

LLC "BIOW"  
NUR-SULTAN  
KAZAKHSTAN

# Circadian rhythms based system for managing the risks of human factor manifestation



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WORK AND THE "BIOW SYSTEM" BELONG TO BIOW LLP AND A.S. KUAT.

# BIOW COMPANY



The founder is Amir Kuat, the winner of the national project "100 new faces of Kazakhstan", a certified specialist of the IAC in the investigation of aviation accidents, an innovator, the youngest scientist in Kazakhstan, who is part of the "golden" fund of the nation;



Development of innovative solutions in various fields (medicine and healthcare, electrical engineering, OSH);



All offered products are innovative and are used in various fields and well-known companies with a worldwide reputation.

# Where was it applied?

Our rich experience is proof of effectiveness

The system is applicable in all spheres of human life



## System results\*

\* The bright results that are "on hearing" are listed, the listed areas do not mean the absence of results and use in other areas.

- Bronze medal at the Olympic Games Beijing 2008;
- Silver medal of the World Championship Pattaya 2019;
- Successful performances of fighters in the UFC;
- Shavkat Rakhmonov - Championship and defense of the M1-Global title, UFC fighter;
- Asian MMA Championship 2019 - Kazakhstan's first place in the medal standings, 7 gold, 9 silver and 5 bronze medals;
- The first meeting in the ring between Alvarez and Gennady Golovkin.

# WHAT DO WE OFFER?



The only risk management system in the world with practically proven effectiveness in reducing the impact of the human factor;



Real injury reduction (proven in practice up to 87.5% see pilot project in ERG);



Increasing the safety culture in an unobtrusive way.

**KNOW  
HOW**



# WHAT ARE CIRCADIAN RHYTHMS?



Circadian rhythms are physical, mental, and behavioral changes that follow a 24-hour cycle;



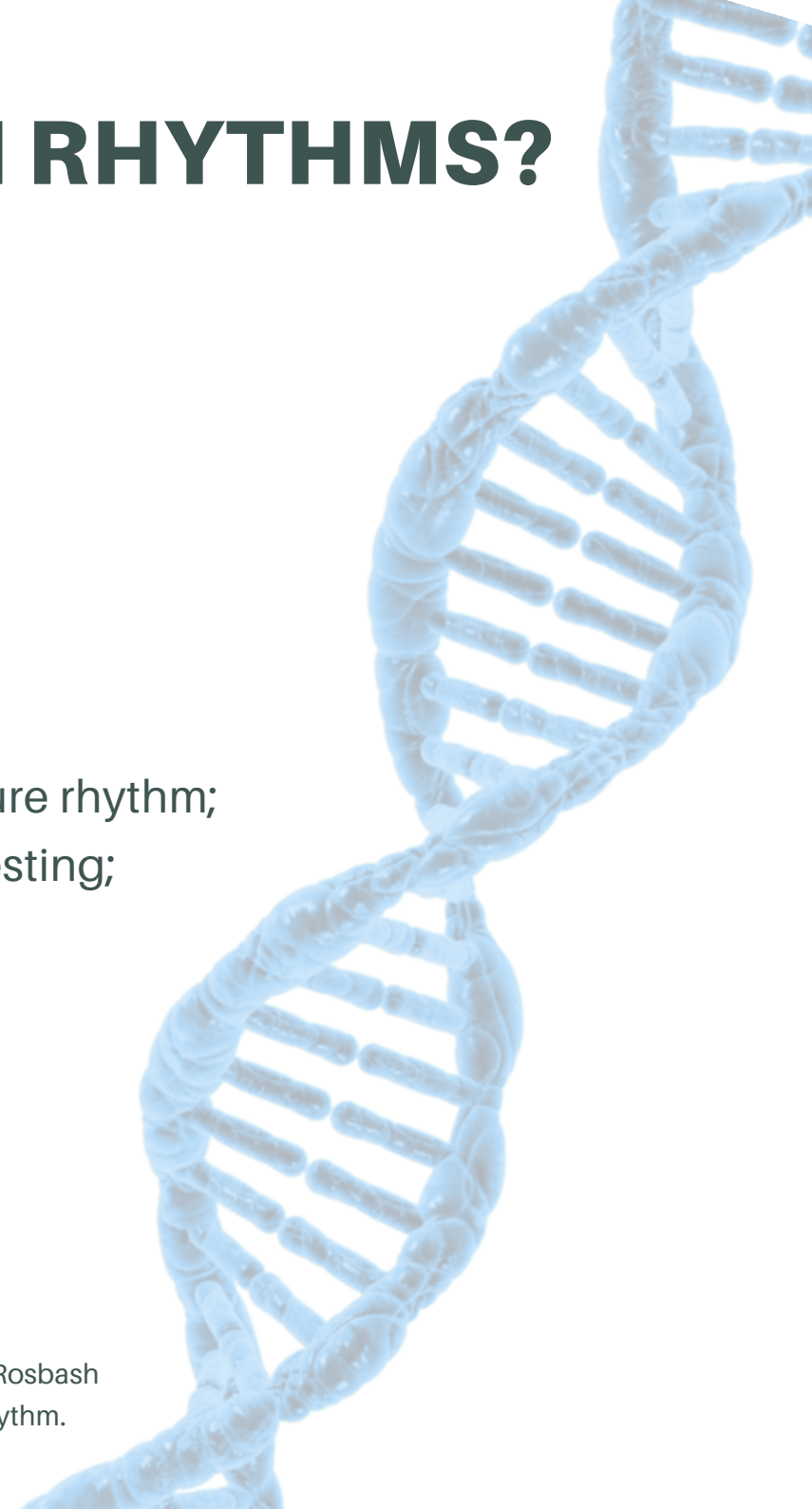
## **Controls:**

- Sleep/wake cycles;
- Cognitive performance;
- Hormonal activity;
- Body temperature rhythm;
- Eating and digesting;



Based on genetic factors and the cellular mechanism of the body.\*

\*The 2017 Nobel Prize in Physiology or Medicine was jointly awarded to Jeffrey C. Hall, Michael Rosbash and Michael W. Young for their discoveries of molecular mechanisms controlling the circadian rhythm.



# CIRCADIAN RHYTHMS (CR)\*

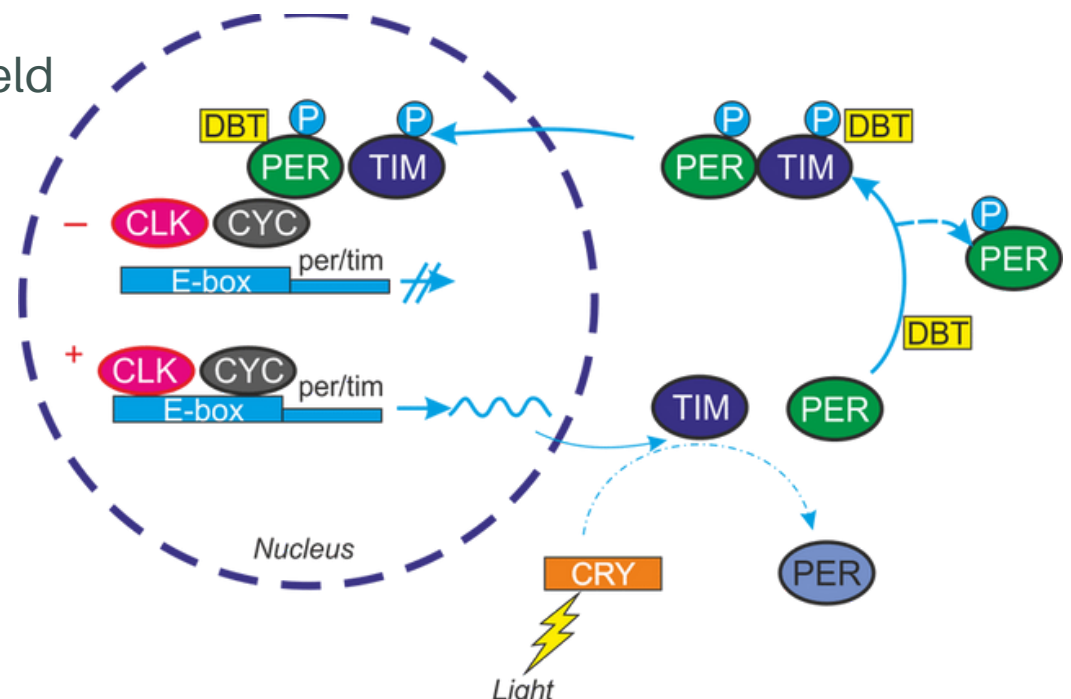
in simple words

The mechanism of circadian rhythms is launched from the moment of birth by irritating a special CRY protein with a beam of light.

P / s: the embryo in the womb does not contact the rays of light in sufficient quantities to trigger the CR mechanism;

After starting, the TIM and PER genes are connected and enter the cell nucleus, the field of which the number grows (there is a "xeroxoping" of the genes);

After reaching the maximum, the TIM and PER genes are "destroyed" by the action of the CLK and CYC genes, and when they reach their minimum, they exit the nucleus and the process repeats again.



# THE EFFECTS OF CIRCADIAN RHYTHMS

which a person usually does not pay attention

## When a person:

- Did the same task well a couple of weeks ago, but now can't do the same, and don't know why;

- Feels apathy/depression;

- Sometimes has difficulty perceiving information;

- Sometimes experiences a physical decline.



# WHAT OUR CONCLUSIONS ARE BASED ON

- Research of more than **1.2 million** data on human deaths in Kazakhstan for the period 2008-2016;
- Data from **3,176** patients treated for coronavirus at the new modular hospital in Nur-Sultan during quarantine in Kazakhstan;
- Research of more than **10 000** data of people in various industries: mining, aviation, sports, medicine, defense, manufacturing, etc.

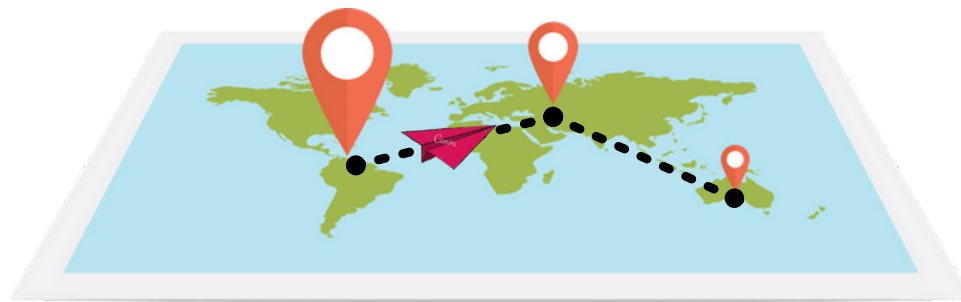


# TIME ZONES AND CIRCADIAN RHYTHMS



- **Jet lag** - is a physiological condition that results from alterations to the body's circadian rhythms caused by rapid long-distance trans-meridian (east-west or west-east) travel;
- **Time zones** also play a critical role in assessing and identifying risks;
- **Planning and accounting** for time zones gives tangible results.

# TIMEZONES AND CIRACIDAN RHYTHMS



■ Risks of 11th of December (e.g.) **may arise again** (depending on circadian rhythms) on 12th of December in Kazakhstan if person will flight at this time;

■ Risks on December 11 (e.g., according to calculations in the **US time zone**), issued a month earlier, **may arise** (depending on circadian rhythms) on **December 12, not on the 11**, if the person is in the **Kazakhstan time zone**.

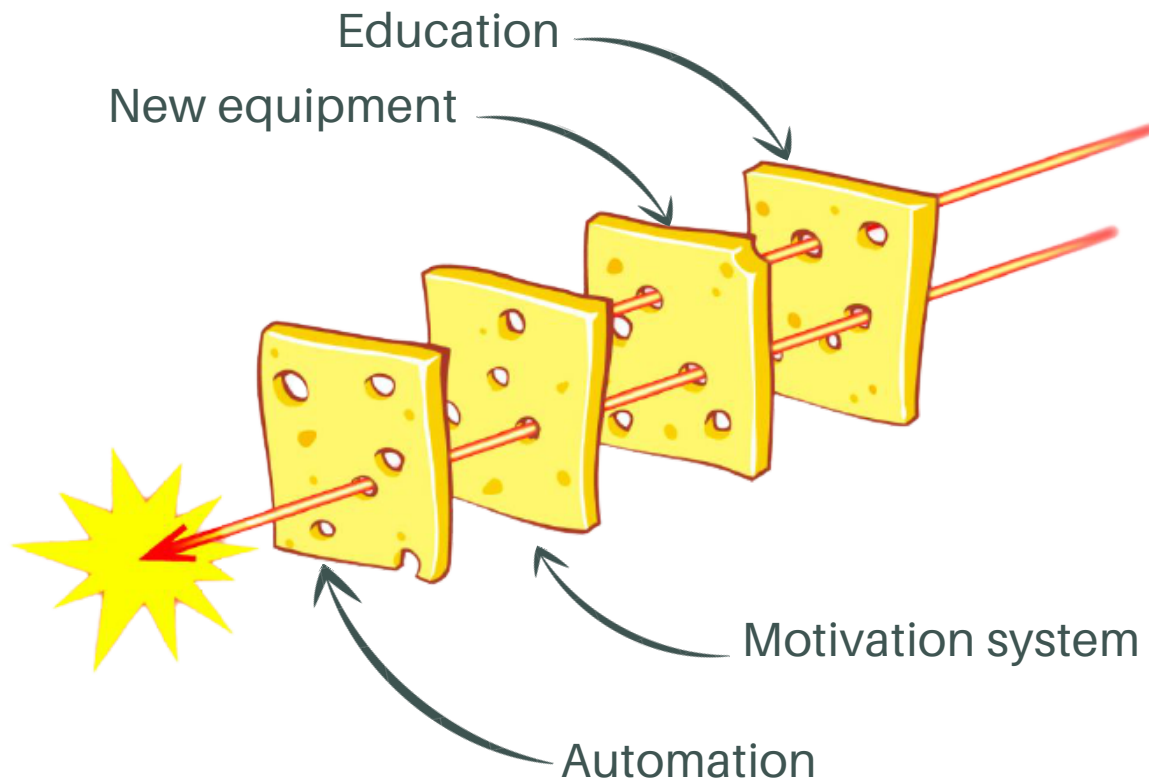
# HOW DO WE DO IT

- The human body is a perfectly balanced mechanism that works like clockwork;
- Having studied more than 1.2 million human data, we have created a mathematical formula that allows us to calculate the process of "copying" and "destroying" circadian rhythm genes with an accuracy of up to 87.5%;

## CALCULATION PROCESS

- Knowing the exact date of birth of a person, preferably the time incl. (key phrases - beam of light, CRY protein);
- Knowing the location of the person (workplace, specifics, etc.);
- Calculations are made using the formula;
- Based on the results obtained, based on the experience of studying 1.5 million data, knowing under what combinations during the period of "copying" or "destruction" of genes, the human body is predisposed to what actions / inactions, the final result is displayed and a recommendation is issued in advance in an understandable language.

# HOW IT WORKS

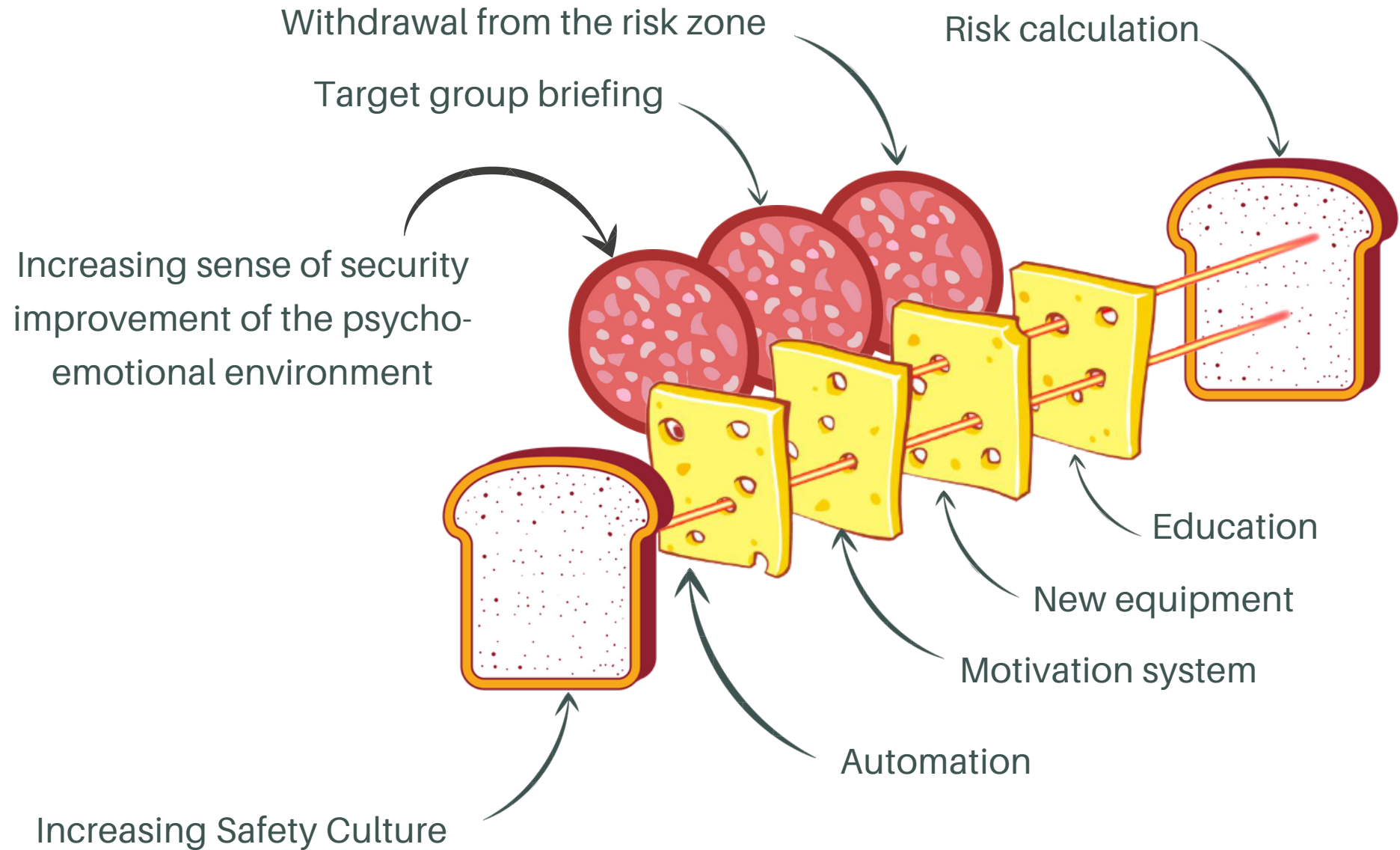


**Even the most  
experienced  
make mistakes**

**and NOBODY, but us:**

- Won't tell you when it will happen;
- Can't calculate risk in advance;
- Give appropriate advice.

# SANDWICH MODEL



- Unobtrusively enhances the level of safety culture in the organization;
- The system allows you to convey information during the briefing to the most skeptical and self-confident persons (beginners and professionals);
- Improves the atmosphere in the workplace, allowing staff to feel cared for and protected (the safety specialist knows who to pay more attention to and what to suggest);
- Convenient, easy to use and saves time, because you know exactly who needs instruction and who does not.

## **System Benefits**

## **Safety culture**

**According to HSE specialists**

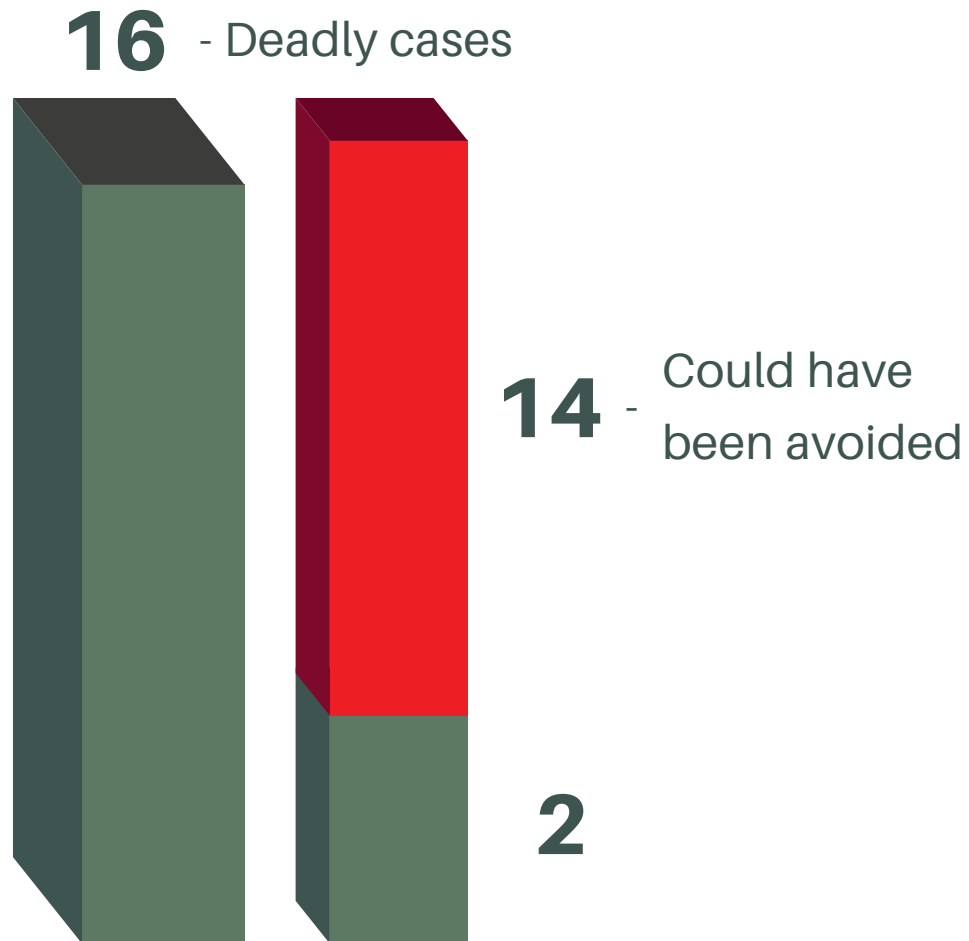


# THE RESULT OF A PILOT PROJECT AT ERG ON THE BASIS OF JSC "SSGPO"

**Work done according to the recommendations:**

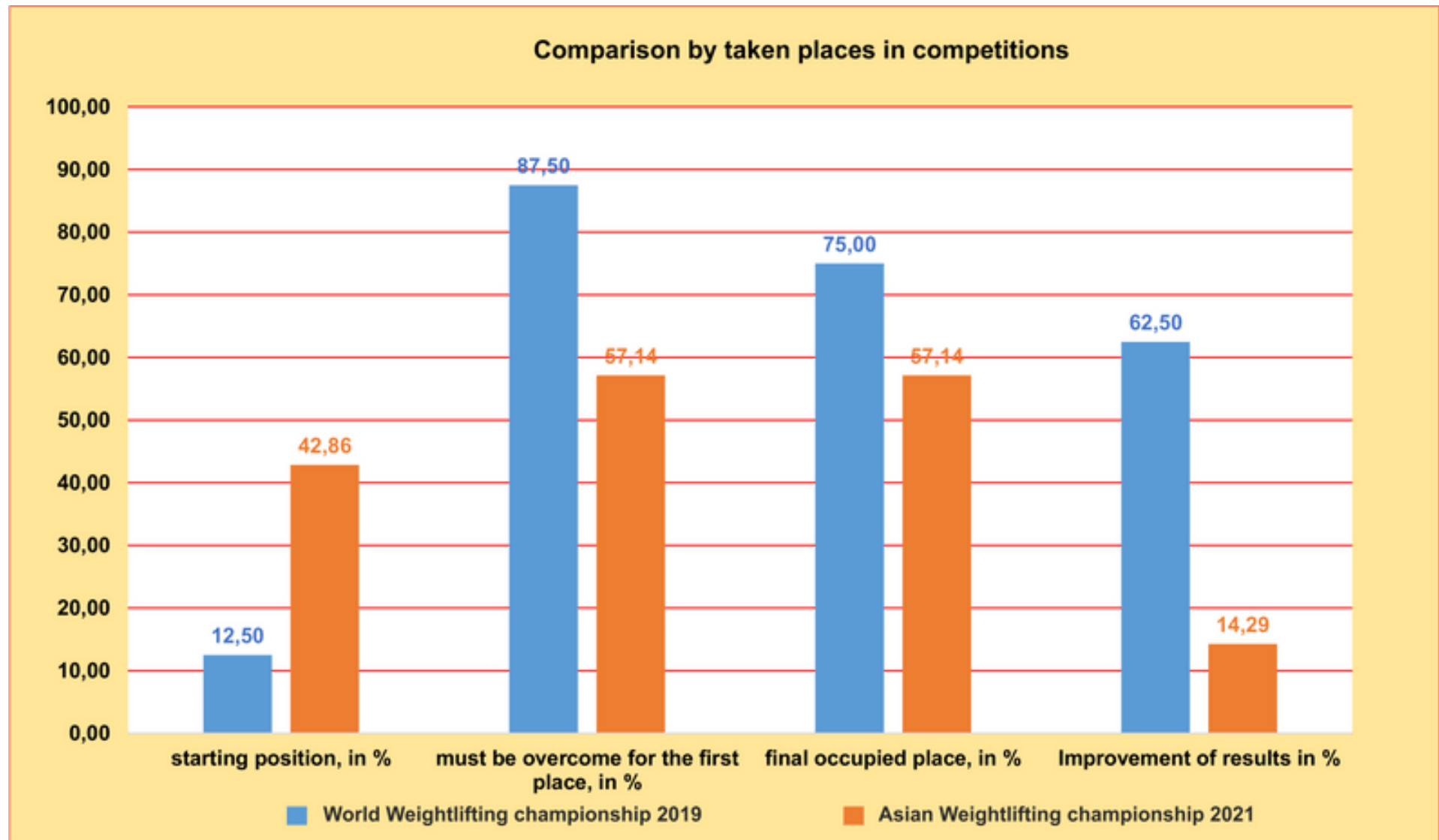
<b>Event</b>	<b>July / person</b>	<b>Aug / person</b>
On vacation	<b>72</b>	<b>107</b>
Preventive measures taken, instructions to reduce the risk	<b>380</b>	<b>74</b>
Day off provided to avoid emergency	<b>2</b>	<b>5</b>
Day off on schedule	<b>216</b>	<b>58</b>
Recommended not to plan to work in potentially hazardous areas	<b>0</b>	<b>1</b>
On sick leave	<b>0</b>	<b>2</b>

# RETROSPECTIVE ANALYSIS RESULTS



Of 16 deadly cases there were 14 avoidable cases, which is 87.5% coincidence with the platform's recommendations

# EFFECTIVENESS OF USE IN SPORTS (WEIGHTLIFTING)



# EFFECTIVENESS OF USE IN SPORTS (MMA)

Risk based on Las Vegas, USA  
time zone calculations.

пн	вт	ср	чт	пт	сб	вс
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

The actual injury occurred in the  
time zone of Almaty, Kazakhstan.

пн	вт	ср	чт	пт	сб	вс
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

# THE EFFECT OF USING THE SYSTEM IN MEDICINE



Reduces the number of medical errors



Reduces the number of patient deaths



In oncology increases survival rates (at least for patients who received chemotherapy, taking into account risk assessment and selection of the most appropriate periods to start therapy).



# COMPATIBILITY OF THE INFLUENCE OF CIRCADIAN RHYTHMS IN DIFFERENT PEOPLE.



One person's risks can have a negative impact on another person's health and life;



incompatibility of influence of circadian rhythms on a person in a working collective has a negative impact on psycho-emotional background in a workplace;



Person can deliberately made mistakes, which negatively affected health and life of people.

**DANGER**



# **EXAMPLES OF RISK CALCULATION BY THE SYSTEM**

# An-26 crash in Almaty on 13.03.2021

1



12.06.1990	A.A.T. s s			
Period	E=0	I=0	P=0	PDD
March 2021	9	-	28	13,24,27
Days	Recomendations			
09.03.2021	High risk of making an intellectual error, it is recommended not to plan in potentially dangerous facilities, take preventive measures before starting work or give a day off			
13.03.2021	Potentially hazardous day, it is recommended not to plan in potentially hazardous facilities and take preventive measures before starting work			
24.03.2021				
27.03.2021				
28.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off			

# An-26 crash in Almaty on 13.03.2021



2

10.06.1996	E.B s s			
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Period	E=0	I=0	P=0	PDD
March 2021	28	13,28,30	9	6,24,27

Days	Recomendations
06.03.2021 24.03.2021 27.03.2021	Potentially hazardous day, it is recommended not to plan in potentially hazardous facilities and take preventive measures before starting work
09.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off
13.03.2021 28.03.2021 30.03.2021	High risk of making an intellectual error, it is recommended not to plan in potentially dangerous facilities, take preventive measures before starting work or give a day off
28.03.2021	High risk of increased impulsivity, it is recommended to take preventive measures before starting work or give a day off

# An-26 crash in Almaty on 13.03.2021

3



24.11.1994	C.M.K. s s			
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Period	E=0	I=0	P=0	PDD
March 2021	24	9,27	9	-

Days	Recomendations
09.03.2021 27.03.2021	High risk of making an intellectual error, it is recommended not to plan in potentially dangerous facilities, take preventive measures before starting work or give a day off
09.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off
24.03.2021	High risk of increased impulsivity, it is recommended to take preventive measures before starting work or give a day off

# An-26 crash in Almaty on 13.03.2021



4

10.11.1985	B.E.B s s			
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Period	E=0	I=0	P=0	PDD
March 2021	13,28	9,24	9	6,30

Days	Recomendations
06.03.2021 30.03.2021	Potentially hazardous day, it is recommended not to plan in potentially hazardous facilities and take preventive measures before starting work
09.03.2021 24.03.2021	High risk of making an intellectual error, it is recommended not to plan in potentially dangerous facilities, take preventive measures before starting work or give a day off
09.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off
13.03.2021 28.03.2021	High risk of increased impulsivity, it is recommended to take preventive measures before starting work or give a day off

# An-26 crash in Almaty on 13.03.2021



5

15.12.1985	Б.Д.Г. s s			
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Period	E=0	I=0	P=0	PDD
March 2021	6	27,28	9	13

Days	Recomendations
06.03.2021	High risk of increased impulsivity, it is recommended to take preventive measures before starting work or give a day off
09.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off
13.03.2021	Potentially hazardous day, it is recommended not to plan in potentially hazardous facilities and take preventive measures before starting work
27.03.2021	High risk of making an intellectual error, it is recommended not to plan in potentially dangerous facilities, take preventive measures before starting work or give a day off
28.03.2021	

# An-26 crash in Almaty on 13.03.2021

6

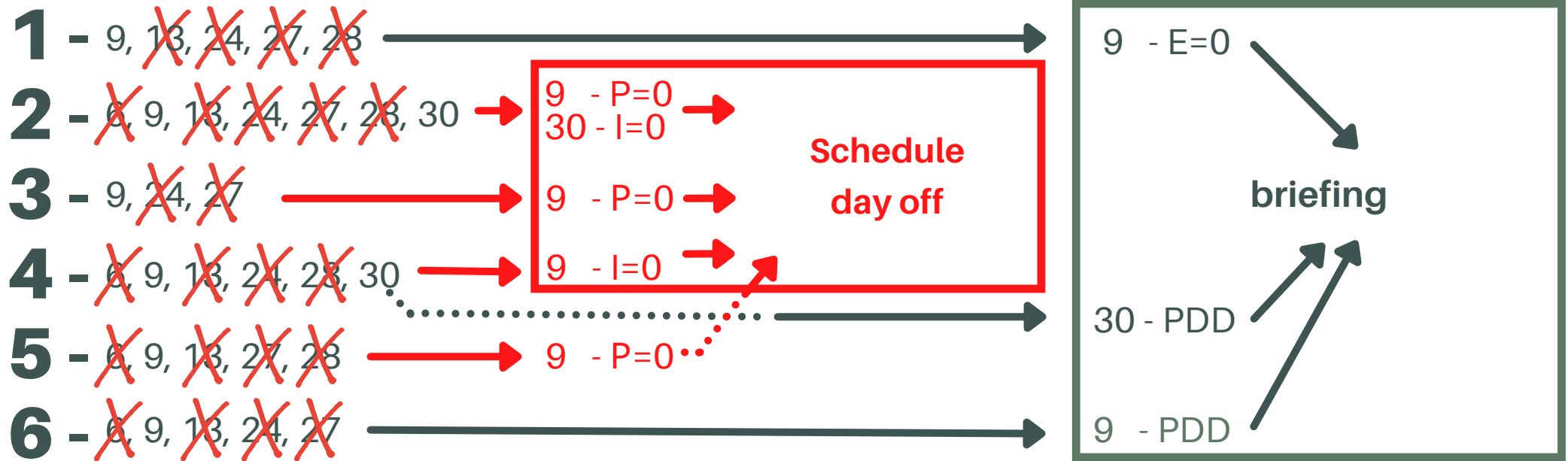


19.10.1984	Б. Г.Е. s s			
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Period	E=0	I=0	P=0	PDD
March 2021	-	-	13,24	6,9,27

Days	Recomendations
06.03.2021 09.03.2021 27.03.2021	Potentially hazardous day, it is recommended not to plan in potentially hazardous facilities and take preventive measures before starting work
13.03.2021 24.03.2021	Traumatic day, it is recommended not to plan work in hazardous facilities, take preventive measures before starting work or give a day off

# Algorithm of actions when working with charts given in the examples



Март						
Пн	Вт	Ср	Чт	Пт	Сб	Вс
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

## Note

- X - Weekends and holidays according to the calendar
- - planning day off
- - briefing

**Thank you for your attention!**