays with dual human and bacterium-matched and mismatched ancestries, in African and European backgrounds, to evaluate the genome wide gene expression host response to *Helicobacter pylori*. We have shown that this response was greatly shaped by the human ancestry, with variability on innate immunity and metabolism. African human ancestry showed signs of coevolution with *H. pylori* while European ancestry appeared to be maladapted (Microorganisms. DOI: 10.3390/microorganisms9020240).

We demonstrated that the oncogenic receptor ErbB2 is modified with sialylated glycans in gastric cancer. Strikingly, the two sites being targeted by this modification occur within the receptor's trastuzumab-binding domain. Moreover, we elucidated a previously elusive glycan-mediated mechanism of molecular resistance to trastuzumab, in which selected glycan species impact receptor activation and membrane stability. We demonstrated that ST6Gal1-mediated aberrant α 2,6-sialylation actively tunes the resistance of ErbB2-driven GC cells to trastuzumab (Oncogene. DOI: 10.1038/s41388-021-01801-w).

We have shown that protein mannosylation acts as an unusual glycan neoepitope that triggers a pro-inflammatory immune response (Arthritis Rheumatol. doi: 10.1002/art.41768.).

We have described for the first time the existence of an intratumor communication network coordinated by extracellular vesicles (EVs) in pancreatic cancer. The main effector of this communication channel is the protein Agrin released in EVs by pancreatic cancer stem cells. Inhibition of communication through EVs or inhibition of Agrin is sufficient to impair tumor growth (Gut. Doi: 10.1136/gutjnl-2021-324994).

We identified a novel strategy used by *Helicobacter pylori* to breach one of the first lines of defense against pathogens. We demonstrated that *H. pylori* disrupts epithelial JAM-A in cell lines, in primary gastric epithelial cells, and in the human gastric mucosa, by cleaving the cytoplasmic domain of the protein. This resulted in loss of the epithelial barrier and in decreased cell-cell adhesion. We identified the *H. pylori* protease that cleaves JAM-A, highlighting an unreported function for HP1012 metalloprotease (Gut Microbes. DOI: 10.1080/19490976.2021.1921928)

We have revealed the slowing of brain activity, as measured by EEG (through the relative power at the conventional frequency bands, delta, theta, alpha, beta-1, and beta-2, considered as AD endophenotypes) in Alzheimer patients carrying risk alleles at IL1RAP (rs10212109, rs9823517, rs4687150), UNC5C (rs17024131), and NAV2 (rs1425227, rs862785) genes, regardless of the disease status and situation towards the strongest risk factors (age, sex, and APOE ϵ 4) (J Alzheimers Dis. doi: 10.3233/JAD-200963).

Cancer Prevention

Overview

Cancer Prevention Unit (CPU) is a multidisciplinary group at the interface of biomedical research, scientific outreach and audiovisual production, specialized in the implementation of innovative programs on cancer prevention and health promotion for the public through multimedia approaches.

Major Outputs

Online course on Cancer prevention. The last phase of the Unit's flagship project *2' Minutos para mudar de vida* involved the production of a massive open online course (MOOC), the first of its kind. We have designed it from the ground up, its pedagogical objectives, structure, scientific contents, and implementation requisites. 2021 completed the ambitious production of all its architecture, programming and multimedia contents, with 10 thematic modules covering all topics of cancer prevention - from general introductory concepts to risk factors, preventive behaviors, screening programs - and the use of videos, text support, knowledge quizzes, Q&A sections, and practical activities. It is designed to have a customizable navigation for use both in classroom and remotely and is now ready for deployment.

2' Minutos para mudar de vida is a nation-wide cancer prevention campaign, with a *first-of-its-kind* TV series, a far-reaching online and mobile app presence, pedagogical materials for the classroom, an original soundtrack album, open public sessions, and now, the first MOOC on cancer prevention.

Impact Evaluation research. We have strengthened our research commitment by rigorously evaluating the impact of our different initiatives and 2021 saw a strong effort in this direction. We have completed our study on the impact of *2' Life-changing minutes* project in a large and complex experimental and "natural" design, covering Appreciation parameters, Narrative engagement, Message delivery, Health Promotion Potential, Knowledge gain and Behavior change, forming an encompassing study on health communication. A manuscript entitled "*2' Life-changing minutes: impact evaluation of a novel communication format for cancer prevention*" has been submitted for publication. The MOOC produced also has been accompanied by the design and instrument development for evaluation of its impact, to be applied and analysed throughout 2022. Another project called "*SPOT – Jogo sério baseado em realidade aumentada para a prevenção do melanoma*" produced a mobile application prototype and a pilot evaluation study. This project rendered 2 master thesis and 1 manuscript entitled "*Melanoma Prevention using an Augmented Reality-based Serious Game: a Pilot Study*" submitted for publication. Another project called "*EMOTICOMM: Improving video-based cancer communication through emotional response analysis*", in collaboration with prof. Georges E. Khalil from the Univ. of Florida, started an exploratory evaluation stage that showed promising results for further exploration and competitive funding.

Literacy in Tuberculosis – 2nd project. As part of our Unit strategic development, we actively engage as providers of scientific and educational audiovisual contents. Following a successful project

commissioned by DGS, through its National Program for Tuberculosis, to produce a novel audiovisual approach on relevant topics of tuberculosis literacy, we were again contracted as providers of educational materials, this time on static material production that could augment and complement the 1st stage of the campaign. We have designed, produced and delivered 6 leaflets and 2 posters on different health and science topics about tuberculosis, 1 *muppi* for communication and promotion purposes, and, in the digital realm, we produced banners and 15 *shareable* figures for DGS' social networks, and 2 digital presentations templates. Further initiatives with DGS are currently under discussion.

International outreach. We have made substantial efforts in promoting our projects in international festivals and media/educational awards with success, and following 2020 distinctions in the *Health for All Film festival* from WHO, *Audience Vote* in the MEDEA awards, 2 Telly awards, and selection for *Pariscience Festival 16^e édition*, in 2021 we achieved great international recognition through 3 major science/film forums: - **Science Film Festival**, organized by the Goethe-Institut in close cooperation with local partners in Southeast Asia, South Asia, Africa and the Middle East, with the goal of “promotion of contemporary scientific, technological and environmental issues through international films” and educational activities the largest of its kind worldwide. Three episodes of the 2' *Minutos para mudar de vida* series were selected and screened in Angola, Burkina Faso, Indonesia, Kenya, Malaysia, Mali, Mozambique, Myanmar, Thailand, and Vietnam, reaching a total audience of over 340 000 viewers; - **APHA Public Health Film Festival** is a key component of the American Public Health Association (APHA) Annual Meeting and Expo., attended by more than 10 000 professionals in Denver CO, USA, and online. Three episodes of the 2' *Minutos para mudar de vida* series were selected and exhibited; - **Stuttgart International Festival of Animated Film – ITFS** is one of the world's largest and most important festivals for animated film and its intersections with visual effects, architecture, art, design, games, and music. The film *'Já tens idade para te preocupares com o cancro?'* was selected and exhibited to over 8100 visitors from 63 countries. These distinctions are unique outreach opportunities for our Unit and for Ipatimup, and grant us ample recognition as experts in educational media production in health.

Pilot projects development, collaborations and competitive calls. The broadening of our objectives led to the development of different intervention ideas into pilot projects, which foster opportunities for external collaborations and for funding. Probably the most expressive was project *'Honest Ads'*, about healthy eating and obesity prevention for small children, that was submitted to the 'Healthy Food Challenge', an international idea call funded by Novo Nordisk and EAT Norway: to this purpose we have collaborated with DGS, RTP, ACeS Porto Oriental, Stop Marketing to Kids Coalition, and several pediatricians, and reached the third and last stage of the call; together with prof. Rita Espanha and prof. Cristina Camilo from ISCTE-IUL we have submitted a project called *"Evaluation on cancer literacy of the Iberian population – a social examination"* to la Caixa Foundation Social sciences call; with prof. António Coelho from FEUP we have submitted the 'SPOT' serious game for melanoma detection prototype to the Health INNOVation Award; We have explored the role of emotional responses to health communication videos in collaboration with with prof. Georges E. Khalil from the Univ. of Florida and applied for FCT funding and la Caixa Social Sciences funding;

With audiovisual production company 'Filmesdamente' we developed a documentary project called "Crónicas da Urgeiriça e outros dilemas do progresso" submitted for funding by ICA and by RTP; With 'Cimbalino Filmes', another production company, we have applied to ICA for funding the writing of the 2nd season of 2' Minutos para mudar de vida.

Master's degree student supervision. We have completed 3 Masters' students thesis with great success: "SPOT – Jogo sério baseado em realidade aumentada para a prevenção do melanoma" from the Multimedia MSc program from FEUP, "Utilização da Realidade Aumentada na Prevenção de Melanoma: uma abordagem baseada na ludificação" from the Bioengineering Masters of FEUP, and "O uso de meios digitais não-académicos para a comunicação de ciência", Master's in Science Education and Outreach from FCUP.

We have enrolled 1 new student from the Masters on Science Communication from the Univ. of Minho, with thesis title "Desenvolvimento e Avaliação de Impacto do curso online 2' Minutos para mudar de vida".

Tratar o Cancro por Tu. Cancer Prevention Unit was involved in the design and organization of the 'Tratar o Cancro por Tu' sessions, in its fundraising, and in the production of audiovisual contents. This program includes live open sessions on cancer literacy and treatments for the general public in different cities in Portugal, online initiatives involving digital influencers, and a new podcast from Antena1 to be presented in 2022.

Presentations, Workshops and Science Outreach

Marcos NT, Carvalho L, Ribeiro N, Gomes P (2021) 2' Minutos para mudar de vida: prevenção de cancro ao alcance de cada um. SciComPT 2021, 23-25 Jun. | Oral presentation

Sousa P, Ribeiro N (2021) O podcasting científico na área da saúde, uma revisão para Portugal. SciComPT 2021, 23-25 Jun. | Oral presentation

Tavares P, Ferreira C, Coelho A, Ribeiro N (2021) SPOT: prevenção do melanoma utilizando um jogo sério baseado em realidade aumentada. SciComPT 2021, 23-25 Jun. | Oral presentation

Ribeiro N. Prevenir, evitar ou ignorar: o que podemos fazer quanto ao cancro? Programa Embaixadores de Ciência do i3S, Escola Secundária Carolina Michaëlis, Porto. | Public session

"How to develop a project of health promotion - case study 2' life changing minutes", Escola Superior de Educação de Paula Frassinetti, April | Workshop

MEDEA Awards Juri

Projects and Awards

"2' Minutos para mudar de vida" - nationwide campaign on health education and cancer prevention, in partnership with Fundação Belmiro de Azevedo and co-sponsored by Fundação Calouste Gulbenkian and Fundação la Caixa | **running**.

“Literacy on Tuberculosis” 2nd project - production of static materials to inform and educate on tuberculosis, sponsored by the *Programa Nacional para a Tuberculose* of Direção-Geral da Saúde (DGS) | **awarded and executed.**

“Prémio Saúde Sustentável 2021” winner, cat. ‘*Promoção da Saúde e Prevenção da doença*’, 10th edition, organized by Jornal de Negócios and Sanofi. | **awarded.**

Selected for the ‘Science Film Festival’ in 10 different countries from Asia to Africa. Organized by the Goethe-Institut in cooperation with partners in Southeast Asia, South Asia, Africa and the Middle East | **selected.**

Selected for the *APHA Public Health Film Festival 2021*, organized by the American Public Health Association (APHA) Annual Meeting and Expo, Denver CO, USA | **selected.**

Official selection for the Stuttgart International Festival of Animated Film – ITFS | **selected.**

Ipatimup Diagnostics

► Overview

In 2021, IPATIMUP Diagnostics maintained the high quality standards successfully achieved in the previous years through CAP accreditation being its recognition reinforced by the IPAC accreditation renewal in two different standards (ISO 15189 and ISO/IEC 17025).

Other goals for 2021, such as maintaining the unit as a professional training center, maintaining the number of tests from the previous year, achieving better client satisfaction with our services and participating in research projects with health institutions and pharmaceutical companies, and inclusion in international networks, were totally accomplished.

► Highlights

- CAP and IPAC accreditation (ISO 15189 and ISO/IEC 17025);
- Participation in international networks – maintained for EUROFORGEN
- Overall client satisfaction was maintained relatively to the previous year;
- The training activity was maintained in line with the previous years. IPATIMUP has maintained its position as a professional training centre through its nomination by the Portuguese Physician's Association (*Ordem dos Médicos*) as a reference centre in molecular pathology of the Anatomical Pathology internship;
- Participation in research projects with health institutions and pharmaceutical companies, as well as the establishment of specific national and international service contracts with hospitals and other health institutions, increased and diversified in 2015.

► Statistics

- Total of exams: 46335 – increased 14,8% (32631 pathologic anatomy, 6193 genetic diagnosis, 4895 molecular pathology)
- Prescribing institutions: 708 (376 health centers, 158 private clinics, 72 public hospitals, 43 private hospitals, 24 laboratories, 18 international institutions, 5 public institutes, 2 colleges, 1 city council)

► Activity Statistics (tables only)

EXAMS

LAP	Total	32631
	Histology	15427
	Cytology (includes 2539 cases of FNA cytology)	6269
	Consultations	200
	Pat. Molecular (PD-L1, Her2 e EBER)	534
	Telepathology	5395
LDG	Total	13643
	Tumour mutation screening	4895
	Genetic Diagnosis	4092
	Pre-natal screening	2040
	COVID serology	2616
LPIG	Total	61
	Genetic Characterizations (including lineage markers)	8
	Parentage investigations (individuals) and genetic profile comparisons (sample/individual)	53

► **Quality Control**

1. INTERNAL QUALITY CONTROL

A) LAP

In 2021 the “turn-around time” (TAT) was the following:

- Histological Exams 53,5% of reports are sent in 2 working days.
- Cytological Exams: 82,9% of reports are sent in 2 working days.
- Screening cytologies: 98,4% of reports are sent in 7 working days.

The main results for the Gynecological Cytology quality control analysis were:

Total cases: 1255

Reviewed cases: 287

Concordance between pathologist and cytotechnician – 99,8%

B) LDG/LPIG

The diagnostic genetics laboratory has an internal quality control system that includes case reanalysis.

In 2021, case reanalysis had a 100% concordance rate.

2. EXTERNAL QUALITY ASSESSMENT

During 2021 Ipatimup Diagnostics has participated in proficiency tests and quality assurance programs for 47 distinct parameters covering all laboratory areas and methods with 97,3% of satisfactory results for the anatomic pathology laboratory and 98% satisfactory results for the genetics laboratory. These external quality assessment schemes were performed in collaboration with several accredited organizations such as CAP, ESP, GenQA - NEQAS, Instand, EMQN and RfB.

► Other Activities

TRAINING

In total, there were 33 people who underwent training at IPATIMUP Diagnostics during 2021, according to the following table:

Nome	Período de estágio	Instituição de origem
Ana Patrícia Costa Gonçalves	1 fevereiro a 19 março	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Diana Silva Oliveira	1 fevereiro a 19 março	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Carolina Lopes Silva Lourenço	1 fevereiro a 19 março	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Maria Silva Campos	22 março a 4 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Erica Mariana Martins Sá	22 março a 4 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Silva	22 março a 4 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Tiago Monteiro Carvalho	12 abril a 2 julho	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Luna Van Hese (estudante Erasmus)	19 a 30 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Rita Pinto Mendes	19 abril a 11 junho	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Djelissa Sofia Fernandes Gomes Pina	26 abril a 2 julho	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Daniela Filipa Granja Pimentel	14 a 25 de junho	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Mafalda Barata Cardoso Moreira	6 a 24 setembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Beatriz Loureiro Silva	6 a 24 setembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Alexandra Carvalho Morais	6 a 24 setembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal

Bárbara Catarina sousa Carvalho	27 setembro a 12 dezembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Inês Santos Teixeira	27 setembro a 12 dezembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Beatriz Fontes Gomes	27 setembro a 12 dezembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Patrícia Isabel Moura Vasques	29 novembro a 17 dezembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Isabel Vieira Pinto	22 março a 1 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Janine Maia Silva	6 a 16 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Beatriz Costa Baptista	19 a 30 abril	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Luna Van Hese	3 maio a 26 junho	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Gonçalo Luís de Albuquerque e Vale	7 junho a 30 agosto	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Ana Catarina Teixeira Alves	6 a 24 setembro	Técnico de Anatomia Patológica - ESTSP - Porto - Portugal
Gonçalo Bruno Mesquita Gerardo	4 janeiro a 26 fevereiro	Interno de Anatomia Patológica - Hospital da Luz - Lisboa - Portugal
André Marques Pereira	1 fevereiro a 31 março	Interno de Anatomia Patológica - Hospital Fernando Fonseca - Lisboa - Portugal
Filipa Galante Pereira	1 abril a 31 maio	Interno de Anatomia Patológica - Hospital Fernando Fonseca - Lisboa - Portugal
Carolina Alves Padrão	1 junho a 31 julho	Interno de Anatomia Patológica - Hospital Fernando Fonseca - Lisboa - Portugal
Ana Carmo Monteiro Valente	1 julho a 31 agosto	Interno de oncologia médica - Centro Hospitalar de São João - Porto - Portugal
Rafael António Moiteiro Cruz	2 agosto a 1 outubro	Interno de Anatomia Patológica - Centro Hospitalar de Lisboa Norte - Lisboa - Portugal
Aluixa Rosmar Dolmenares Lozada	1 outubro a 30 novembro	Interna de anatomia patológica - Hospital Distrital de Santarém - Santarém - Portugal
Yve Lacerda	1 setembro a 30 outubro	Interno de Anatomia Patológica - Hospital do Câncer de Barrretos - São Paulo - Brasil

Bijal Shah	2 a 30 novembro	Patologista - Manchester University NHS Foundation Trust - Manchester, U.K.
Aluixa Lozada	1 a 30 dezembro	Interno de Anatomia Patológica - Hospital Distrital de Santarém - Santarém - Portugal
Ilze Fridrihsone	15 setembro a 15 novembro	Patologista - Centrālā Laboratorija - Letónia
Helton Estrela Ramos	15 setembro a 15 janeiro	Professor associado - Universidade Federal da Bahia - Salvador - Bahia - Brasil
Inês Isabel Ferreira Barros	2 setembro a 31 outubro	Interno de endocrinologia - Hospital de Braga - Braga - Portugal
Sara Gomes Campos Lopes	2 novembro a 30 dezembro	Interno de endocrinologia - Hospital de Braga - Braga - Portugal
Yve Lacerda	2 setembro a 31 outubro	Interno de Anatomia Patológica - Hospital de Câncer de Barretos - São Paulo - Brasil
Elena Prados	2 a 30 novembro	Interna de Patologia - Hospital Universitario Son Espases of Palma de Mallorca - Espanha
Maria Abreu	2 setembro a 30 dezembro	Interno de Genética Médica - Centro Hospitalar do Porto - Porto -Portugal
Ana Raquel Machado Neves	1 a 29 de outubro	Patologista - Hospital Pedro Hispano - Matosinhos - Portugal

PUBLICATIONS

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Annexes

Recent PhD's

1. Soraia Miliza da Cruz Santiago Mamede de Melo
26-01-2021, FMUP
Diagnosis of E-cadherin missense mutations through molecular and morphological changes involved in cell extrusion
Orientadora: Raquel Seruca
2. Antónia Maria Afonso Póvoa
15-07-2021, FMUP
Papel dos biomarcadores moleculares na estratificação do risco do carcinoma papilar da tireoide, para um tratamento cirúrgico personalizado.
Orientadora: Paula Soares
3. Isabel José Dionísio de Sousa
09-03-2021, FMUP
Factors related to tumour microenvironment in ovarian cancer
Orientadora: Paula Soares
4. Manuel António Costa Campos
23-03-2021, FMUP
Squamous cell carcinogenesis of the skin: Molecular characterization of prognostic therapeutic biomarkers.
Orientadora: Paula Soares; Coorientador: José Manuel Lopes
5. Ana Rita Marçal Dantas de Lima
15-04-2021, FMUP
ROle of the MITOchondrial fission protein DRP1 as a prognosis and predictive biomarker in the treatment of differentiated thyroid cancer (ROMITO-DRP1)
Orientador: Valdemar Máximo
6. Joana Costa Aguiar de Castro Peixoto
15-06-2021, FMUP
The Metabolic Regulation of the Cancer Stem Cell Phenotype in Glioblastoma
Orientador: Jorge Lima; Coorientadora: Almut Schulze
7. Daniel André Gonçalves Ferreira
14-12-2021, ICBAS
A tissue engineering approach to fabricate a stomach-on-a-chip: a biomimetic device to decode the role of CD44v6 in gastric cancer
Orientador: Pedro Granja; Co-Orientadora: Carla Oliveira
8. Abel Ernesto Fernandes de Sousa
07/10/2021, GABBA
Study of control of protein abundance using Multi-Omics data from Cancer samples
Orientador: Pedro Ferreira; Co-Orientadora: Carla Oliveira

Recent Master's

1. Catarina Esquível Costa Pinhão Martins

06/10/2021, FEUP

P-cadherin as a phenotypic stability factor of the hybrid epithelial/mesenchymal phenotype in breast cancer.

Orientadora: Joana Paredes; Co-Orientador: Tito T. Jesus

2. Inês Maria Pereira de Sousa Conde

02/12/2021, FMUP

Unravelling a cancer stem cell signature associated with breast cancer metastatic organotropism.

Orientadora: Joana Paredes; Co-Orientadora: Ana Sofia Ribeiro

3. Diogo Rafael Dias Coelho

10/12/2021, ICBAS

Deciphering the functional role of KRAS-induced SUSD2 downregulation in colorectal cancer.

Orientadora: Sérgia Velho

4. Ana Raquel da Silva Borralho

10/12/2021, FMUP

Unravelling the Importance of MHC Class I in Colorectal Cancer Cell Stemness and Tumour Initiation

Orientadora: Mireia Castillo-Martin; Co-orientadora: Paula Soares

5. Ana Carolina Cunha Dias

09/12/2021, ICBAS

Avaliação de biomarcadores genéticos no diagnóstico e seguimento de doentes com cancro do tracto urinário superior

Orientadora: Paula Soares; Co-orientador: Rui Batista

6. Lia Cristiana Gomes Rodrigues

02/12/2021, ESS- IPP

DGCR8 microprocessor defect and deregulation of its expression in thyroid lesions

Orientador: João Vinagre; Co-orientadora: Paula Soares

7. Beatriz Farias Leão

25-03-2021, FMUP

Expression of Thomsen-Friedenreich antigen in colorectal cancer and association with microsatellite instability

Orientador: Celso Albuquerque Reis

8. Tânia Isabel Meleiro Lopes

19/11/2021, Universidade de Aveiro

Comparison of two extracellular vesicles isolation methodologies from gastric cancer cells for STn detection

Orientadores: Daniela Freitas e Celso Reis

9. Cátia Alexandra Coelho Ramos
04/02/2021, Universidade de Aveiro
Exploring the impact of gastric cancer extracellular vesicles glycosylation in cancer communication
Orientadores: Daniela Freitas e Celso Reis

10. Maria Cristina Cadinha Marques
15/12/2021, FMUP
Metabolites of the gastric cancer microbiome
Orientador: Rui Ferreira

11. Maria Francisca Ribeiro Alves
26/11/2021, ICBAS
Glycans as dual players of intestinal microbiome and immune response – impact in Inflammatory Bowel Disease immunopathogenesis
Orientadora: Salomé Pinho

12. Bruno Miguel Maio Oliveira
07/12/2021, ICBAS
The impact of glycans as regulators of T cell-mediated immune response in gastrointestinal disorders
Orientadora: Salomé Pinho

13. Ana Rita Couto Oliveira
24/11/2021, FMUP
Intercellular communication in cancer drug resistance: the role of extracellular vesicles
Orientador: José Carlos Machado

14. Telma Filipa Lopes dos Santos Costa
29/09/2021, ICBAS
Impact of tumor-associated myeloid cell depletion on T-cell leukemia development
Orientador: Nuno Rodrigues dos Santos

15. Isabelle Li
04/08/2021, Université de Paris
Investigating the expression and localization of FoxM1 during cellular transformation
Orientadora: Florence Janody

16. Isabel Patrícia Dias Meireles
07/12/2021, Universidade de Coimbra
Validating the role of the MAL/SRF pathways in promoting stem-like features downstream of the P-cadherin/actin cytoskeleton complex.
Orientadora: Florence Janody

17. Lídia Maria Pereira Fária
13/12/2021, ICBAS
Exploring the role of the actin-MRTFA-SRF signalling pathway downstream of P-cadherin in basal-like breast cancer cells.
Orientadora: Florence Janody

18. Pedro Manuel Fernandes Rodrigues
22/11/2021, FCUP
Disclosing the genetic history of male lineages present in populations from Patagonia
Orientadora: Verónica Gomes

19. Marisa Mariano Faustino
22/11/2021, FCUP
Polymorphisms and mutation rate estimates of Y-STRs and X-STRs in the Portuguese Population
Orientadora: Nádia Pinto

20. Bibiana Patrícia Augusto Ribeiro
09-12-2021, FCUP
Genetic characterization of the maternal lineages in Andean Colombian populations
Orientadora: Maria João Prata

21. Helena Isabel Sousa Rodrigues
16/12/2021, FCUP
Development of a SNaPshot® Multiplex system for the genetic characterization of Glucose-6-Phosphate Dehydrogenase in a newborns population sample from Bengo, Angola.
Orientadora: Maria João Prata

22. Diana Cristina Silva Ferreira
02/12/2021, FMUP
m6ACODE: Deciphering the hidden message in m6A RNA methylation in Gastric Cancer
Orientadora: Raquel Almeida

23. Alexandre Rodrigues Coelho
06/12/2021, Universidade do Algarve
Study of RNA-binding protein networks in colorectal cancer cells
Orientador: Bruno Pereira

24. Francisco Manuel Oliveira de Almeida
17/12/2021, FCUP
Analysis and comparison tool for multiple variant calling results from germline NGS data with clinical applications
Orientador: Carla Oliveira; Co-Orientador: Pedro Ferreira

25. Sérgio Manuel Pires Marinho
15/12/2021, FMUP
tRNA-Ser-AGA: a new player in NSCLC cisplatin resistance
Orientadora: Mafalda Santos; Co-Orientadora: Carla Oliveira

26. Sofia Isabel Martins de Sousa

Setembro, FFUP

Inhibitors of CHI3L1 for the treatment of pancreatic adenocarcinoma: virtual screening and preliminary studies on inhibition of cell growth

Orientadora: Helena Vasconcelos; Co-orientadora: Andreia Palmeira

27. Helena Isabel de Freitas Branco

Dezembro, ICBAS

Studying the chemosensitizing effect of Pirfenidone in non-small cell lung cancer cell lines

Orientadora: Cristina Xavier; Co-orientadores: Helena Vasconcelos; Lúcio Lara Santos

28. Rita Catarina Pereira Rebelo

Novembro, FMUP

Investigating the potential activity of imatinib and selonsertib as cell-surface GRP78 inhibitors in cancer cells lines: preliminar studies on antitumor activity for selonsertib

Orientadora: Helena Vasconcelos; Co-orientadora: Cristina Xavier

Research Projects

1. GenomePT .: National Laboratory for Genome Sequencing and Analysis - PT2020/FCT
2. Tackling cancer stem cells: a challenge and an opportunity to advance in anti-cancer therapy (CANCERSTEM) - FCT
3. Glycans as immunomodulators in Inflammatory Bowel Disease - CCFA
4. Today's Present, Tomorrow's Future on the Study of Germline E-Cadherin Missense Mutations: A Step Forward on Providing Informed Genetic Counseling to Everyone. - No Stomach for Cancer, Inc
5. TRICAN .: O papel dos Tregs na resposta imune ao cancro - FCT
6. GLYCOkiller .: Identificação de Novas Drogas Glicospecíficos para Combater a Metástase de Células Cancerígenas - FCT
7. GLYCANTIGENS .: Glicoantígenios da proteína MUC1: Um perspectiva estrutural na luta contra o cancro - FCT
8. Hoxome .: Função dos genes HOXB no Cancro de Mama - FCT
9. LuCaS .: Rastreamento do cancro do pulmão - uma metodologia não invasiva para o diagnóstico precoce - FCT
10. TNaSA .: Algoritmo preditivo de resposta à imunoterapia baseado na expressão neoantigénica - FCT
11. The other faces of telomerase in thyroid cancer: looking beyond tumour immortalization - SPEDM
12. Expansão de células estaminais hematopoiéticas no desenvolvimento: a intersecção fígado fetal-hematopoiese - FCT
13. O efeito benéfico dos fibroblastos na regeneração cardíaca - FCT
14. Implementação de Biomarcadores Moleculares para medicina de precisão com doentes com tumores cerebrais pediátricos - Liga Portuguesa Contra o Cancro
15. Development of NAM-CLASI-FIVH method: a new in vivo tool for an accurate analysis of diversity and spatial organization of gastric microbiota - FCT
16. New Therapeutic Biomarkers in mGC - Industry
17. Novos alvos na insuficiência cardíaca diastólica: das comorbilidades à medicina personalizada - FCT
18. Solve the Unsolved - Rare Diseases - H2020
19. Making Immunotherapy a Reality for Pancreatic Cancer Patients - Astrazeneca
20. ReProgram: Reconstrução do Programa de Células Estaminais do Cancro - FCT
21. 3DChroMe: Solving the 3D Chromatin Structure Of CDH1 Locus To Identify Disease-Associated Mechanisms - FCT
22. GLYCO-LUPUS: Glicanos na autoimunidade. Impacto na patogénese e tratamento do Lupus Eritematoso Sistémico - FCT
23. Mistranslation: a novel trigger of genome instability in Cancer - FCT
24. LIPOPREDICT: Previsão da resposta dos pacientes a fármacos antineoplásicos lipossomais: focando na atividade endocítica do LRP1B - FCT

25. inSTEM .: Identificação de uma nova rede de regulação pós-transcricional em células estaminais intestinais - FCT
26. Terapias Dirigidas à Rede de Comunicação Mediada por Exossomas em Cancro Pancreático - ExoNet - FCT
27. As outras faces da Telomerase: olhando para além da imortalização tumoral - FCT
28. CTEVs .: Vesículas Extracelulares tumorais circulantes para deteção minimamente invasiva de doença residual mínima em doentes com leucemia mielóide aguda - FCT
29. GenSpec .: Determinar o Papel do Microambiente na Modulação do Espectro de Mutações Genéticas Adquiridas Durante o Desenvolvimento de Cancro - FCT
30. GastroCure .: GastroCure - Extratos bioativos de soja e vegetais crucíferos para aplicação em distúrbios gastrointestinais: desenvolvimento, caracterização e libertação - FCT
31. MALIGN .: Metabolitos do Microbioma como novos biomarcadores de cancro gástrico - FCT
32. E-RISK .: Malformações congénitas orofaciais e risco de cancro gástrico: uma questão de adesão entre as células e a matriz extracelular, mediada por Caderina-E - FCT
33. Bloqueio da interação MUC16-mesotelina para inibir a metastização peritoneal do carcinoma do ovário - FCT
34. GLYcanMATRIX .: Compreender a dinâmica dos glicanos das células de cancro e matriz extracelular como nova estratégia de intervenção na progressão tumoral - FCT
35. EPISTASIS .: Do genótipo ao fenótipo: avaliando os efeitos epistáticos entre as mutações e os polimorfismos nas doenças genéticas - FCT
36. CaTCh .: Avaliação pré-clínica de novos compostos químicos para o tratamento do cancro: colmatando necessidades clínicas atuais - FCT
37. Impact of covid-19 on the treatment of cancer patients - FCT
38. Genome wide association study to evaluate human genetic susceptibility to SARS-CoV-2 infection: towards a polygenic risk score - FCT
39. Is thyroid gland a target of SARS-CoV-2 infection? Early identification and follow-up of thyroid dysfunction in COVID-19 patients - FCT
40. Captura de Células Tumorais Circulantes: uma estratégia baseada na interação célula-matriz combinada com glicomarcadores específicos para o cancro - FCT
41. Molecular strategies to be applied in the depuration of commercial bivalves for elimination of toxic compounds - FCT
42. Occult Hepatitis C in Different Clinical Settings: Detection, Characterization and Diagnostic Tools - FCT
43. Biomarkers for minimal residual disease - Celgene
44. CeLac and European consortium for a personalized medicine approach to Gastric Cancer - European Comission
45. MAGICIAM .: MAGICIAM: um sistema imunomodelador de macrófagos para prevenir a invasão e metastização das células tumorais - FCT
46. Spinit-crispr: deteção específica de ácidos nucleicos para diagnóstico point-of-care de doenças tropicais - ANI
47. Glycome as a predictor of IBD development - Departamento de Defesa Americano
48. Human diversity along the Magalhães circum-navegation space: genetics, history and culture - FCT

49. HSP in Pre-Clinical Cancer Models - Pharmis Biofarmacêutica,Lda
50. NeuroCovid project-COVID-19 driven neurological phenotypes - BIAL
51. Metastização Cerebral: o impacto molecular e biomecânico das células tumorais no microambiente cerebral - FCT
52. Helicophage - desenvolvimento de um cocktail de fagos modificados para combater infecções provocadas por Helicobacter pylori e para prevenir o cancro gástrico - FCT
53. Nanopartículas Multifuncionais para Quimiorradioterapia do Glioblastoma - FCT
54. Stroke in translation: Biomarkers for diagnosis and management of acute ischemic stroke - FCT
55. Combate aos cancros metastáticos: o palco é do ruténio. - FCT
56. Soluções computacionais eficientes para análise integrada de DNA-barcoding, metabarcoding e dados associados de sequenciação de alto débito - FCT
57. Bases moleculares para o diagnóstico precoce e tratamento de tumores adrenocorticals na era da medicina personalizada - FCT
58. Glycome as a predictor of Inflammatory Bowel Disease development. - IOIBD
59. Development of a biomimetic multifunctional pré-clinical model to assist immunotherapy optimization. - Astrazeneca
60. Cancer Research on Therapy Resistance: From Basic Mechanisms to Novel Targets - CCDRN
61. Nuclear biomarkers for predictive prognosis of hereditary diffuse gastric cancer. - No Stomach for Cancer, Inc
62. The Porto Comprehensive Cancer Center - CCDRN
63. de migraña crónica y episódica en mujeres - POCTEP
64. Epigenomics of ctDNA allows tailored treatment in pancreatic cancer - SPGastroenterologia
65. Hereditary Breast Ovarian Cancer (HBOC):Optimizing Hereditary Cancer Pathways to save lives ans costs" - EVITA

Articles

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