

# Immunotherapy of cervical cancer as a biological dissipative structure

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## Abstract

Cervical cancer can be not only prevented, but also effectively treated. Decreased efficiency of biochemical, neurohormonal and/or immunological mechanisms leads to infectious states which, irrespective of their bacterial, viral or parasitic aetiology, are only the necessary, but not the sufficient causes of neogenesis. The cause of cancer is the natural and common phenomenon of the self-organization of systems, endangered by ending of their existence, into more efficient time-space structures at the expense of their surrounding. Infected cells or infectious changed tissues in their final phase of existence are often recognized as a precancerous state, but their genome does not differ from other organism cells, and that is why the carcinogenesis can still be prevented by direct fighting of pathogenic microorganisms, and indirectly by strengthening the body by neurohormonal therapy or vaccine immunopotentialization. Primary prophylaxis of neoplasms requires that not only the dissipathogenic state of cells be prevented, but also their tissue surrounding be normalized to head off the risk of the self-organization of neoplastic forms of life, differing in their genetic identity from the surrounding cells. Lactovaginal immunopotentialization complements the conservative and operative methods of oncological treatment, as well as has prophylactic application in women with the history of miscarriages, premature deliveries, lack of or significantly shortened lactation, neurohormonal menstruating disorders, chronic and recurrent inflammations of the reproductive organs, long-term hormonal contraception and hormone replacement therapy during menopause, or only deficiency of *Lactobacillus vaginalis*, as indicators of risk of cervical cancer.

## INTRODUCTION

The medicine of the 21<sup>st</sup> century makes use of the newest technology developed in the previous century thanks to the achievements of the quantum mechanics and thermodynamics, as well as identification of energy and mass in a simplified A. Einstein's equation:  $E=mc^2$ . Unfortunately, it requires concurrent adaptation of the nursing, prophylaxis, prevention, diagnostics, treatment and rehabilitation principles to the same level of general

knowledge. This, in turn, forces doctors not only to change their opinions, but also to reevaluate their professional habits, which proves even more difficult. From the history of medicine, we know the initial difficulties with practical use of breakthrough discoveries of the organism cell structure, the presence of bacteria and viruses, X-radiation, computer tomography and more recently – imaging and spectroscopy with the use of nuclear mag-

netic resonance. In each of those stages of medicine development, discovering the mystery of cancer as the most tragic disease in a human being was attempted, each time by associating it with new causes. Although now aetiology is distinguished from pathogenesis, still too many people consider cancer as both the cause and the neoplastic disease itself.

The biggest achievement of the molecular biology of the 20<sup>th</sup> century was the discovery of the human genome structure, which, however, did not fulfil the medical expectations. It turned out that genes, made of deoxyribonucleic acids, only in connection with adequate ribonucleic acids and proteins make up the inheritance unit, which was first called a gene. Otherwise, the organism cells, which have the same genome, could not have been differentiated. Oncogenes and protooncogenes suffered the same fate in the attempts made at explaining the etiopathogenesis of neoplasms. Then, in the middle of the human genome, sequences of nucleotides corresponding to known viruses were found. Finally, alongside experimental integrating or removing parts of the DNA sequence (after the mutation fashion), the possibility of dissipative self-organization of the genome as a structure determining the internal state of cells was identified. This, however, entails the necessity to understand not only the morphological (material) changes, but also the concurrent and equivalent energy transformations, which is the subject matter of medical thermodynamics (Klimek 2001a, 2001c, 2007b, 2010). In 1967, I. Prigogine described the common phenomenon called self-organization of dissipative structures, for which he received the Noble Prize 10 years later (Prigogine 1980). Scientifically, it is called the extension of the second thermodynamics law and contributes to clearing up the mystery of cancer by R. Klimek in 1977 (Klimek 2001d, 2003, 2004, 2006). Earlier, there was simply no chance for associating the carcinogenesis with the self-organization of dissipative structures. The terminology concerning those structures is still difficult to internalize for doctors, despite the fact that it was presented in detail as long as 30 years ago in gynaecological literature (Klimek 1987a, 1978b, 1980, 1985a, 1981b, 1989b, 1989c, 1990a, 1990b, 1990c, 1990d; Klimek *et al.* 1999b). Unfortunately, they have to supplement their education in this field by themselves, as they are more and more frequently using spectroscopy and nuclear magnetic resonance imaging. Three dimensional pictures of the body inside are produced by registering milliards of resonating atoms and particles, concurrently allowing for their matter and energy states (Hollis 1987; Klimek *et al.* 1981a, 1981b, 1982; Mann *et al.* 1984). However, the thing is that not only does it require to understand the technology of medical devices, which is presented in manuals anyway, but in the first place it has to do with fundamental change in the diagnostic-therapeutic proceedings in line with the new terminology (Fedor-Freybergh 1988, 1992; Fedor-

Freybergh *et al.* 1993; Hodorowicz *et al.* 2011; Jasiczek & Klimek 2011; Klimek 2007b; Klimek *et al.* 2011).

Cells, like all multicellular organism, in order to exist, must exchange matter and energy with the surrounding environment through their rims, and these processes are dependent on the absolute temperature. Like in case of humans who, because of the mere fact of growing old, lose strength and wellness in their old age, such a useless loss underlying all phenomena is defined as entropy and is treated as a measure of disarray (chaos) of every system. The more disarrayed is the system, the biggest are the losses. The notion of entropy is extremely important in relation to biological systems (e.g. organism, cells, cell nucleus or cell cytoplasm) because the sum of the entropies of the system and its surrounding environment must always be positive. If for any reason the cell, in order to maintain its metabolism, reduces the production of its own entropy, it must increase it in its surrounding by means of, most generally understood, dissipation of matter and/or energy. The neoplastic cell, which in its surrounding, namely in the human organism, as it proliferates in a clone-like manner, causes an increasing disorganization which leads to its wasting (neoplastic cachexy), is in fact such a dissipative system.

Understanding the self-organization of dissipative structures as a natural phenomenon, which was first described in physics, chemistry and sociology, became necessary in the contemporary oncology. However, the failure to adequately embrace discoveries in general requires a more detailed explanation based on the well over a hundred years long history of social reaction to successive breakthrough discoveries made by the Jagiellonian University researchers to this regard, ended with the description of cervical and ovarian neoplasms as dissipative structures (Kaim *et al.* 2001; Klimek 1985a, 1990a, 2002; Klimek *et al.* 2001).

## HISTORY OF THE DISCOVERY OF THE DISSIPATIVE SELF-ORGANIZATION OF CANCER

Nicolaus Copernicus, during his philosophical and astronomical studies at the Cracovian University between 1491 and 1495, presented the new heliocentric astronomical concept before he commenced the canonical law studies in Italy (1496–1500). During his second stay in this country, while doing medical studies in Padova (1501–1503), in his work 'On the Heliocentric Structure of the Universe', he substantiated his view on the daily and yearly motion and the so-called declination motion (Markowski 2008). In retrospect, after several centuries, his subsequent epoch-making work entitled: 'De revolutionibus libri sex' can be reduced to the simple statement about stopping the sun and moving the earth. For the medieval men this seemed unbelievable and proved dangerous and even life-threatening for men like Giordano Bruno who

understood and furthered the Copernican vision of the universe. Then, five centuries later, the professors of the Jagiellonian University K. Olszewski and Z. Wróblewski, as first, liquefied oxygen and nitrogen from air, and also solidified carbon dioxide and alcohol, which was immediately recognized and commonly acknowledged as a scientific achievement. Simultaneously, L. Marchlewski showed similarity between the porphyrin structure of haemoglobin and chlorophyll, thus indicating the metabolic sameness unity in using oxygen by animals and plants; it was complemented by R. Klimek, B. Skarżyński and T. Szczepkowski, between 1954 and 1956, (Klimek *et al.* 1956; Skarżyński *et al.* 1956) who proved its similarity also to haemoproteins (cytochroms) in chemosynthesizing autotrophic bacteria. This monumental achievement cannot be compared to moving the earth around stopping the sun or liquefying of 'air', which can be comprehensible to the public, as it requires adequate education and/or personal interest. It also applies to the discovery, made by the effort of several generations of the Jagiellonian University scholars, of the natural cause of occurrence of neoplasms and the resulting diseases.

B. Skarżyński, as a physician and biochemist, jointly with the Nobel Prize laureate in chemistry from 1929 – H. von Euler-Cheplin – wrote the most important work in his life entitled: 'Biochemie der Tumoren' (1942, F. Enke Verlag, Stuttgart), translated into Italian in 1945 (von Euler & Skarżyński 1942)! He ended his several dozen year long studies on the pathogenesis of neoplasms in 1955 with the following statement: 'The essential moment in neoplastic transformation of normal tissue is the cell damage that does not go as far as to render the cell incapable of living, but transforms it sufficiently to specifically transform its metabolism. According to the biochemistry facts, cancerogenesis would be the reaction of normal tissue to constantly repeated insignificant damage and to unfavourable environment created by the cancerogenous factor' (Klimek 2006). He was not able to indicate a single factor causing neogenesis, however, his generalization made it possible for R. Klimek to use his own studies on neuroendocrine cervical cancer to describe the etiopathogenesis of neoplastic cells as the self-organizing dissipative structures (Klimek 2001a, 2007b, 2010). What turned out to be the sufficient cause of neoplasms, was the internal dissipathogenic state of cells, which can result from numerous possible and necessary factors.

The introduction of spectroscopy and nuclear magnetic resonance (NMR) imaging to the medicine made it possible for R. Klimek, in 1980, together with the originator of this method P. Lauterbur (doctor honoris causa at the Jagiellonian University, 1988, and Nobel Prize laureate, 2003) to verify the thermodynamic theory of neogenesis by recognizing and differentiating between cancerous and precancerous cells, based on cervical and vulval cancers (Klimek *et al.* 1981a, 1981b,

1982; Mann *et al.* 1984). Thus, completely new opportunities appeared for primary oncological prophylaxis by influencing the environment, and not only cell systems at risk of ending their metabolism in the present form of life. Such a line of thermodynamic reasoning has an over a hundred year long history at the Jagiellonian University, starting with the pioneering works by M. Smoluchowski on the role of thermal fluctuation in the functioning of life systems, through the studies by T. Szczepkowski and J. Hennel on the nuclear magnetic resonance of proteins in the middle of the 20. century, to the dozen or so year long work of the Inter-University NMR Team managed by R. Klimek, which included building an advanced centre for clinical imaging (NMR) diagnostics and primary studies on psycho-emotional states of the human brain. It fundamentally changes the prophylaxis and therapy for neoplastic diseases and should definitely beneficially change the results of the fight with cervical cancer, provided the essence of energy-information transformations, and not only material changes in human organism, are understood by doctors (Klimek *et al.* 1983; Szymanski 1999; Klimek *et al.* 2011). For instance, it results from the demographic data that this cancer is a disease connected with low social and economic status, lack of access to healthcare, cigarette smoking, alcoholism, sexual contacts at an early age and with many partners, which is often associated with infectious sexually transmitted diseases, pregnancies at a too early age, pathological course of pregnancies and deliveries, especially of the premature ones, as well as lack of or shortened lactation (Cosmi *et al.* 1997; Klimek 1996; Klimek 1989a, 1992a, 1992b, 1992c, 1997, 1998a, 1998b, 1999, 2001a, 2001b, 2001c, 2001d, 2002). It is associated with erroneous diagnostic and therapeutic proceedings (Klimek *et al.* 1999a, Klimek *et al.* 1999b, 1996; 2006, 2000; Tomaszewska *et al.* 2000), and recently also frightening with cancer as the fatal illness in media advertisements of vaccines against one virus (Majewski & Sikorski 2006; Pisarski 2007). Meanwhile, the similarity between factors for this cancer and for infectious diseases, and even their sameness with the factors for premature deliveries (Klimek 1996; Klimek *et al.* 2002; Klimek & Klimek 1990), should make the primary prophylaxis against this disease easier, and not reduce it to the prevention of infections with only several out of nearly 200 types of one virus, with harmful and thus unacceptable omission of the above mentioned risk factors, and not only many other pathogenic microorganisms (Klimek 1990d, 2001b; Klimek & Paradysz 1969; Malarewicz 1994, 2007).

Cervical cancer can be not only prevented, but also effectively treated in spite of increased incidence in women due to the growing number of operative deliveries and inadequate use of steroid preparations as contraceptive tablets or menopausal therapies. Recently, a multiple increase of risk for this disease was showed in connection with the use of contraceptive tablets (Smith

*et al.* 2003; Vessey & Painter 2006; Zondervan *et al.* 1996) and, obviously, the risk additionally grows when associated with the infection with human papilloma-virus (Cogliano *et al.* 2005; Moreno *et al.* 2002). One cannot omit the fact that it is the very virus that – as its name indicates – infects humans who, when healthy, have been effectively eliminating it for centuries. Only decreased efficiency of biochemical, neurohormonal and/or immunological mechanisms leads to infectious states which, irrespective of their bacterial, viral or parasitic aetiology, are only the necessary, but not the sufficient, causes of neogenesis. It is not the virus, but only the infection caused by the virus that becomes an oncogenic factor, as the germ itself is a sufficient cause of formation of papilla, which indicates the infectious disease.

## INFECTION AND PRECANCEROUS STATE

Infected cells or infectiously changed tissues in their final phase of existence are often recognized as a precancerous state, but their genome does not differ from other organism cells, and that is why the carcinogenesis can still be prevented by direct fighting of pathogenic microorganisms, and indirectly by strengthening the body by neurohormonal therapy or vaccine immunopotentialization. However, the anti-viral or anti-bacteria vaccines cannot be called anti-cancer, as every neoplasm has a unique identity, irrespective of the type and the factors, which are always numerous, that lead to ending of the cells existence. However, some natural agents, e.g. saprophytic bacteria of the *Lactobacillus vaginalis* type, which maintain proper pH of the vagina and cooperate with the organism also in the direct fighting of infectious microorganisms, whose antigens they recognize, should be used, especially in precancerous states. This is how in Poland, 20 years ago, the introduction of the vaccine comprising coccoidal and weakened forms of *Lactobacillus vaginalis* (SolcoTrichovac-Gynatren) began – it was meant for fighting precancerous states of cervix in women treated for infertility, in whom intraepithelial neoplasia and/or non-specific vaginitis was found (Bałajewicz *et al.* 1989; Klimek 1986, 1987, 1988a, 1988b, 2007a; Klimek *et al.* 1986; Klimek & Madej 1985; Madej & Klimek 1988). The efficiency of such an immunopotentialization is showed by quick normalization of the clinical state of cervix found after administration of only two vaccine doses, at two-week intervals, which in 0.5 ml includes  $7 \times 10^9$  of bacteria. For instance, 38 women aged  $28 \pm 4.2$  years (the 20–35 years range) with cytologically and/or colposcopically diagnosed intraepithelial neoplasia (group 1) were observed and compared with concurrently treated (also due to infertility) 41 female patients aged  $29.5 \pm 3.5$  years (the 20–36 range) diagnosed with bacterial vaginosis (group 2). In neither group the clinical or cytological signs of viral infection of the reproductive organ were found. During the 4-week immunopotentialization, the statistically significant ( $p < 0.001$ ) normalization of the cervix

state was found in 27 women (68.2%), which, at subsequent 2-week intervals, has been presented in Table 1 in relation to the cytological results ( $\chi^2 = 26.2$ ), and in Table 2 – in relation to the colposcopic assessment ( $\chi^2 = 20$ ).

In Table 3, the starting and ending cytological evaluations of vaginal smears (inflammatory changes, presence of *Lactobacillus vaginalis*, presence of metaplastic cells) and the results of the colposcopic evaluation (inflammatory state, regeneration zone, vessel presence) in group 1 in relation to group 2, excluding precancerous states, have been presented.

It results from the tables that vaccination, even after two doses, leads to the significant reduction in the inflammatory state rates and the size of the vascular bed, and concurrently increases the regeneration zones and the number of saprophytic *Lactobacillus vaginalis* bacteria. What is noticeable, is the lack of distinct differences in the rates of metaplastic cells, and increased effect of immunopotentialization on non-oncological indexes in women with intraepithelial neoplasia

**Tab. 1.** Effect of two injections of Gynatren on cytological diagnosis of CIN.

Week	0	2	4
CIN-	5	14	27
I	21	12	7
II	10	5	3
III	2	1	1

**Tab. 2.** Effect of two injections of Gynatren on colposcopic diagnosis of the precancerous states of cervix.

Week	0	2	4
Changes -	6	7	27
+	26	12	10
++	6	2	1

**Tab. 3.** Cytological and colposcopic starting and ending results (%) of two injections of Gynatren with respect to CIN presence.

Week	0	4
CIN	Yes No	Yes No
Cytology		
Inflammation	63%	63%
<i>Lactobacillus vag.</i>	54%	66%
Metaplasia	97%	98%
Colposcopy		
Inflammation	81%	90%
Regeneration	5%	40%
Vessels	46%	40%



(group 1) compared with women without it (group 2) with identical 22% increase in the number of *Lactobacillus vaginalis*.

The SolcoTrichovac-Gynatren vaccine, comprising coccoidal and weakened forms of selected strains of Döderlein acts directly on pathogens of the non-specific inflammation and trichomoniasis. Even after the first injection, after 2–3 weeks antibodies against antigens of the majority of pathological microorganisms are produced and simultaneously the Döderlein bacilli are quickly renewed; and after three injections made at 2-week intervals they ensure a one-year period of immunological protection against infections (Bonilla-Musoles *et al.* 1983; Milovanowic *et al.* 1980; Ruttgers 1984). The use of the vaccine, as presented in Tables 1–3, rapidly changes the environment of the vagina and thus normalizes the surrounding of the precancerous cells, making the neoplastic transformation difficult or even impossible (Buchner *et al.* 1988; Klimek 1988a, 1998b; Klimek *et al.* 1989; Klimek & Madej 1985). That is the fundamental difference between this immunoprophylaxis and the treatment for precancerous states on the one hand, and the effect of the vaccine against several types of one of a hundred and a few dozen types of the HPV virus on the other hand. This virus is only one of the numerous factors and not the only cause of pathological cell structures. Also, the role of virusology as an independent scientific discipline should not be discounted; according to it, successful fighting of any virus cannot take place without common vaccination, especially with the use of the Silgard (Gardasil) vaccine which, according to the characteristics prepared by the manufacturer, is ineffective in the event that HPV has been found at the first injection. The more so, during the anticipated collection of evidence for possible effectiveness of Silgard in the next 15–20 years, the prospective clients should not be frightened with the fatal disease, whose risk increases by several times after, for example, only several years of using contraceptive tablets by persons not infected with HPV (Moreno *et al.* 2002).

Iatrogenic and social factors predisposing to cervical cancer, also called a ‘mothers’ cancer and/or ‘cancer of sexual activity at an early age’ – are well documented and cannot be replaced by any, especially prematurely advertised, vaccines presented as first and only one, in defiance of international literature and Polish experience with the SolcoTrichovac-Gynatren vaccine (Klimek & Klimek 1990; Klimek 1992b, 1992c, 1997, 1998a; Klimek *et al.* 2006). Due to the naturalness of procreation, what is particularly evident is the lack of sufficient primary prophylaxis of all diseases, and not only infectious or neoplastic ones, in women, which results from 10 main manifestations of gynaecologists’ negligence:

1. Causing the increase in the number of operative deliveries and prematurity due to lack of understanding of the relativity of pregnancy duration:  $281 \pm 11$  days, the range of 259–302 days;
2. Discounting the incidence of hypothalamic postpartum and juvenile syndromes as the causes of the pathological course of pregnancies, premature deliveries, lactation disorders and increased oncological risk (in about 20% of those female patients intraepithelial neoplasia of cervix is found).
3. Only one-sided oncological evaluation of the vaginal smear cytology, without providing available information on the neurohormonal and inflammatory states of the vagina.
4. Failure to conduct the enzymatic monitoring of pregnancies by measuring the concentration of oxytocinase (CAP1) and isooxytocinase (CAP2) as the most stable enzymes regulating the activity of neurohormones and indirectly the whole steroidogenesis in the organism.
5. Use of dexamethasone and betametasone instead of natural sustained-action adrenocorticotropine for preventing miscarriages and premature deliveries in mothers and prematurity in neonates.
6. Failure to evaluate, directly after the delivery, the degree of neonate maturity concurrently with the quickness of his/her respiratory adaptation with respect to the Apgar score for the retrospective evaluation of obstetrical proceedings.
7. Failure to understand the necessity to concurrently evaluate the matter and energy states in the face of increasingly common clinical imaging and spectroscopy with the use of nuclear magnetic resonance.
8. Increasing the oncological risk due to failure to understand the thermodynamic etiopathogenesis of neoplasms and the resulting neoplastic diseases.
9. Failure to concurrently treat infertility in both sexual partners who in other relationships can be healthy (fertile).
10. Uncritical adoption of free, pseudoscientific information, and at the same time discounting Polish theoretical and practical achievements, even by authors of medical textbooks and gynaecological-obstetrical recommendations.

## PROPHYLAXIS AND TREATMENT

Primary prophylaxis of neoplasms requires that not only the dissipathogenic state of cells be prevented, but also their tissue surrounding be normalized to head off the risk of the self-organization of neoplastic forms of life, differing in their genetic identity from the surrounding cells. Pathological states of cells can recede after neurohormonal normalization and/or immunopotentialization of their surrounding, which in the event that the operative resection of neoplasms is necessary, especially in early phases of the disease, significantly improves the results of oncological treat-

ment (Klimek 1985b, 1990a, 1990b, 1990c). Many possible and even necessary factors and conditions can lead the cell metabolism to the end of its existence, which is clinically defined as the precancerous state of cells. For instance, cervical cancer is the best investigated neoplasm in women, whose possible and necessary factors can be placed in a huge range from genetic inherited states to psycho-emotional behaviour of humans in the constantly changing socio-economical environment. It should be noted that the same factors remain in a cause-and-effect relationship with the occurrence of premature deliveries (Jasiczek & Klimek 2011; Klimek *et al.* 2002). About 20% of women with post-partum neurohormonal disorders have clinically recognizable precancerous states of cervix due to, among others, obstetrical haemorrhages, miscarriages and premature deliveries (Klimek 1978b; Klimek & Paradysz 1969). Also, the pathogenic human papilloma virus (HPV) is only a potential, but not necessary factor for cervical cancer, as the cancer can be diagnosed in the absence of the virus. In Poland, in 2006, HPV was the cause of condylomata acuminata in 3 female patients out of 100 000, whereas in the same population, 41 female patients died because of cervical cancer (Niemic 2007). At the same time, the very use of contraceptive tablets increases the risk of this type of cancer in women several times, irrespective of the infectious diseases (Klimek *et al.* 2011).

Neither HPV viruses, nor contraceptive tablets, nor many other bacteria or viruses, can be classified as factors sufficient for the neogenesis. Their complete elimination, even as necessary factors, can only reduce the incidence, as it is the factors reducing reparative and defensive mechanisms of the whole organism, e.g. narcotics, stimulants or even low socio-economical status or inadequate nutrition, and even the fact of threatening with cancer or using the very term in advertising, that have a much stronger pathological effect. In the first place, the treatment of even least advanced precancerous states, e.g. intraepithelial cervical neoplasia (CIN1), cannot be given up only because of the fact that in 50% it diminishes, as in the other half of the affected women the neoplastic disease develops.

Neoplasm, like every new dissipative system, does not have its own history because it develops *de novo* as one of many possible biological structures in equally unique biological surrounding whose condition determines the development of the neoplastic disease. There are no two identical neoplasms, even when developed separately in the same organ in the human body. The fact of unique genetic identity of every neoplasm must be taken into consideration when defining any vaccine as directed against cancer, especially when understood as a neoplastic disease, e.g. cervical cancer. Calling the commonly used vaccine the influenza-preventing vaccine can be justified only in this sense that without the presence of any type of influenza virus the disease cannot develop as the sufficient and only cause of this disease is the virus of influenza itself, which unfortu-

nately constantly mutates. Meanwhile, there is no virus of cancer whose only possible or even necessary causes would be germs. After all, there are many other and more frequent types of such factors apart from infections; in relation to cervical cancer even up to 120 (Klimek 2001d; Klimek *et al.* 2011; Klimek & Walas-Skolicka 1977). Informing women about vaccinations against cervical cancer and not – as is the case – only against several types of human papilloma virus in advertising is unacceptable.

Neoplastic diseases are not contagious and therefore one cannot become infected with them like with influenza, which can take place even in spite of earlier vaccination against several types of influenza-causing viruses, if other types or rather new mutations are causing individual incidence. In contrast to neoplastic diseases, in infectious diseases the causes of the disease can be isolated from the patient organism, e.g. viruses or bacteria, and used to infect other persons. However, in spite of many attempts, implantation of cancerous cells into healthy humans does not cause them to develop a neoplastic disease. Experimentally, one can integrate viruses into the animal cell genome, however, even the subsequent, isolated from it and corresponding to the integrated virus sequences of nucleotides, are not infectious (Hodorowicz *et al.* 2011; Klimek *et al.* 2011; Klimek *et al.* 2006).

From the point of view of medical thermodynamics, what is the sufficient cause of any neoplastic disease is not a material factor, but a natural phenomenon of the self-organization of dissipative systems. By way of destroying germs or preventing infections, many infectious diseases can be causally reduced or eliminated; however, in order to fight neoplasms as a natural phenomenon, a completely new strategy needs to be applied, similar to building lightning rods or early warning stations for pernicious forces of nature. It means the necessity to medically improve reparative-defensive mechanisms of the whole organism. And the methods and means applied for that purpose must be

**Tab. 4.** Characteristics of the vaccines Gynatren and Gardasil.

The vaccine	Gynatren (Lyseen)	Gardasil (Silgard)
Action	Prophylaxis and treatment	Prophylaxis
Tolerance	Very good	Very good
Registration in EU against	Specific and non-specific infections and inflammations of female reproductive organs	4 out of 200 types of HPV
Use in precancerous states of cervix (CIN1-3)	Effective	No indications
Effects	Cytological and colposcopic even during the vaccination	Possibly in 20 years

used, and especially advertised, in accordance with the current state of knowledge, as presented in Table 4, which juxtaposes the characteristics of the vaccines: Gynateren (Lyseen) and Gardasil (Silgard).

Gardasil acts prophylactically on the protein component of only 4 selected types of HPV. Gynatren, on the other hand, contains antigens characteristic of pathological flora of the vagina and in addition promotes the presence of saprophytic bacteria of lactic acid. Such a lactovaginal immunopotentialization complements the conservative and operative methods of oncological treatment, as well as has prophylactic application in women with the history of miscarriages, premature deliveries, lack of or significantly shortened lactation, neurohormonal menstruating disorders, chronic and recurrent inflammations of the reproductive organs, long-term hormonal contraception and hormone replacement therapy during menopause, or only deficiency of *Lactobacillus vaginalis*, as indicators of risk of cervical cancer.

## CONCLUSIONS

The most effective prophylaxis of neoplasms is adequate upbringing and educating every human being to live and work in line with the auto-teleological principles of the concordance between actions and recognized ethical values. Teleology recognizes the existence of purpose components even in the very cause of every event. For example, viruses infect the cervical intraepithelial cells for the purpose of their own survival and numerical multiplication, and not for the purpose of neoplastic transformations, which is destructive even for the viruses themselves, as well as for germs. Viruses make use of the natural phenomenon of shedding of epithelial cells, by which, already multiplied, they spread in the human environment. Uniquely, the infected cell does not have to vanish or undergo shedding if it makes use of the vitality (life) of virus and enters endosymbiosis with it, that is integrates it into its genome. By way of such a self-organization, which is possible only by increasing the dissipation of matter and energy in the nearest biological surrounding – the genetic identity of the previous form of life of such a cell undergoes a change, and simultaneously the multiplication of viruses is discontinued. Thus the causal purpose of the viral infection itself disappears! Instead, the cloning of cervical cancer cells, which are responsible for the development of ailments and symptoms of the disease called cervical cancer, begin. This, in turn, eliminates persons whose defensive-reparative mechanisms did not fight the viral infection from the human population. Thus, in the general biological sense, the cancer turns out to be the regulator of the size of the *Homo sapiens* population and at the same time the barrier for the reproduction of human viruses. The recovery or spontaneous resolution of the infection with human papillomavirus, which takes

place in several dozen percent, does not ensure permanent resistance to this disease, let alone to the neoplasms as self-organizing, unique biological dissipative structures.

The cause of cancer is the natural and common phenomenon of the self-organization of systems, endangered by ending of their existence, into more efficient time-space structures at the expense of their surrounding. With respect to humans, it means that carcinogenesis cannot be eliminated, but the development and progress of diseases caused by neoplastic cells can and should be effectively prevented; and in fact, the diseases are increasingly often curable.

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