6. konferenca učiteljev/-ic naravoslovnih predmetov – NAK 2021

IZZIVI AVTENTIČNOSTI V NARAVOSLOVNEM IZOBRAŽEVANJU

Zavod Republike Slovenije za šolstvo
REPUBLIKA SLOVENIJA
MINISTRSTVO ZA IZOBRAŽEVANJE, ZNANOST IN ŠPORT
EVROPSKA UNIJA
EVROPSKI SOCIALNI SKLAD
NALOŽBA V VAŠO PRIHODNOST
Naložbo sofinancirata Republika Slovenija in Evropska unija iz Evropskega socialnega sklada

ZDRAVILA ZA NAPREDNA ZDRAVLJENJA S CELICAMI

MIOMIR KNEŽEVIĆ, ANA HERMAN

EDUCELL d.o.o. podjetje za celično biologijo, Prevale 9, TRZIN

Zavod Republike Slovenije za šolstvo

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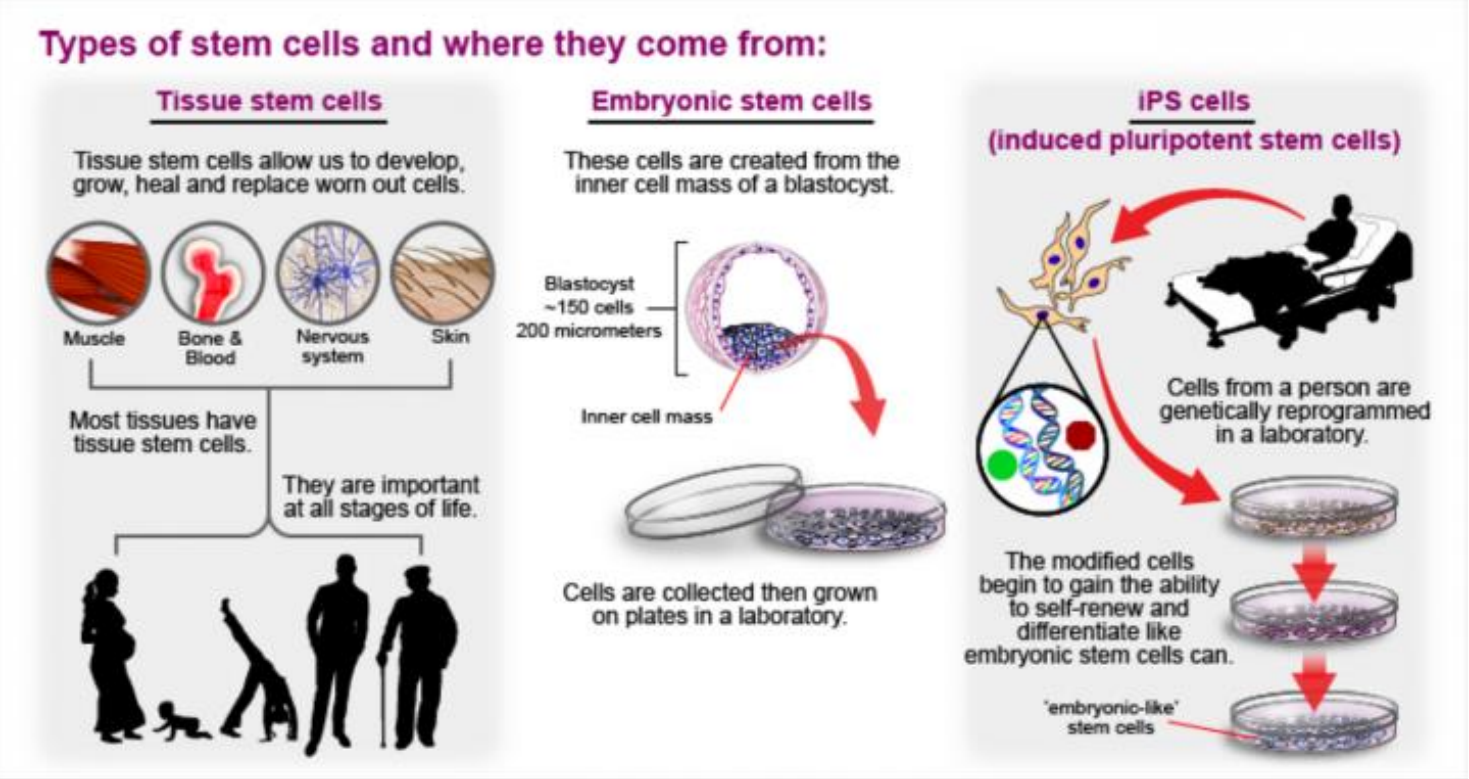
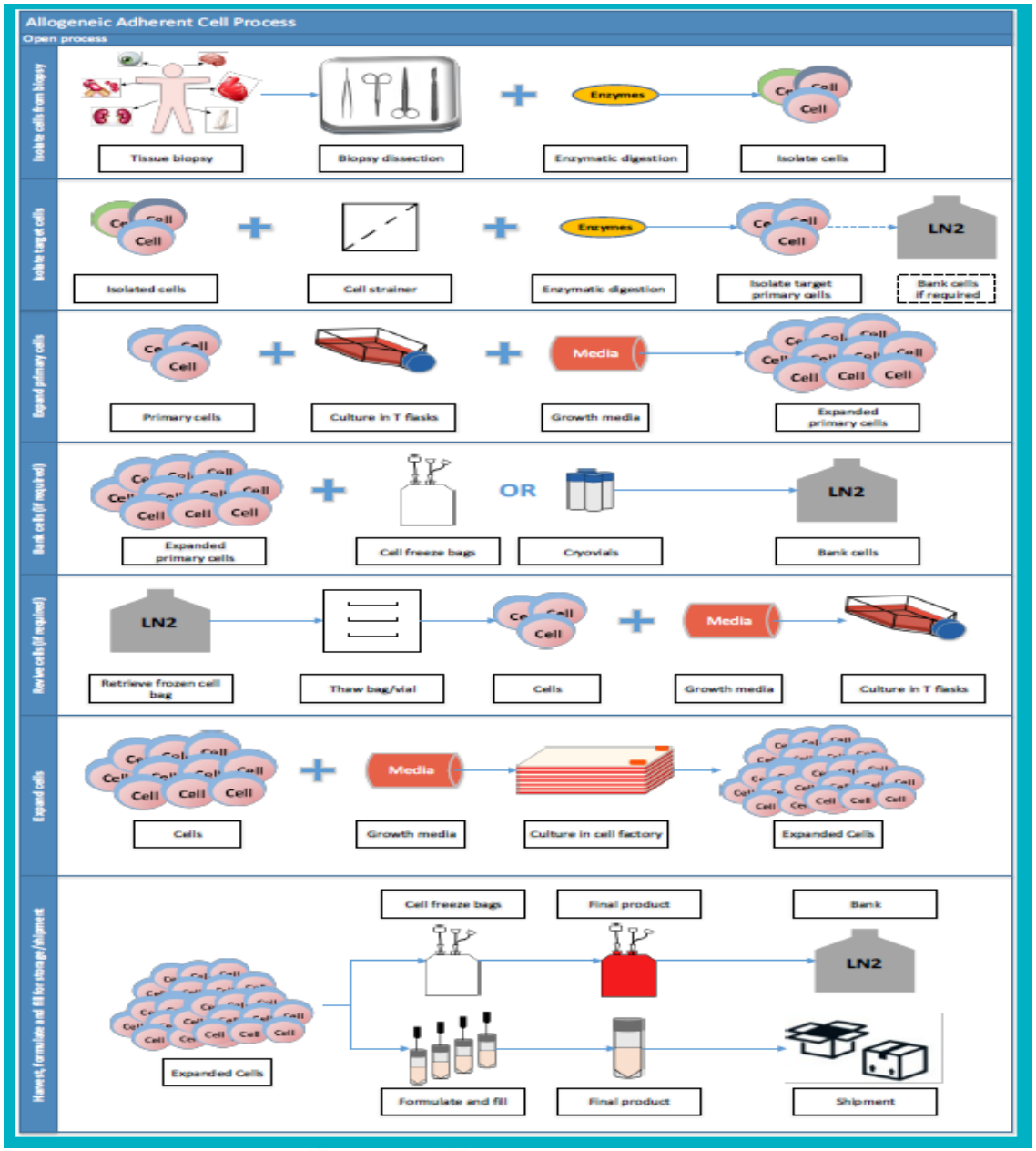
Poznamo več skupin matičnih celic



https://www.ed.ac.uk/regenerative-medicine/about/stem-cells-regenerative-medicine

Ali naj uporabjamo avtologne (lastne) ali alogenske (darovane) celice za terapijo?



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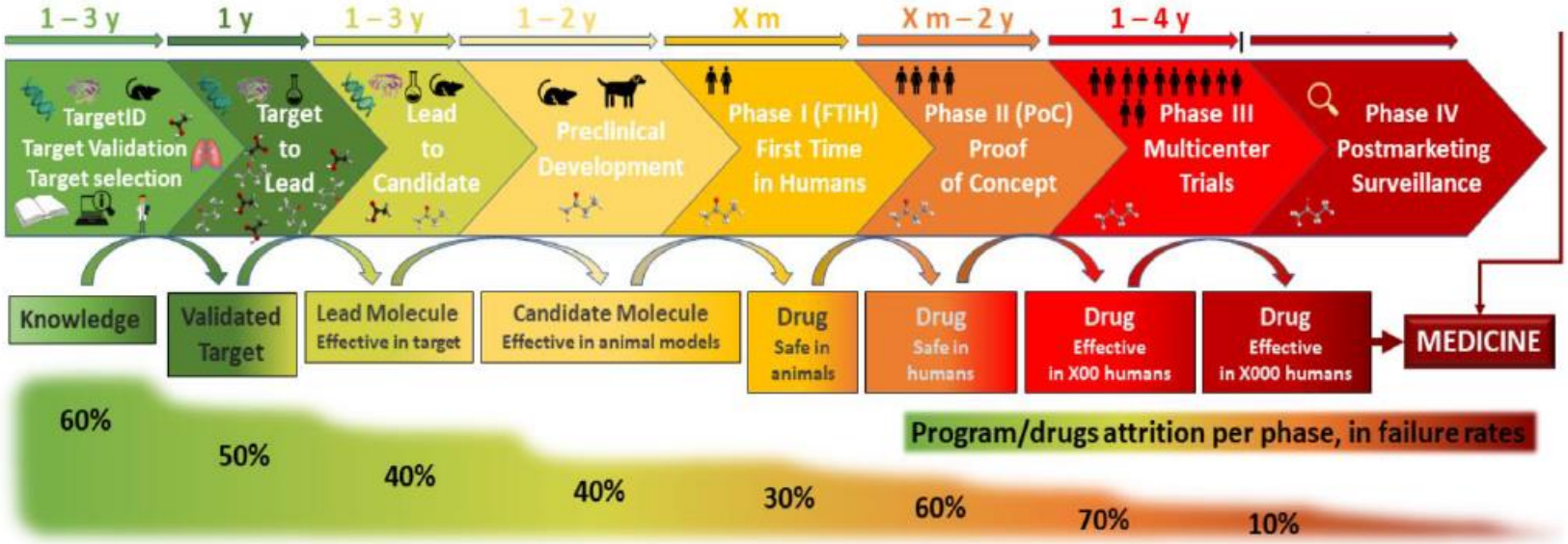
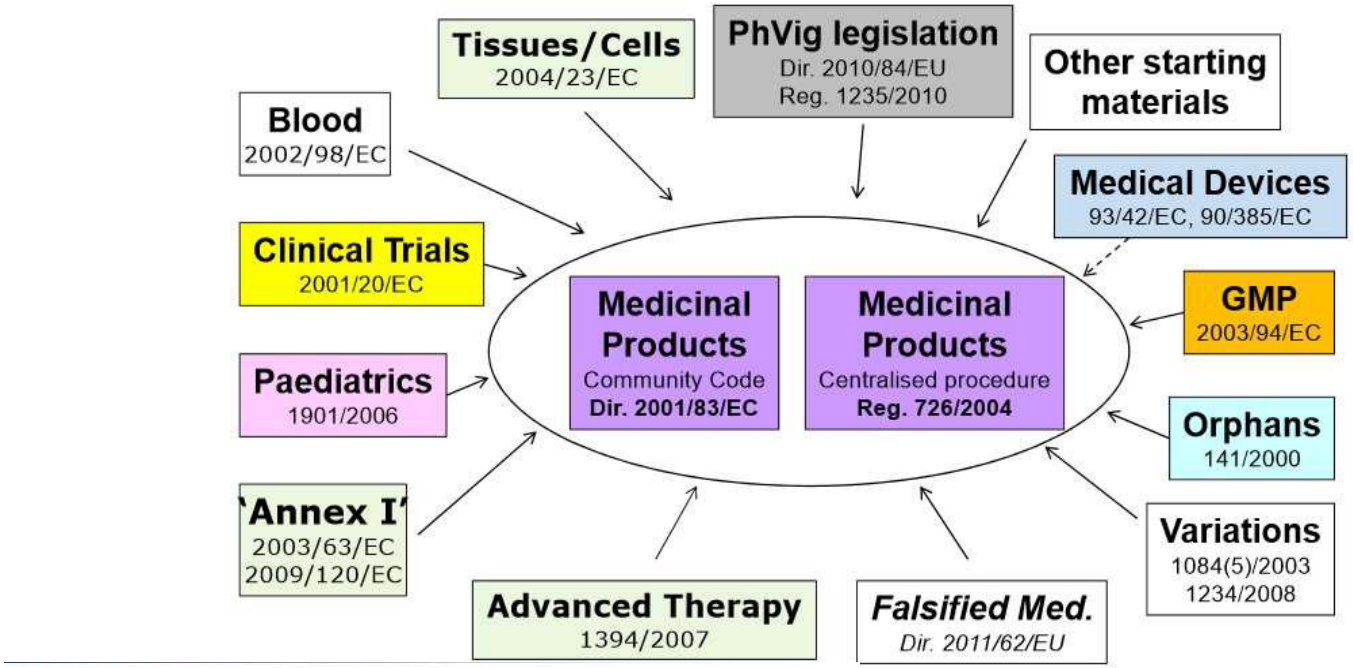
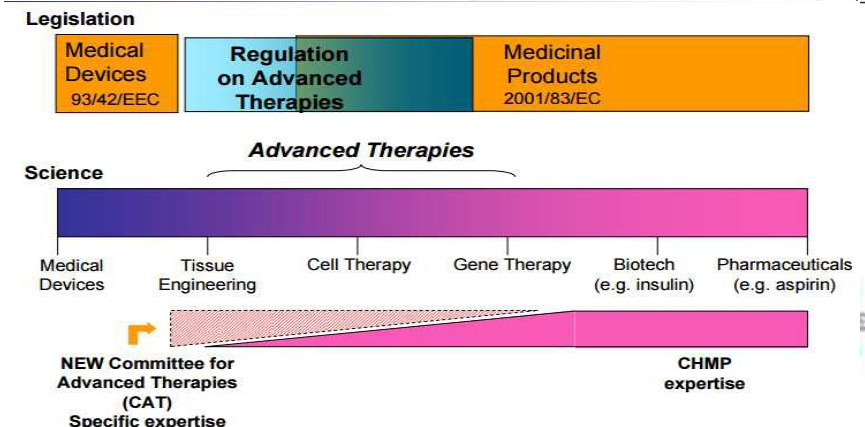
Razvoj novega zdravila je dolgotrajen in drag postopek



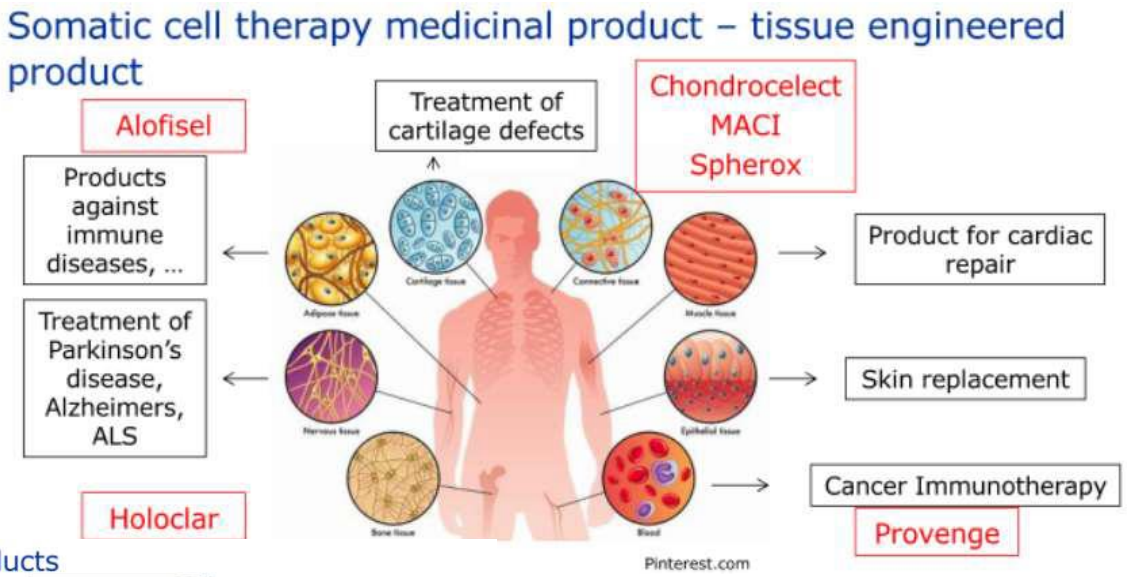
Reference:
https://doctortarget.com/machine-learning-applied-drug-discovery/

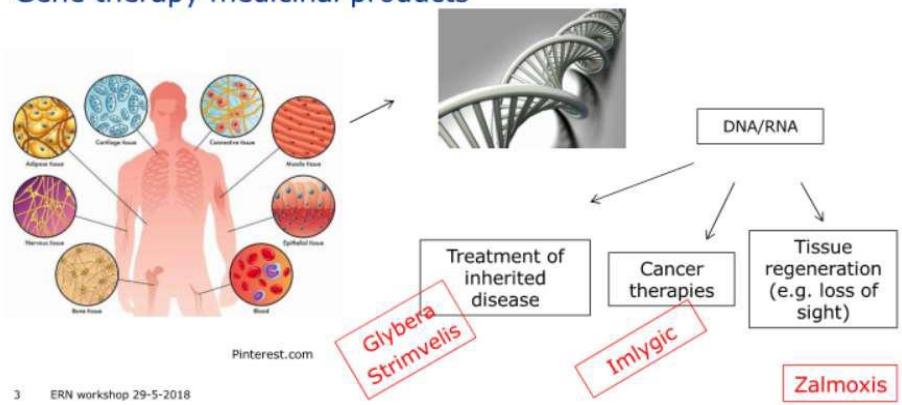
Zdravila za napredna zdravljenja (ATMP) v EU urejajo celične terapije





Hitro narašča število registriranih ATMP v EU, še več jih je v kliničnih raziskavah





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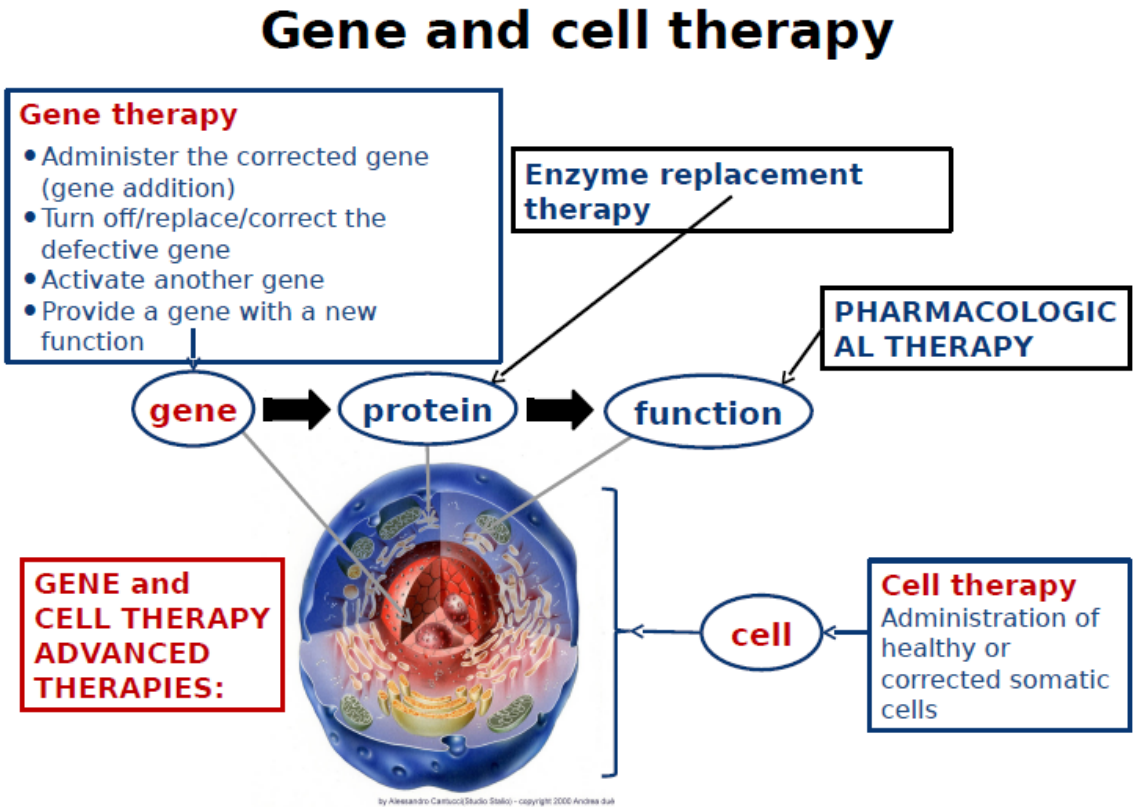
Genske celične terapije (CGT) so že sedanjost



Za CGT potrebujemo virusne vektorje

Gene therapy viral vectors

		Adenovirus	Adeno-associated virus	Alphavirus	Herpesvirus	Retrovirus / Lentivirus	Vaccinia virus
Particle characteristics	Genome	dsDNA	ssDNA	ssRNA (+)	dsDNA	ssRNA (+)	dsDNA
	Capsid	Icosahedral	Icosahedral	Icosahedral	Icosahedral	Icosahedral	Complex
	Coat	Naked	Naked	Enveloped	Enveloped	Enveloped	Enveloped
	Virion polymerase	Negative	Negative	Negative	Negative	Positive	Positive
	Virion diameter	70 - 90 nm	18 - 26 nm	60 - 70 nm	150 - 200nm	80 - 130 nm	170 - 200 X 300 - 450nm
	Genome size	39 - 38 kb	5 kb	12 kb	120 - 200 kb	3 - 9 kb	130 - 280 kb
							
	Family	*Adenoviridae*	*Parvoviridae*	*Togaviridae*	*Herpesviridae*	*Retroviridae*	*Poxviridae*
Gene Therapy Properties	Infection / tropism	Dividing and non-diving cells	Dividing and non-diving cells	Dividing and non-diving cells	Dividing and non-diving cells	Dividing cells*	Dividing and non-diving cells
	Host genome interaction	Non-integrating	Non-integrating*	Non-integrating	Non-integrating	Integrating	Non-integrating
	Transgene expression	Transient	Potential long lasting	Transient	Potential long lasting	Long lasting	Transient
	Packaging capacity	7.5 kb	4.5 kb	7.5 kb	> 30 kb	8 kb	25 kb

*Figure 2. A comparison of different viral vectors in use for gene therapy: overview of their advantages and disadvantages. * Adeno-associated viruses are able to integrate with low frequency into chromosome 19. Lentiviruses also infect non-dividing cells. You can also download the original image in high resolution as jpg or powerpoint file.*

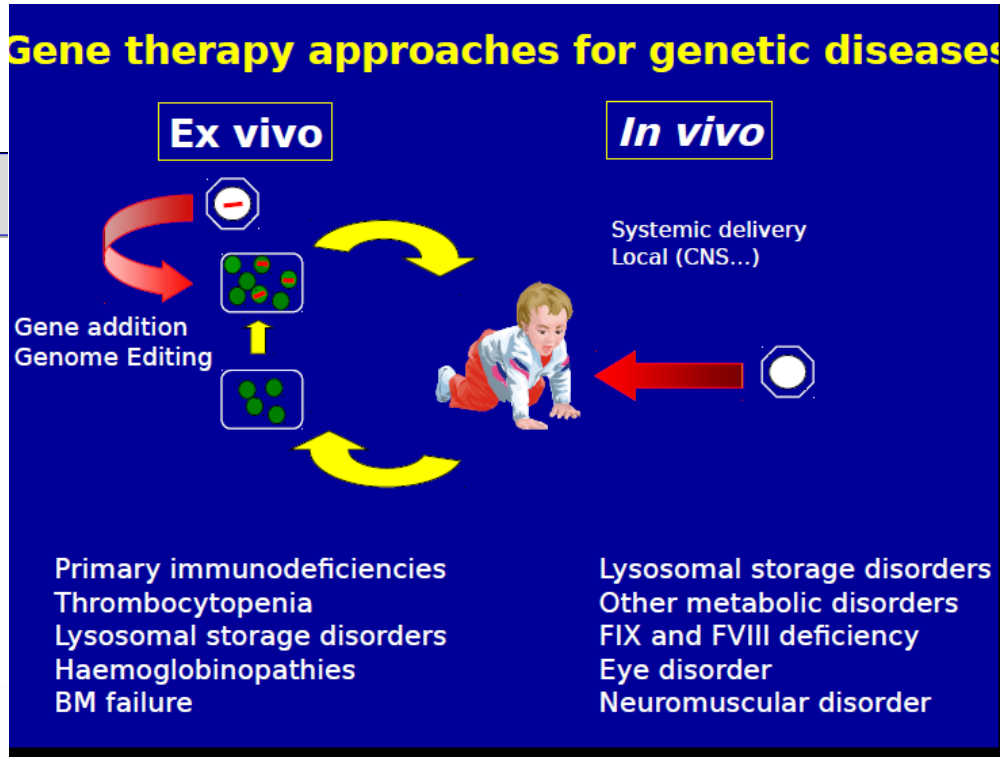
http://www.genetherapynet.com/viral-vectors.html

Več CGT je že registriranih

Gene therapy based drugs authorised in the world

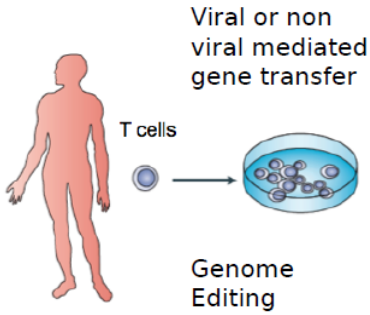
Name	Company	Disease	Current market area	Positive Opinion
Strimvelis	GSK	ADA-SCID	Europe	**2016**
Zalmoxis	MolMed	add-on treatment in pts with cancer who have received a HSC transplant	Europe	**2016**
Kymriha	Novartis	B cell leukemia	USA	**2017**
Yeskarta	KITE	Non Hodgkin Lymphoma	USA	**2017**
Luxturna	Spark Therapeutics	Leber Amaurosis	USA	**2017**

March 2018

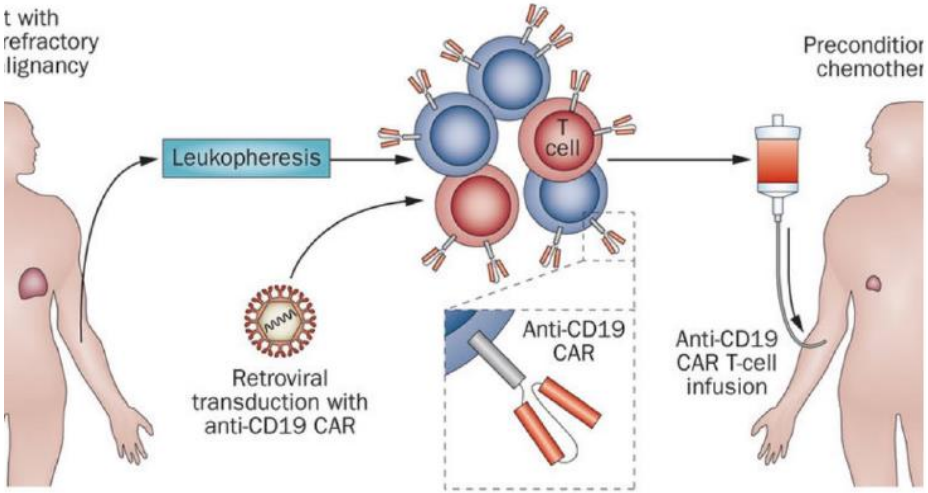


CAR (chimeric antigen receptor) celice so revolucija v onkologiji: T, NK,..

Adoptive T-cell therapy for cancer: The era of genetically engineered cells



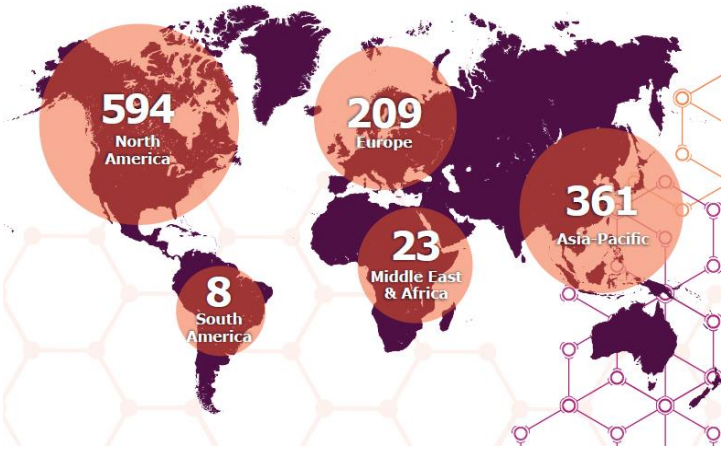
- Increasing the safety profile of T cells (suicide genes)
- Redirecting T cell specificity (CAR & TCR)
- Increasing function and persistence of T cells
- Modifying homing of T cells....



C. Bonini

Na vseh „frontah“ CGT je prišlo leta 2021 do naglega napredka

1,195 Total regenerative medicine and advanced therapy developers worldwide



2021 has already been a year of 'firsts' for the regenerative medicine sector, with major clinical milestones, strong commercial progress, and record breaking investment. And more records may be broken before the year is over.

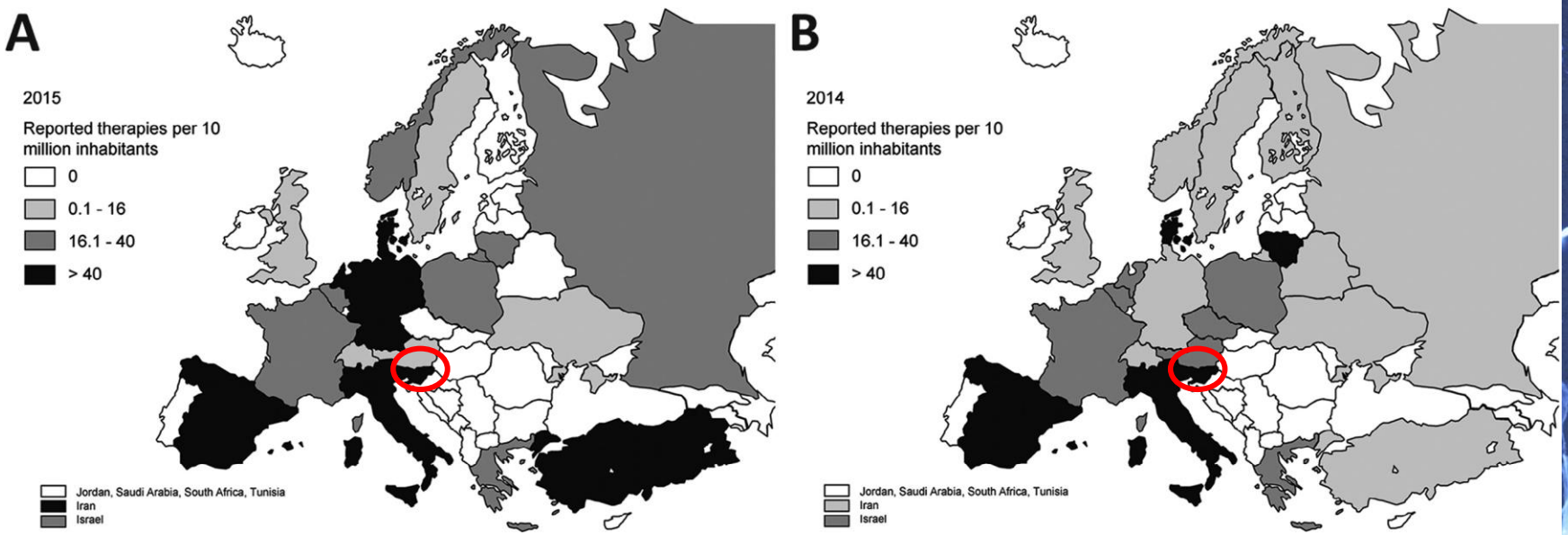
For the first time ever, CRISPR gene-editing technology was deployed *in vivo* in human patients — to treat ATTR amyloidosis — with extremely positive interim Phase 1 results. An *ex vivo* approach has shown compelling early-stage results in sickle cell and beta thalassemia patients.

The sector raised more than $14B in the first half, the strongest half on record and already reaching 71% of the record $19.9B raised in 2020. Twenty companies have issued initial public offerings (IPOs) so far this year, exceeding the record number of IPOs raised in all of 2020.

We are on track to have the highest annual number of regulatory approvals of new gene therapy and gene-modified cell therapy products, with three already approved and an additional four to receive regulatory decisions across the US and Europe in the remainder of 2021. The approvals so far include two CAR-T treatments, one for a new indication (multiple myeloma), and a gene therapy for cerebral adrenoleukodystrophy, a deadly inherited disease. The previous record number of approvals for this product category was 3 in 2017. For all regenerative medicine products, we could exceed the previous record of nine approvals in 2016.

And we're on the cusp of an even larger breakout. There are more than 2,600 trials ongoing worldwide — including 1,320 industry-sponsored trials by nearly 1,200 companies — with 243 of those in Phase 3. The breadth of medical applications spans from rare and devastating diseases like ALS that have few, or no, treatment options, to more prevalent conditions like heart failure. CAR-T therapies, conventionally used as treatments of last resort for certain blood cancers, are comparing favorably to earlier line treatments.

Slovenija ON THE CELL THERAPY MAP



Number of cell therapies/10 million inhabitants -year 2015 (A) in 2014 (B) – the newest report

EBMT associated countries. The highest transplant rates (i.e., >40 per 10 million population) were reported in (in decreasing order) Slovenia, Denmark, Iran, Spain, Italy, Germany, Turkey and the Netherlands in 2015 and in Slovenia, Italy, Iran, Lithuania, Denmark and Spain in 2014.

Slovenia

Ljublijana, Educell d.o.o., A. Barlic, L. Girandon, M. Veber, M. Knezevic, N. Kregar-Velikonja, (29; 3/26), [21; 1/20]

Ljublijana, UMC Ljubljana, Advanced Heart Failure and Transplantation Center, B. Vrtovec, G. Poglajen, M. Sever, G. Zemljic, (34; 0/34), [34; 0/34]

Ljublijana, University Medical Center, Hematology, CIC 640, S. Zver, J. Pretnar, [34; 0/34][33; 0/33]

I. Martin et al., 2017

„We are not made of drugs, we are made of cells.“

Akutni refraktarni GvHD

Do sedaj v 4 letih zdravljenih

9 pacientov (5 pediatričnih, 4 odrasli)

Rezultati primerljivi s tistimi v literaturi

Ni bilo smrti zaradi GvHD

Treatment of Severe Steroid-Refractory Acute-Graft-vs.-Host Disease With Mesenchymal Stem Cells–Single Center Experience

Maja Česen Mazič[1], Lenart Girandon[2], Miomir Kneževič[2], Simona L. Avčin[1] and Janez Jazbec[1]*

[1] Department for Pediatric Hematology and Oncology, University Children Hospital Ljubljana, Ljubljana, Slovenia, [2] Educell Ltd., Ljubljana, Slovenia

Refraktarna Crohnova bolezen

Zdravljenje Crohnove bolezni, refraktarne na kortikosteroide in biološka zdravila

Avtologni MSC, 2 dozi

Zdravljeni 4 pacienti, ni bilo neželjenih reakcij

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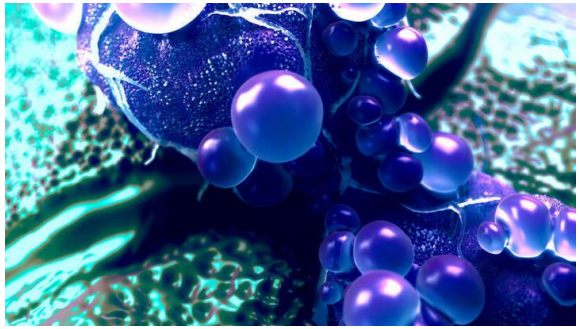
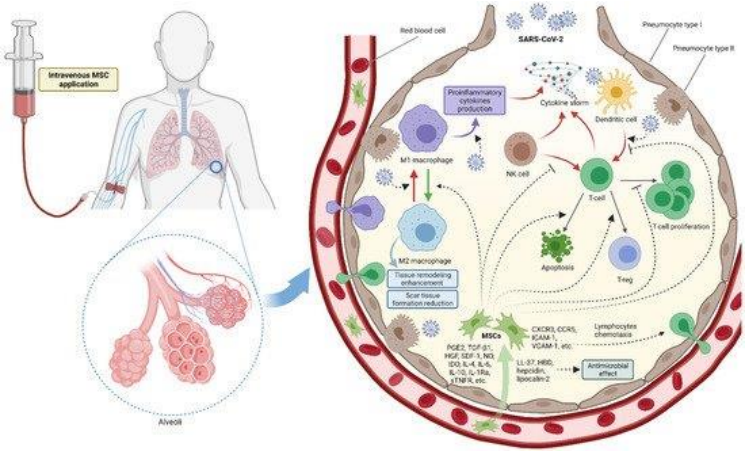
Uspešno sodelujemo pri zdravljenju COVID-19 bolnikov

Uspešna ozdravitev bolnika s COVID-19 z mezenhimskimi matičnimi celicami

31.05.2021, Medicina danes



Skupina hrvaških zdravnikov je v znanstveni reviji CMJ (Croatian Medical Journal) poročala o uspešnem primeru eksperimentalnega zdravljenja bolnika s težko obliko okužbe z virusom SARS-CoV-2 in razvitim akutnim sindromom dihalne stiske (ARDS). S pomočjo raziskovalcev slovenskih biotehnoloških družb Educell in Biobanka so bolniku v kliničnem bolnišničnem centru v Splitu presadili alogene mezenhimske matične celice zdravega donorja.



Že 25 let v Sloveniji uspešno zdravimo ortopedske bolnike, že več kot 500 jih je prejelo celično terapijo

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Najlepša hvala za pozornost!