ყურადღება უნდა მიექცეს, ასევე, ვაქცინაციაზე უარის თქმას ადამიანის ცნობიერების მიერ ტრადიციული მედიცინის მიუღებლობის, მის ეფექტურობაში რწმენის არარსებობის, მკურნალობაში ალტერნატიული, არატრადიციული მედიცინის გამოყენების გამო.

სტატიაში გამოყოფილია ვაქცინაციის პროცესისადმი უნდობლობის მიზეზები: უნდობლობა ვაქცინის მწარმოებლებისადმი, რომლებიც დაინტერესებულნი არიან მოგების მიღებაში; სამედიცინო დაწესებულებებისადმი, რომლებიც ახორციელებენ აცრას და პირობებისადმი, რომელშიც ინახება ვაქცინები; სახელმწიფო ორგანოებისადმი, რომლების ახორციელებენ ვაქცინების შესყიდვას; კორუფციული ფაქტორის არსებობის შესაძლებლობა უფლებამოსილების ბოროტად გამოყენების დროს; ვაქცინაციის გამო დაავადების და გვერდითი ეფექტების განვითრების შიში; ვაქცინაციის შესახებ მონაცემების დამახინჯება მასობრივი ინფორმაციის საშუალებების მიერ.

COVID-19 VACCINATION: CHALLENGES AND OUTCOMES OF GEORGIAN HEALTHCARE SYSTEM

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The 2020 became devastating for global health. The rapid spread of the unknown virus has caused the death of millions of people worldwide and has placed a heavy burden on the health systems and economies of all countries. The struggle against the invisible enemy is still going on today.

The rapid and uncontrolled spread of the Coronavirus has led to an overload of the healthcare system. Various preventive measures have been taken worldwide to stop the spread of the virus. Most of the institutions were closed, and the workflow switched to remote mode; The public gathering was forbidden, and a curfew was imposed; social distancing appeared the best weapon against the virus. Pandemics caused the global crises; by the end of 2020, there were more than 83 million cases, while the death rate was over 1.82 million [7].

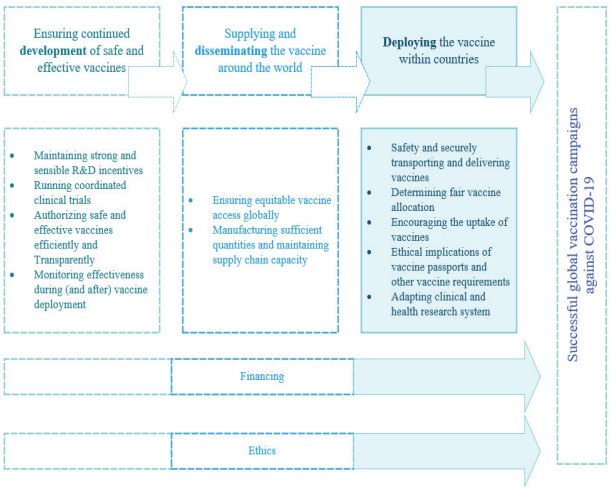
Covid-19 has completely changed people's lives, lockdown and isolating up to 4 billion people worldwide, produced fear and panic in society. Moreover, the stressful environment, along with health problems, provoked psychological problems [14,17,18].

The Coronavirus posed the greatest challenge for humanity as the struggle against Covid-19 became a top priority for all countries. In addition to high rates of morbidity and mortality, Covid-19 also issued unprecedented economic costs. A way out of the current crisis is only possible by achieving herd immunity through vaccination. Scepticism and vaccine rejection threaten the achieved progress made to date in the fight against vaccine-preventable diseases. Achievements of modern science relating to vaccination in emergencies deserve recognition. Decades of work have been done within a year; a leading manufacturer has developed several vaccines with running different trial phases simultaneously. Some of them received approval from regulatory bodies and are used in large quantities.

In countries where the vaccination process began early, the level of effectiveness is perceived. The best example of this is Israel, where restrictions are almost released, and society returned to its normal rhythm of life. In the modern world, despite the progress and innovative achievements in science, superstition and mistrust in science, especially in vaccines, remains an essential problem. Anti-vaccine propaganda and fake data are widely spread through social networks and lead to misinformation.

Scepticism and anti-vaccination attitudes of a particular group of society pose a great threat to the effectiveness of the vaccination process and raise a dangerous barrier to the development of herd immunity [1].

Figure 1 demonstrates a framework for understanding 11 remaining and new policy challenges in implementing successful COVID-19 vaccination campaigns, which is very important for developing countries.



note: Forman et al. [8]

Fig. 1. A framework for understanding 11 remaining and new policy challenges in the implementation of successful COVID-19 vaccination campaigns

Material and methods. This study is based on qualitative and quantitative research methods. Analysis of the scientific literature and regulatory documents is also provided. The purpose of the study was to find out the current situation of the vaccination process in the different countries and Georgia. Thus, the research was carried out on the hypothesis that the vaccination process causes difficulties for developing countries.

Sampling procedures and participants

To obtain information about the vaccination process, a sociological study was conducted. The selected online questionnaire was distributed on social networks and by e-mails (random sampling method). Participation in the study was completely voluntary and anonymous; any personal information was not required other than age and gender. With the introductory part of the questionnaire, the respondents were informed about the aims and content of the research. The survey was conducted in April of 2021; Respondents were Georgian citizens from 18 to 70.

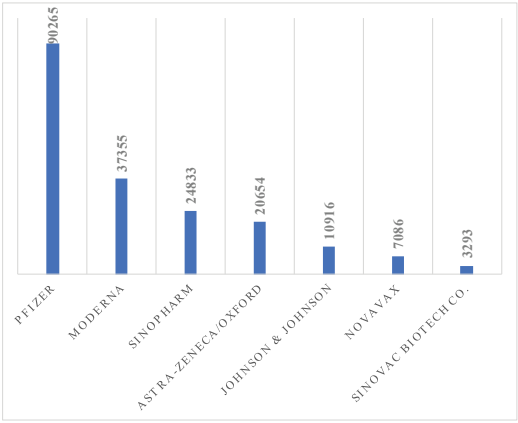
Questionnaire.

The questionnaire was semi-structured, with multiply and open-ended answers, a total of 22 questions, divided into four blocks: 1) General information; 2) Attitudes, Experience and Preference; 3) Awareness and 4) Satisfaction.

The data was collected through Google forms, then processed and exported into IBM SPSS 26 statistical software for analyses. To process the quantitative data, Univariate, Bivariate and Multivariate analysis methodologies were used. All missing quantitative data were excluded from the calculation. All comments, remarks and other outcomes were also analyzed as qualitative data and are presented in the paper.

The Coronavirus has been discovered at the end of 2019 [13]. Because of the rapid spread and severity of disease, on January 30 of 2020, the World Health Organization (WHO) declared a state of an international public health emergency, and on March 11, it declared a pandemic [11,21,22].

The government of Georgia has created a website where citizens can book their place (show their interest), with which vaccine they prefer to be vaccinated. As the results, for now, show, the leader is Pfizer-BioNTech, which is followed by Moderna (Fig. 2). It should be mentioned that while registering, a citizen can choose 3 vaccines, and they will be contacted automatically when the country gets vaccines, and it will be available to get them. According to the data given on CNN health, Georgia is on 129th place among vaccination rates (Table 1).



note: authors according to Ministry of Labor, Health and Social Affairs (date of data collection 28th of May)

Fig. 2. The results of pre-registration on vaccines

Table 1. Comparing vaccination rates

Location	Total doses	Doses administered per 100 people	Days since first dose	Location	Total doses	Doses administered per 100 people	Days since first dose
Mainland China	620,974,000	43	167	**Kuwait**	1,820,000	43	158
United States	293,705,050	88	168	**Ethiopia**	1,798,140	2	79
India	207,088,953	15	135	**Croatia**	1,722,430	42	155
Brazil	66,934,363	31	134	**Bahrain**	1,684,849	99	165
United Kingdom	63,960,762	94	174	**Uzbekistan**	1,642,744	5	60
Germany	49,255,748	59	156	**Bolivia**	1,630,173	14	122
France	35,630,161	53	155	**Lithuania**	1,601,344	59	155
Italy	34,073,292	56	155	**Costa Rica**	1,457,802	29	158
Mexico	29,861,331	23	158	**Bulgaria**	1,348,204	19	155
Turkey	28,802,681	34	138	**Ukraine**	1,141,413	3	96
Russia	28,365,082	19	177	**Slovenia**	1,063,461	51	155
Spain	26,133,689	56	155	**Vietnam**	1,034,867	1	84
Indonesia	25,782,177	9	138	**Panama**	1,001,690	23	131
Canada	23,157,029	61	168	**Zimbabwe**	976,796	7	102
Poland	19,807,955	52	155	**Kenya**	966,433	2	87
Chile	18,411,274	96	158	**South Africa**	898,955	2	103
Morocco	14,050,494	38	123	**Tunisia**	875,808	7	79
Saudi Arabia	13,828,247	40	165	**Angola**	859,979	3	90
United Arab Emirates	12,756,630	129	151	**Ghana**	847,871	3	90
Argentina	11,906,697	26	153	**Cuba**	809,697	7	21
Japan	11,176,328	9	103	**Albania**	759,043	26	140
Israel	10,578,400	122	163	**Laos**	750,783	10	151

Bangladesh	9,939,018	6	113	**Lebanon**	742,365	11	106
Colombia	8,842,360	17	103	**Latvia**	721,987	38	154
Netherlands	8,840,874	52	145	**Belarus**	710,922	8	153
Hungary	8,659,977	90	156	**Estonia**	698,545	53	155
Romania	7,740,297	40	155	**Afghanistan**	593,313	2	97
South Korea	7,542,308	15	94	**Cyprus**	572,426	65	155
Belgium	6,594,867	57	154	**New Zealand**	562,149	12	100
Pakistan	6,130,509	3	118	**Iraq**	549,969	1	65
Portugal	5,608,607	55	155	**Uganda**	541,569	1	82
Greece	5,498,042	53	147	**Ivory Coast**	528,084	2	91
Czech Republic	5,181,141	48	155	**Senegal**	513,332	3	97
Austria	5,044,253	56	155	**Malta**	512,214	116	155
Sweden	4,996,809	49	155	**West Bank + Gaza**	489,698	10	118
Switzerland	4,521,540	52	159	**Bhutan**	482,716	63	65
Philippines	4,495,375	4	91	**Guatemala**	478,753	3	95
Cambodia	4,438,196	27	110	**Maldives**	472,694	87	119
Serbia	4,437,750	65	158	**Moldova**	406,758	10	90
Dominican Republic	4,188,983	39	104	**Rwanda**	400,096	3	106
Australia	4,153,149	16	98	**Mozambique**	393,105	1	84
Singapore	3,728,869	64	152	**Taiwan**	378,277	2	70
Peru	3,694,005	11	111	**Malawi**	352,607	2	81
Thailand	3,548,330	5	92	**Paraguay**	340,338	5	98
Denmark	3,315,062	57	155	**Luxembourg**	340,132	54	154
Iran	3,141,577	4	111	**Venezuela**	316,000	1	102
Kazakhstan	3,140,963	17	119	**North Macedonia**	304,904	15	103
Mongolia	3,027,240	92	97	**Togo**	304,630	4	82
Malaysia	2,999,036	9	96	**Guinea**	302,356	2	152
Myanmar	2,994,900	6	124	**Oman**	296,894	6	155
Finland	2,939,551	53	155	**Sudan**	290,500	< 1	83
Uruguay	2,770,246	80	91	**Iceland**	249,800	73	153
Nepal	2,767,931	10	124	**Guyana**	245,614	31	109
Norway	2,598,403	48	155	**Bosnia–Herzegovina**	232,706	7	108
Slovakia	2,530,482	46	156	**Mauritius**	220,646	17	125
Qatar	2,491,638	86	159	**Equatorial Guinea**	219,677	16	108
Ireland	2,349,207	48	153	**Honduras**	208,843	2	95
Hong Kong	2,328,725	31	94	**Montenegro**	200,228	32	100
Azerbaijan	2,208,074	22	133	**Nicaragua**	167,500	3	90
Ecuador	2,172,656	12	130	**Macao**	166,856	26	111
Egypt	2,128,164	2	127	**Jamaica**	164,703	6	82
Nigeria	1,984,242	< 1	87	**Niger**	159,525	< 1	63
Jordan	1,904,235	19	138	**Curaçao**	151,302	92	
Sri Lanka	1,851,001	9	122	**Georgia**	**151,095**	**4**	**77**
El Salvador	1,832,228	28	103	**Zambia**	146,645	< 1	47

note: authors according to CNN Health, retrieved 31 May

Efforts to vaccinate the poorest countries against Covid-19 have slowed to a trickle, leaving many with weakened defences against the Coronavirus just as the weight of the pandemic shifts from developed to developing nations.

An initiative backed by the World Health Organization and rich countries to supply free vaccines to 92 low- and middle-income countries recently slashed the number of shots it plans to ship by the end of May. That initiative, called Covax, will deliver 145 million doses instead of about 240 million because India, its main supplier, has largely stopped exporting shots as it fights a surge in cases at home [20].

That is widening an already huge vaccination gap between rich and poor countries. While more than 200 million doses have been administered in the U.S., Covax has so far supplied fewer than 41 million of its planned two billion doses by the end of 2021 [20].

The slow uptake of Covid-19 vaccines in developing countries could create problems for the rest of the world. Epidemiologists believe that failure to vaccinate much of the developing world could leave a large reservoir of the Coronavirus circulating, giving it the chance to mutate and possibly spill over to developed countries .

The foundational principles for the equitable allocation framework for the COVID-19 vaccine include ethical and procedural principles embedded in U.S. social institutions and culture [10].

Ethical Principles

Maximum benefit - This principle encompasses the obligation to protect and promote the public's health and socio-economic well-being in the short term and long term. Societal benefit is broadly understood in this context as the public's health and socioeconomic well-being. While societal benefit includes the health and well-being of individuals, the committee recognizes that conflicts may emerge between societal and individual needs and risks that will require resolution. The framework the committee proposes seeks to combine them to the extent possible.

Equal concern - The government's obligation to express equal concern or regard for its residents should both guide and constrain its allocation and distribution of goods, such as vaccines, and burdens, such as delays, in the provision of vaccines. This fundamental obligation requires that every person be considered and treated as having equal dignity, worth, and value.

Mitigation of health inequities - The obligation to mitigate health inequities and their effects have become particularly salient in this pandemic. SARS-CoV-2 infections and COVID-19 illnesses and deaths are strongly associated with race, ethnicity, occupation, and socioeconomic status. A significantly higher burden is experienced by Black, Hispanic or Latinx, American Indian and Alaska Native, and Native Hawaiian and Pacific Islander populations. This disproportionate burden largely reflects the impacts of systemic racism and socioeconomic factors that are associated with increased likelihood of acquiring the infection (e.g., frontline jobs that do not allow social distancing, crowded living conditions, lack of access to personal protective equipment [PPE], inability to work from home) and of having the more severe disease when infected (as a result of a higher prevalence of comorbid conditions or other factors). The social groups at higher risk of COVID-19 also experience disproportionately large burdens of other adverse health conditions.

Procedural Principles

Fairness - The three substantive ethical principles must be interpreted in practical terms when applied in the vaccination program. These decisions about allocation, distribution and access to the vaccine should incorporate input from affected groups, especially those disproportionately affected by the pandemic.

Transparency - The principle of transparency includes the obligation to communicate with the public openly, clearly, accurately, and straightforwardly about the vaccine allocation criteria and framework as they are being developed and deployed. Central to this process is clear articulation and explanation of the allocation criteria. Those explanations must include the principles underlying these criteria, as grounded in widely accepted societal institutions and culture, as well as the procedures for ensuring their faithful implementation.

Evidence-based - Vaccination phases, specifying who receives the vaccine when, should be based on the best available scientific evidence regarding the risk of disease, transmission, and societal impact. The framework must be adaptive, capable of being changed as the understanding of the disease and its risk factors deepens and as vaccines become available, especially if some vaccines prove more useful for particular populations than others. If the criteria used to identify categories of individuals or groups for each phase evolve accordingly, those changes will need to be stated and applied clearly and in keeping with the framework's foundational principles [10].

Covid-19 Vaccines Market Study

Pfizer-BioNTech

The Pfizer-BioNTech COVID-19 vaccine was sent to the FDA for possible Emergency Use Authorization (EUA) on Friday, November 20 and authorized on December 11. It is an mRNA vaccine that codes for the virus's spike protein and is encapsulated in a lipid nanoparticle. Once injected, the cells churn out the spike protein, triggering the body's immune system to recognize the virus. Phase III trials demonstrated 95% efficacy. The Pfizer-BioNTech vaccine requires storage at about degrees -94°F (-70°C), which requires specialized freezers.

Now authorized in the U.S. for adolescents 12 to 15 years of age [3].

Moderna

On November 16, Moderna issued a preliminary data readout of its COVID-19 vaccine, suggesting an efficacy rate of 94.5%; The FDA authorized it on December 19. Like the Pfizer-BioNTech vaccine, it is an mRNA vaccine. However, unlike that vaccine, the Moderna vaccine is stable at degrees 36 to 46 °F (2-8°C), about the temperature of a standard home or medical refrigerator, for up to 30 days and can be stored for up to six months at -4 degrees F.

Moderna reported in May 2021; a Phase II/III trial of 3,732 children ages 12 to 17 in the U.S. demonstrated their vaccine produced an immune response equivalent to earlier findings in adults. Data also suggested the vaccine was 93% effective after one dose at preventing mild COVID-19 cases. It was generally well-tolerated and plans to submit to the FDA in early June for expanded authorization for adolescents.

AstraZeneca-University of Oxford

On November 23, AstraZeneca and the University of Oxford announced high-level results from an interim analysis of their COVID-19 vaccine, AZD1222. The analysis was from the trials in the U.K. and Brazil and demonstrated efficacy of up to 90%. The vaccine was effective at preventing COVID-19, with no hospitalizations or severe cases in people receiving it. There were a total of 131 COVID-19 positive cases in the interim analysis group. One dosing regimen was given at a half dose and demonstrated 90% efficacy, followed by a full dose at least

one month apart. Another dosing regimen demonstrated 62% efficacy when given two full doses at least one month apart. The combined analysis showed average efficacy of 70%. The AstraZeneca vaccine can be stored, transported and handled at normal refrigerated conditions: 36-46 °F (2-8°C) for at least six months and administered within existing healthcare settings.

On March 25, 2021, AstraZeneca released primary analysis that the vaccine demonstrated 76% efficacy against symptomatic COVID-19, 100% efficacy against severe or critical disease and hospitalizations, and 85% efficacy against symptomatic COVID-19 in people 65 years and older.

The AstraZeneca and University of Oxford's vaccine uses technology from an Oxford spinout company, Vaccitech. It deploys a replication-deficient chimpanzee viral vector based on a weakened version of a common cold virus (adenovirus) that causes infections in chimpanzees. It contains the genetic materials of the spike protein. After vaccination, the cells produce the spike protein, stimulating the immune system to attack the SARS-CoV-2 virus.

The COVID-19 vaccine developed by AstraZeneca and the University of Oxford has been linked to blood clots. More than a dozen European countries have halted the distribution of the AstraZeneca-Oxford vaccine as a result. To date, there have been about 222 suspected blood clotting cases in Europe, with more than 30 deaths linked to the AstraZeneca-Oxford vaccine, out of 34 million vaccinations. In these cases, the clots are pulmonary embolism, deep vein thrombosis (DVT) or thrombocytopenia.

In May, due to concerns over blood clots, it was recommended that people under the age of 40 should receive a different vaccine in England. There have been cases of reported venous strokes, but until May 25, there were no reported cases of arterial thrombosis (clots in the arteries). A report of an arterial stroke in the U.K. was published online in the Journal of Neurology Neurosurgery & Psychiatry in late May.

Johnson & Johnson

Johnson & Johnson announced on November 15 that it initiated a second global Phase III trial of its Janssen COVID-19 vaccine. They expect to enroll up to 60,000 volunteers worldwide. Whereas all of the other three vaccine candidates require two doses about 28 days apart, the J&J vaccine only requires a single dose. Interim results from its Phase I/IIa trial demonstrated that a single dose of the vaccine induced a robust immune response and was generally well-tolerated. The ENSEMBLE 2 study evaluated a two-dose regimen as well.

The Phase III ENSEMBLE trial demonstrated that the single-shot vaccine is 66% effective overall in preventing moderate-to-severe COVID-19, 28 days after vaccination. However, it showed 100% efficacy ad preventing severe disease after day 49.

The vaccine uses the company's advanced technology platform, which is used to develop its approved Ebola vaccine and its Zika, RSV and HIV investigational vaccine candidates. It revolves around using an inactivated common cold virus, similar to what the AstraZeneca-University of Oxford program utilizes.

In April 2021, the CDC and FDA recommended a pause on the distribution of the Johnson & Johnson COVID-19 vaccine. Six cases of a "rare and severe" type of blood clot had been identified. The clots observed with the J&J vaccine are cerebral venous sinus thrombosis (CVST) in combination with low levels of blood platelets, called thrombocytopenia. All six of the cases were in women between the ages of 18 and 48 and occurred six to 13 days after receiving the single-dose vaccine. These six cases were extremely rare out of more than seven million doses administered. An FDA advisory committee is expected to make a recommendation on resuming distribution on April 23.

Russia's Sputnik V Vaccine

Around November 11, Russia's National Research Center for Epidemiology and Microbiology, which Russia authorized for use in August - ahead of even beginning a Phase III trial - claimed had an efficacy rate of 92% after the second dose. It was based on a first interim analysis 21 days after the first injection during the ongoing Phase III study. On November 24, the organization claimed 95% efficacy based on new preliminary data. On December 14, 2020, they reported an efficacy of 91.4%. It also offered to share one of its two human adenoviral vectors with AstraZeneca to increase the effectiveness of the AstraZeneca vaccine.

Russia's Gamaleya research institute appears to be focused on potentially marketing their vaccine worldwide. Even the name of the vaccine has emphasized the idea of a race. The organization has indicated that a dose of the vaccine will cost no more than $10, about half the cost of the Pfizer vaccine. The organization has also predicted they could produce 1 billion doses in the next year. Besides Russia, it will potentially be sold in India, Korea, Brazil, China, and Hungary. The Hungarian government is the only European Union country to express interest to date.

On February 2, 2021, The Lancet published Phase III data demonstrating a 91.6% efficacy against the original strain of the virus.

This vaccine, even into late May 2021, remains controversial. It is being distributed in 39 countries and expected to be distributed in 27 more. However, inconsistent clinical trial data has scientists question the analyses, and wondering if it has been manipulated. It was originally authorized in Russia in August 2020 after being tested on only 38 people. The Gamaleya Research Institute published results showing 95% efficacy in The Lancet but did not include raw data. In mid-May, a group of international scientists highlighted concerns over patterns in The Lancet data consistent with data manipulation.

Sinovac Biotech

On January 13, 2021, China-based Sinovac Biotech reported that its COVID-19 vaccine had a 50.38% efficacy in late-stage clinical trials in Brazil. The company's clinical trials are demonstrating dramatically varying efficacy rates. A local trial showed an efficacy rate of 65% in Indonesia, but the trial had only 1,620 participants. Turkey reported an efficacy rate of 91.25% in December 2020. Another trial in Brazil run by a local partner, Butantan Institute, a 78% efficacy rate in mild cases while 100% against severe and moderate infections. It is an inactivated vaccine that uses inactivated SARS-CoV-2 viruses.

In May 2021, WHO requested more data from the company regarding the safety of the shot and its manufacturing process. They want to determine if it is compliant with WHO standards and expect to decide in June.

Novavax

On January 28, 2021, Novavax announced that its COVID-19 vaccine, NVX-CoV2373, hit the primary endpoint with a vaccine efficacy of 89.3% in its Phase III trial in the U.K. The vaccine is a protein-based COVID-19 vaccine candidate. It also has data from the South Africa Phase IIb trial and several Phase I, II and III trials. It has demonstrated high clinical efficacy against the U.K. and South Africa variants as well.

The vaccine contains a full-length, prefusion spike protein made using the company's recombinant nanoparticle technology and its proprietary saponin-based Matrix-M adjuvant. It is stable at 2 to 8 °C and shipped in a ready-to-use liquid formulation.

Table 2. Characteristics of Covid-19 vaccines

Pfizer Type: mRNA Doses: 2, 21 Days Apart EUA Date: December 11, 2020 Price: $19.50 per dose for the first 100 million doses Efficacy: About 95%. Apparently 100% at preventing hospitalization and death.	**Moderna** Type: mRNA Doses: 2, 28 Days Apart EUA Date: December 18, 2020 Price: $25-$37 per dose Efficacy: About 95%. Apparently 100% at preventing hospitalization and death. Variants: Lab data suggest “quite effective” against the U.K. variant as well as the South African and Latin American variants.
AstraZeneca-University of Oxford Type: Adenovirus-based Doses: 2, 28 Days Apart Likely EUA Date: Authorized in Europe on January 12, 2021, and other countries, but unlikely in the U.S. until spring Price: $2.15 (U.S.) in the E.U.; $3-4 (U.S.) in the U.K. and U.S.; $5.25 (U.S.) in South Africa Efficacy: Currently, about 70%	**Johnson & Johnson** Type: Adenovirus-based Doses: 1 Authorized Price: $10 per dose Efficacy: In J&J’s global clinical trial, it demonstrated 66% efficacy at preventing symptomatic COVID-19 infections. In the U.S., it was slightly higher, 72%. It appears to be 100% effective at preventing hospitalizations and death. Variants: Based on clinical studies in Africa, UK and Latin America, there is evidence the vaccine is effective against the variants, although less so against the South African and Latin American strains.
Russia’s Sputnik V Vaccine Type: Adenovirus-based Doses: 2 Likely EUA Date: Not applicable in the U.S. Price: $10 per dose Efficacy: 91.4% Variants: Unknown. Clinical trial data was largely conducted in Russia prior to the emergence of major variants.	Sinovac Biotech Type: Inactivated SARS-CoV-2 virus Doses: 2 Likely EUA Date: Not applicable in the U.S. Price: $60 per dose in China ($29.75 per dose) Efficacy: 50.38% to 91.25%, depending on the clinical trial Variants: Unknown, although a study in Brazil demonstrated 50.4% efficacy at preventing symptomatic infections.
Novavax Type: Protein-based vaccine Doses: 2 Likely EUA Date: Possibly in March or February 2021 in the U.K.; possibly Q1 2021 or later in the U.S. The most recent suggestion for EUA in the U.S. was May 2021. Price: $16 in the U.S. Efficacy: 89.3% Variants: Effective against U.K. and South African	CanSino Biologics Type: Viral vector, loading an antigen from the SARS-CoV-2 virus onto an adenovirus. Doses: 1 Price: Unknown Likely EUA Date: Not applicable in the U.S. Efficacy: 65.7% at preventing symptomatic cases. 90.98% efficacy in preventing severe disease. Variants: Unknown

note. Authors, according to Biospace

Table 3. Vaccination process in Georgia

Date – 29 May 2021	Total	% Of population
At least one dose	134 602	3.60%
Fully vaccinated	24 607	0.70%

Note: authors according to the data collected from Our World in Data, 29th of May

Research Findings. The research showed out that the vaccination process appears to be successful in well-developed countries. It should be explained by the fact that they have easier access to vaccines, and people have much more information about it. As shown in Figure 3, Israel appears to be the leader among the countries, and according to the data collected from “Our World in Data”, from the 29th of May, they have already vaccinated 62.96% people of their population. According to Table 3, there is vaccinated only 0.70% of the Georgian population at the present time, which is not a really satisfying number.

The Georgian government bought the first doses of vaccines (AstraZeneca, PfizerBioNTech) through the Covax platform, which helps countries access vaccines. The rest doses (Sinopharm) Georgia bought from the Chinese government. Besides this, the Chinese government gifted extra 100 000 doses of Sinovac to Georgia (Table 4).

In order to study the current situation in Georgia, there has been done the research. A total of 151 respondents participated in the study, of which 147 forms were valid for analyses.

General Information

The respondents were divided into four age groups. The majority of respondents identified themselves as females (78,2%), Table 5, and 43.5% are healthcare workers, Table 6.

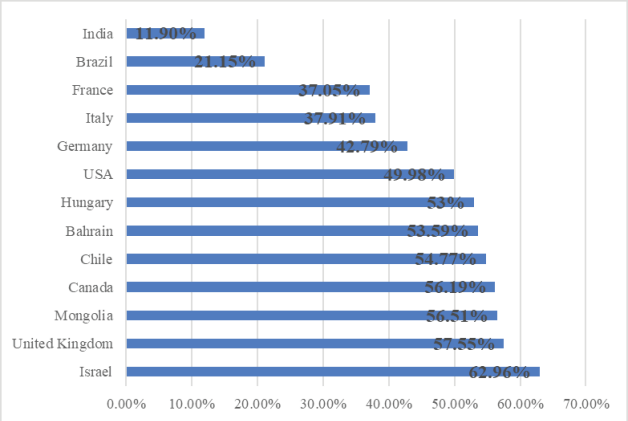


Fig. 3. Share of people who received at least one dose of Covid19 vaccine
note: authors according to the data collected from Our World in Data, 29th of May

Table 4. Vaccines received in Georgia

	Vaccine	Doses received	Received date
1	**AstraZeneca/Oxford**	43 200	13.03.2021
2	**Pfizer-BioNTech**	29 250	25.03.2021
3	**Sinopharm**	100 000	03.04.2021
4	**Sinovac**	100 000	30.04.2021
5	**AstraZeneca**	43 000	06.05.2021

note: authors according to the data collected from Georgian government websites

Table 5. Age and Gender

Statements	18-34 N (%)	35-50 N (%)	51-64 N (%)	65 > N (%)	Standard deviation
Age	91 (61.9)	42 (28.6)	13 (8.8)	1 (0.7)	0.686

Statements	Female N (%)	Male N (%)	Standard deviation
Gender	115 (78.2)	32 (21.8)	0.414

Table 6. Occupation

Statements	Yes N (%)	No N (%)	Standard deviation
Healthcare worker	64 (43.5)	83 (56.5)	0.498

Attitudes towards vaccination, Experience and Preference. The majority of the respondents (84.4%) believe that vaccination keeps them safe from infectious disease and strengthens the immune system and 67.3% of respondents believes that "vaccination is safe, effective and necessary". Besides this, it should be mentioned that the mistrust rate is high among respondents: 34.0% of them has refused a vaccine because of distrust of it, and 87.8% knows someone who has refused to be vaccinated because of mistrust of the vaccine, Table 7.

Despite low trust in vaccines, 70.1% agrees that refusing vaccination poses a threat to themselves, their families and the community, and 78.2% states that universal vaccination will improve the epidemiological situation in the country, Table 7.

Respondents were asked about planned prophylactic and influenza vaccination, where 90.5% of them have vaccinated status of prophylactic vaccines when only 40.1% of respondents have been vaccinated against influenza, Table 7.

A little more than half of the respondents (51.0) have not had Coronavirus yet, 32,7% of them were already infected, and 16,3% do not know their status, Table 7.

The majority of the respondents (89.8) have not had the Covid-19 vaccine; only 10.2% of respondents state that they already received at least one dose of the vaccine, Table 7. Among those who have not been vaccinated against covid-19, 42.2% are intended to get the vaccine, 38.8% have not decided yet, 7.5% are categorically against being vaccinated, and only 1,4 are waiting their turn, Table 8.

Table 7. Attitude and experience

Statements	Responses				
	Yes N (%)	No N (%)	I don't know N (%)	N/A	Standard deviation
Do you believe that vaccination keeps you have safe from disease and strengthens your immune system?	124 (84.4)	23 (15.6)	-	-	0.365
Do you think vaccination is safe, effective and necessary?	99 (67.3)	48 (32.7)	-	-	0.471
Have you had planned prophylactic vaccinations?	133 (90.5)	12 (8.2)	2 (1.4)	-	0.354
Have you ever been vaccinated against influenza?	59 (40.1)	88 (59.9)	-	-	0.492
Have you ever refused a vaccine because of distrust of it?	50 (34.0)	96 (65.3)	-	1 (0.7)	0.476
Do you know anybody who has refused to be vaccinated because of mistrust of the vaccine?	129 (87.8)	18 (12.2)	-	-	0.329
Do you think that refusing vaccination poses a threat to yourself, your family or community?	103 (70.1)	42 (28.6)	-	2 (1.4)	0.455
Do you think that universal vaccination will improve the epidemiological situation in the country?	115 (78.2)	31 (21.1)	-	1 (0.7)	0.410
Have you already had Coronavirus?	48 (32.7)	75 (51.0)	24 (16.3)	-	0.693
Have you had a vaccination against Covid-19 (minimum 1 dose)?	15 (10.2)	132 (89.8)	-	-	0.304

Table 8. Intention

Statements	Responses						
	Yes, I will get it N (%)	I have not decided yet N (%)	I am not going to get it N (%)	I have already done N (%)	I have registered and waiting for my turn N (%)	N/A N (%)	Standard deviation
If you have not been vaccinated yet, are you going to get the Covid-19 vaccine?	62 42.2)	57 (38.8)	11 (7.5)	14 (9.5)	2 (1.4)	1 (0.7)	1.0

Table 9. Chinese vaccine

Statements	Responses					
	Yes, sure N (%)	No, never N (%)	I have not decided yet N (%)	I am not going to get the vaccine at all N (%)	N/A N (%)	Standard deviation
If there is no other alternative, will you do the Chinese vaccine?	17 (11.6)	49 (33.3)	68 (46.3)	11 (7.5)	2 (1.4)	0.8

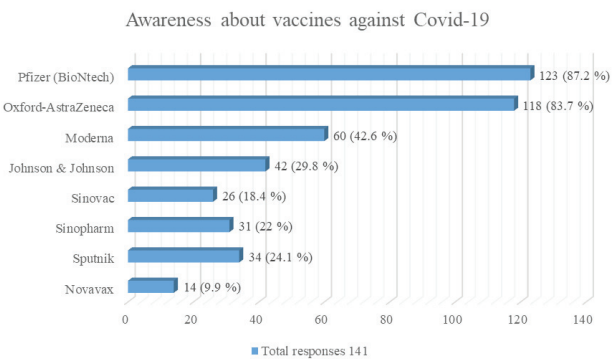


Fig. 4. Awareness about vaccines

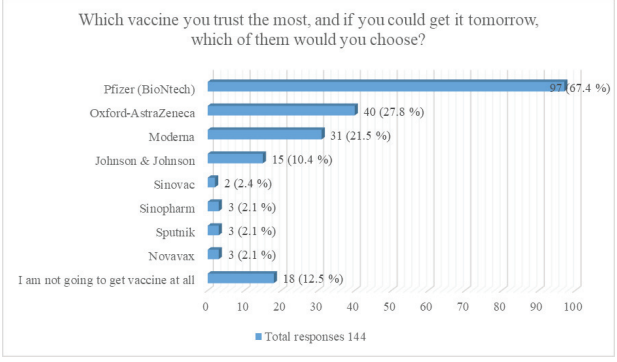


Fig. 5. Preference

The opinion and preference towards vaccines are different: the majority of respondents prefer vaccines made in western countries, Fig 5. As for Chinese-made vaccines, on the question "If there is no other alternative, will you do the Chinese vaccine?", 11.6% of respondents state that they will definitely do it, 46.3 %, 33.3% never, 46.3% have not decided yet and 7.5% state that they are not going to get the vaccine at all Table 9.

Awareness.

44.2% of respondents are aware and have information about the coronavirus vaccine, 49.0% have a common view, and 5.4% of them do not have any information, 1.4% did not respond, Table 10. The range of information about vaccines and their characteristics is different (Fig. 4).

Internet is the main source of information for the majority of the respondents (73.5%), T.V. is preferred by 14.3%, 5.4% receives information from "friends, relatives and acquaintances", and the other (6.1%) use all source of information, Table 11.

When exploring internet information, 40.8% of respondents find it difficult to distinguish between real and fake information; for 58.5 %, it is not hard, Table 12.

Satisfaction.

36.1% of respondents positively assess the work of the government and the healthcare system in terms of combating the pandemic, 38.8% are neutral (neither positive nor negative), 24.5% assess it negatively, and 1 (0.7%) respondent did not answer on the question Table 13.

What refers to the assessment of vaccination process, negative outcomes have 34.0% of surveyed respondents, 20.4% of them assess it positively, and the majority of them (44.2%) have a neutral position, 1.4% do did not respond, Table 13.

Results of qualitative data analyses

After analyzing the collected qualitative data, respondents were divided into four target groups: 1) Fear and low trust, 2) Allergies and other medical conditions; Table 14

Table 10. Awareness

Statements	Responses				
	Yes N (%)	No N (%)	I have a common view N (%)	N/A N (%)	Standard deviation
Do you have information about coronavirus vaccines?	65 (44.2)	8 (5.4)	72 (49.0)	2 (1.4)	0.974

Table 11. Source of information

Statements	Responses					
	Television N (%)	Internet N (%)	Friends, Relatives, Acquittances N (%)	All sources N (%)	N/A	Standard deviation
What is the main source of information for you?	21 (14.3)	108 (73.5)	8 (5.4)	9 (6.1)	1 (0.7)	0.741

Table 12. Type of information

Statement	Responses			
	Yes N (%)	No N (%)	N/A	Standard deviation
When searching for information on the Internet, do you find it difficult to distinguish between real and fake information?	60 (40.8)	86 (58.5)	1 (0.7)	0.494

Table 13. Satisfaction

Statements	Responses						
	Extremally negative N (%)	Negative N (%)	Neither Negative, nor Positive N (%)	Positive N (%)	Extremally Positive N (%)	N/A N (%)	Standard deviation
How would you assess the work of the country's healthcare system in terms of fighting the pandemic?	12 (8.2)	24 (16.3)	57 (38.8)	42 (28.6)	11 (7.5)	1 (0.7)	1.038
How would you assess the vaccination process in Georgia?	15 (10.2)	35 (23.8)	65 (44.2)	24 (16.3)	6 (4.1)	2 (1.4)	0.976

Table 14. Target groups of the population

Fear and low trust	The majority of the respondents have low trust in vaccines against covid-19. The main reason for mistrust and scepticism is that the vaccines are new developed, are not fully tested, and long-term outcomes are not recognized. Some respondents find it difficult to believe that vaccines developed within a short period of time as a crisis's response activity would be effective. Besides this, there are a variety of myths about modern DNA and RNA-based vaccines. The fear of injection and allergic reactions are also an actual dilemma for respondents.
Allergies and other medical conditions	Respondents are afraid to get the vaccine because of their allergy, Breastfeeding or other medical conditions; besides this, they cannot get proper and corresponding information from healthcare workers about their medical condition and vaccination.
Limited choice of vaccines	A limited number of desired vaccines and not being the target group to get the vaccine decreased motivation among respondents. Even though there were changes regarding vaccination politics and broadening target groups, a barrier still exists - there is no vaccine for the people who have the desire to get it.
Misinformation	According to the qualitative data, respondents have trouble getting proper information concerning vaccines and their effectiveness. There is no data on the Georgian language, and existing ones are not trustworthy; fake sources are widespread, leading to misinformation. In addition, government websites are complicated referring to information access.

note: authors, according to the research

The research outlined the following recommendations:
- More active and multilateral steps from the government;
- Proper mobilization of financial resources;
- Provide a sufficient quantity and variety of vaccines by envisaging the desire of citizens;
- Retraining of healthcare workers;
- Active and targeted social campaigns about the vaccination process;
- Ensuring access to information;
- Highlight the benefits of vaccination;
- Encourage vaccinated people with various activities;
- Analyze benefits and harms to small groups of people.
- Open more vaccination points.

Conclusion. The findings of the study indicate that the vaccination process as well informational campaign in Georgia really was not effective, and that's why it has vaccinated a low percent of the population.

The quantitative research proved and supported the hypothesis that the vaccination process is facing difficulties in developing countries because of less availability of the desirable vaccine, government activity, not aggressive social campaign. All these factors play an important role in beating the pandemic, but comparing to Israel, which is the leader of vaccinated countries, it can be said that active government steps in getting vaccine also plays an important role.

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SUMMARY

COVID-19 VACCINATION: CHALLENGES AND OUTCOMES OF GEORGIAN HEALTHCARE SYSTEM

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Covid-19 appeared to be the main problem for the whole world; the only way to beat the pandemics is a vaccination, which appeared the challenge for the countries and pharmaceutical companies. The paper aims to study the current situation of the vaccination process in the different countries and Georgia. The paper outlines the challenges of the vaccination process in the whole world and Georgia. The article uses both qualitative and quantitative research methodologies. Analysis of the scientific literature and regulatory documents is also provided. To obtain information about the vaccination process in Georgia, a sociological study was conducted. Study participants were Georgian citizens. The online questionnaire link was sent via social networks and by e-mail. Collected data in Google forms were cleaned and exported to IBM SPSS 26 statistical software for analysis. The research clarified the hypothesis that the vaccination process would be difficult for developing countries, and the vaccination process has problems in two main factors: 1. Limit of vaccines, and 2. People's willingness to be vaccinated, thus the government has to work on these two directions. Georgia, as a developing country, still faces problems. As the research showed that, if the vaccination campaign is not more active, it will be challenging to get positive results.

Keywords: vaccination, Covid-19, pandemics.

РЕЗЮМЕ

ВАКЦИНАЦИЯ ПРОТИВ COVID-19: ПРОБЛЕМЫ И ТРУДНОСТИ ГРУЗИНСКОЙ СИСТЕМЫ ЗДРАВООХРАНЕНИЯ

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Пандемия коронавируса вызвала глобальные проблемы по всему миру и оказала значительное влияние практически на все сферы. Вакцинация - единственный способ справиться с пандемией, которая стала серьезной проблемой для стран всего мира и фармацевтических компаний. В связи с актуальностью вопроса, целью статьи явилось изучить текущее состояние процесса вакцинации в разных странах и в Грузии. В процессе исследования использованы как качественные, так и количественные методы исследования. В статье рассматриваются проблемы, связанные с процессом вакцинации на примере разных стран, научных трудов, исследований и статистики. Предоставлен анализ научной литературы и нормативных документов. Для получения информации о процессе вакцинации в Грузии проведен социологический опрос. Участниками исследования были граждане Грузии (метод случайной выборки). Для анализа данных использовано статистическое программное обеспечение IBM SPSS v26. Социологическое исследование не позволяет обобщить население в целом, однако четко показывает недостатки в системе здравоохранения и отвечает на главный вопрос исследования о том, что процесс вакцинации неэффективен в развивающихся странах из-за двух основных факторов: 1) ограниченное количество вакцин и 2) общественная готовность пройти вакцинацию. Грузия, как развивающаяся страна, сталкивается с аналогичными проблемами. Без активной кампании по информированию общественности о вакцинации процесс эффективной вакцинации и достижения желаемого результата затруднен.

რეზიუმე

კოვიდ-19-ის საწინააღმდეგო ვაქცინაცია: საქართველოს ჯანდაცვის სისტემის გამოწვევები და სირთულეები

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გრიგოლ რობაქიძის სახ. უნივერსიტეტი, თბილისი, საქართველო

კორონავირუსის პანდემიამ გლობალური პრობლემები გამოიწვია მსოფლიოში და მნიშვნელოვანი გავლენა იქონია თითქმის ყველა სფეროზე. პანდემიის დაძლევის ერთადერთი გზად ვაქცინაცია ისახება,რაც მნიშვნელოვან გამოწვევად იქცა მსოფლიო ქვეყნებისა და ფარმაცევტული კომპანიებისთვის. საკითხის აქტუალობიდან გამომდინარე, კვლევის მიზანია ვაქცინაციის პროცესის არსებული მდგომარეობის შესწავლა სხვადასხვა ქვეყანაში და საქართველოში. კვლევის პროცესში გამოყენებულია როგორც თვისობრივი, ისე რაოდენობრივი კვლევის მეთოდები. სტატიაში განხილულია ვაქცინაციის პროცესთან დაკავშირებული გამოწვევები სხვადასხვა ქვეყნის მაგალითზე, სამეცნიერო ნაშრომები, კვლევები და სტატისტიკური მონაცემები. მოცემულია სამეცნიერო ლიტერატურისა და მარეგულირებელი დოკუმენტების ანალიზი. საქართველოში კოვიდ-19-ის საწინააღმდეგო ვაქცინის/ვაქცინაციის პროცესის მიმართ საზოგადოების ნდობისა და მზაობის შესახებ ინფორმაციის მისაღებად ჩატარდა სოციოლოგიური გამოკითხვა. კვლევის მონაწილეები იყვნენ საქართველოს მოქალაქეები (შემთხვევითი შერჩევის მეთოდი). მონაცემთა ანალიზისთვის გამოყენებულია IBM SPSS v.26 Statistical software. ჩატარებული სოციოლოგიური კვლევა არ იძლევა გენერალურ ერთობლიობაზე განზოგადების საშუალებას, თუმცა ნათლად წარმოაჩენს ჯანდაცვის სისტემაში არსებულ

ხარვეზებს და პასუხობს კვლევის მთავარ შეკითხვას, რომ განვითარებად ქვეყნებში ვაქცინაციის პროცესი ეფექტურად არ მიმდინარეობს, რაც გამოწვეულია ორი მთავარი ფაქტორით: 1) ვაქცინების მარაგი, 2) საზოგადოების მზაობა და ვაქცინაციის სურვილი. საქართველო, როგორც განვითარებადი ქვეყანა, ანალოგიური გამოწვევის წინაშეა, ვაქცინაციასთან დაკავშირებით საზოგადოების ცნობიერების ამაღლების აქტიური კამპანიის გარეშე ეფექტური ვაქცინაციის პროცესი და სასურველი შედეგის მიღწევა რთული იქნება.

MICROENVIRONMENT ALTERATIONS IN CONJUNCTIVAL NEOPLASTIC LEOSIONS WITH DIFFERENT PROLIFERATION-APOPTOTIC CHARACTERISTICS

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Recent research shows the important role of tumor immune microenvironment in the formation and progression of different types of cancers [1]. Tumor immune microenvironment is mainly composed of different types of infiltrating T lymphocytes, including CD8+ cytotoxic T cells. In addition, there is the substantial number of Foxp3+ regulatory T cells in the tumor microenvironment [2]. Recently, it has been noted that not only tumor infiltrating lymphocytes (TILs) [3], but also tumor associated neutrophils (TANs) [4], may play an important role in the progression of different malignant tumors. Some studies also indicate that the distribution of TILs and TANs might be associated with the molecular characteristics of different tumors [5]. Many studies have also shown that not only the presence or the absence of TILs and neutrophils in immune tumor microenvironment affect the development and prognosis of solid tumors, but also their specific distribution in the tumor, including for example tumor bead, tumor margin or tumor associated stroma is also important [6]. International immune-oncology working group recommended the evaluation of TILs in standard haematoxylin and eosin (H&E) stained sections in different cancer types [3]. However, many investigators also employ and immunohistochemical evaluation of the different subsets of T cells, by specific markers, including CD3, CD8 and Foxp3.

Pathological assessment of TILs by human eye is considered as a gold standard in diagnostic pathology [3]. However, the human eye based assessment is subjective and characterised with high interobserver variability [7]. Recently, the development of digital pathology applications opened the new window for the detailed and objective quantification of cells in immune tumor microenvironment [7]. One of the widely used application in digital pathology, amongst others is the freely available software QuPath [8]. The software allows the investigator the specific cell quantification and analysis in different tumor areas in both H&E and IHC stained slides, producing the robust and reliable data for further statistical analysis [8].

The role of tumor infiltrating lymphocytes as well as the role of tumor associated neutrophils has not been investigated in conjunctival intraepithelial lesions. The aim of our study was to investigate the distribution patterns of TILs and TANs in different types of conjunctival lesions with different proliferation and apoptotic characteristics.

Material and methods. Study included formalin-fixed and paraffin-embedded (FFPE) tissue sections of 10 normal conjunctivas, 12 actinic keratosis, 25 pterigeas, 14 CoIN1, 12 CoIN2, 8 CoIN3 and 7 squamous cell carcinoma, altogether 88 cases. FFPE tissue blocks were retrieved from the teaching, research and diagnostic laboratory of Tbilisi State Medical University. H&E stained sections were revised and diagnosed by two independent pathologists (T.M., G.B.).

Digital analysis of tumor associated neutrophils (TANs) and tumor infiltrating lymphocytes (TILs). The analysis of TANs and TILs was performed using freely available digital pathology analysis software QuPath (V 0.2.1) as following: 10 randomly selected high power fields of H&E stained sections were captured from each case using the digital camera of Leica 3000 microscope. Then, the images were included in the digital pathology software QuPath. Relevant areas such as the lesion, normal tissue, subepithelial and intraepithelial areas were manually annotated and staining vectors were corrected. The number of TILs was evaluated using QuPath's automatic cell detection system, whilst the number of TANs were counted manually. All cell detections were converted into numbers and finally the average number of TANs and TILs were recorded for each case. The digital analysis algorithm is given in Fig. 1.

Immunohistochemistry. Tissue sections were stained by standard immunohistochemical procedure, using antibodies against: Ki67, Bcl2, p53, CD3, CD8, Foxp3. Similar digital analysis algorithm was used for the counting of CD3, CD8 and Foxp3 in two major areas of the lesions: the subepithelial compartment and in intraepithelial compartment. The average of the detected T cells was recorded. In addition, the Ki67 and Bcl2 labelling index was evaluated by two independent pathologists (G.B. and T.M.) as the percentage of Ki67 and Bcl2 positive cells in the lesion. The Ki67 and Bcl2 labelling index was divided into low (≤10%) and high (>10%) labelling index. The presence of p53 mutations was evaluated as following: the cases with either strong expression of p53 or complete loss of p53 staining were considered as p53 mutant. The cases with the average expression of p53 were considered as wild type (WT).

The number of marker positive cells has been recorded and analysed with the following statistical methods: correlations were assessed using Spearman's rank test and comparisons between