

## MINI-REVIEW

# Cancer Control and the Communication Innovation in South Korea: Implications for Cancer Disparities

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## Abstract

Over the last 10 years, the number of cancer survivors in South Korea has reached nearly one million with a survival rate of 49.4%. However, integrated supportive care for cancer survivors is lagging. One area in which the current cancer control policy needs updating is in the utilization of information and communication technology (ICT). The remarkable progress in the field of ICT over the past 10 years presents exciting new opportunities for health promotion. Recent communication innovations are conducive to the exchange of meta-information, giving rise to a new service area and transforming patients into active medical consumers. Consequently, such innovations encourage active participation in the mutual utilization and sharing of high-quality information. However, these benefits from new ICTs will almost certainly not be equally available to all, leading to so-called communication inequalities where cancer survivors from lower socioeconomic classes will likely have more limited access to the best means of making use of the health information. Therefore, most essentially, emphasis must be placed on helping cancer survivors and their caregivers utilize such advances in ICT to create a more efficient flow of health information, thereby reducing communication inequalities and expanding social support. Once we enhance access to health information and better manage the quality of information, as a matter of fact, we can expect an alleviation of the health inequalities faced by cancer survivors.

**Keywords:** Cancer control - information and communication technology - health communication - South Korea

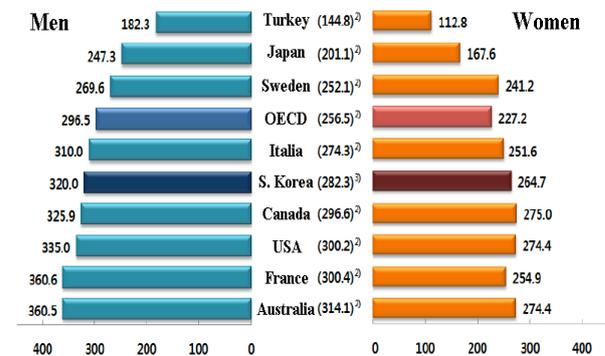
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## Introduction

Carcinogenesis is known to have increased due to not only changes in diet and a decrease in physical activities but also reasons including the aging of the population, the development of cancer diagnosis technology, and the activation of early examinations. In South Korea, the number of people diagnosed with cancer in 2010 alone amounted to 202,053, which was an increase of 4.0% from 194,359 in 2009 and of 98.5% from 101,772 in 2000, or 10 years earlier, respectively (National Cancer Center of Korea: NCC, 2012). When these figures are calculated in terms of the age-adjusted incidence rate, which gives the weight value to each country's standard population ratio per age, South Korea's cancer incidence rate per 100 thousand people amounts to 282.3 (Men: 320.0, Women: 264.7). This rate is lower than 300.2 (Men: 335.0, Women: 274.4), the average for the United States, but higher than 256.5, the average for the nations of the Organization for Economic Cooperation and Development (OECD; Figure 1). Except for thyroid cancer, the ranking of cancer by incidence among men and women in South Korea exhibits a similarity to that of Japan (NCC, 2012).

However, the development of medical technology and the early examination system have increased the number

of survivors following cancer diagnosis or treatment as well. There are an estimated 12 million cancer survivors, a term considered by the National Cancer Institute to refer to people from the point of cancer diagnosis until the end of life (National Cancer Institute, 2009), living in the United State, with 5-year survival rates dramatically increasing over the last few decades (American Cancer Society: ACS, 2011). In the case of South Korea, such a population group amounts to 1 million as of 2010, and these people's 5-year



**Figure 1. International Comparison for Cancer Incidence Rate, 2010 (per 100,000).** Note: Calculated by a standard population size of each country for international comparison

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survival rate was 64.1% during 2006-2010, a continued improvement from 41.2% in 1993 (Figure 2). Such figures show that, as with the US and Japan, South Korea, too, has witnessed a considerable increase in the number of cancer survivors (Table 1). When converted in terms of the total population of South Korea as of 2010, 1 out of 52 people, or 1.9% (Men: 1.7%, Women: 2.1%) of the population has received cancer treatment or survived after cancer treatment (NCC, 2012). As for the types of cancer, the number of thyroid cancer survivors was the greatest, followed by survivors of gastric cancer, colon cancer, breast cancer, lung cancer, and liver cancer, in descending order.

However, because of the focus of the current state cancer control policy on treatment and prevention, while continued improvements have been made in cancer incidence rates and survival rates, programs for cancer survivors have been restricted only to hospice management projects, thus leading to a great shortage of information necessary for these survivors. Consequently, along with tailored health and medical services that take into consideration cancer survivors' types and stages of cancer, the promotion of these people's self-care management and social support is necessary (ACS, 2011;

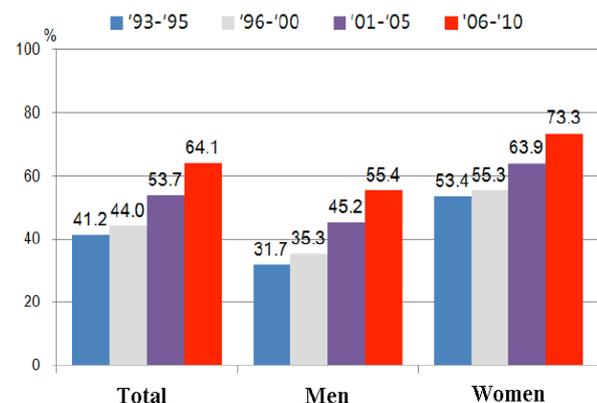
NCC, 2012). In particular, to enable cancer survivors to receive systematic, evidence-based services even after the completion of cancer treatment, it is necessary to provide health information crucial for cancer survivors in terms of the cancer continuum.

The dramatic development of information and communication technologies (ICTs) today has created new opportunities that provide patients with health information. For example, cancer patients are placed in a cancer continuum from diagnosis to treatment, then to control of the disease. Regarding cancer control, ICTs can play diverse roles across the entire survival time from the prevention of cancer to its treatment, ultimately to end-of-life care (Viswanath et al., 2012). In other words, to prevent recurrence of cancer and to minimize post-treatment aftereffects, active control by medical service providers and patients is important. ICTs can make an important contribution to such efforts on the part of cancer survivors. The intent of the study is to discuss: i) the positive and negative aspects that may result by communication innovation through ICTs with respect to cancer control and cancer survivor care; and ii) the effect of inequalities in the use of information technology according to socioeconomic status on cancer inequalities such as cancer incidence rates and mortality rates.

**Table 1. International Comparison for 5-year Cancer Survival Rate (%)**

Cancer type	S. Korea			USA <sup>a</sup>	Japan <sup>b</sup>
	('96-'00)	('01-'05)	('06-'10)		
All types	44.0	53.7	64.1	65.4	54.3
Stomach	46.6	57.7	67.0	26.9	62.1
Liver	13.2	20.1	26.7	16.0	23.1
Cervical	80.0	81.2	80.2	67.9	71.5
Colorectal	58.0	66.6	72.6	64.3	65.2
Thyroid	94.9	98.3	99.8	97.5	92.4
Breast	83.2	88.5	91.0	88.9	85.5
Lung	12.7	16.2	19.7	15.9	25.6
Pancreatic	7.6	8.0	8.0	5.8	6.7
Prostate	67.2	80.1	90.2	99.2	75.5

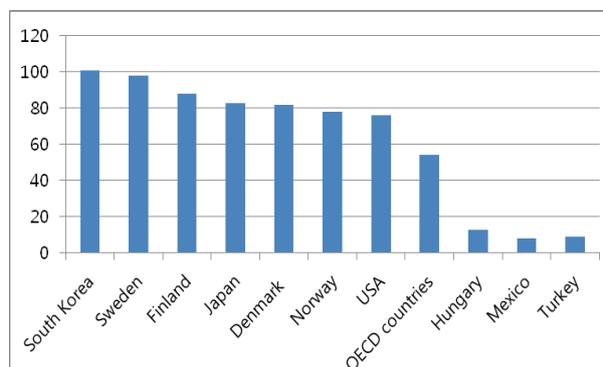
\*Source: National Cancer Center of Korea. Development of Delivery System for Integrated Supportive Cancer Survivor Care. The Korea Ministry of Health and Welfare, 2011. <sup>a</sup>Howlander N, Noone AM, Krapcho M, Neyman N, Aminou R, Altekruse SF et al (eds.). SEER Cancer Statistics Review, 1975-2009, 2012. <sup>b</sup>Matsuda T, Ajiki W, et al (2011). Population-based survival of cancer patients diagnosed between 1993 and 1999 in Japan: A chronological and international comparative study. Japanese Journal of Clinical Oncology



**Figure 2. Trends for 5-year Survival Rates by Gender: All Cancer.** Source: National cancer center of Korea. development of delivery system for integrated supportive cancer survivor care. the Korea ministry of health and welfare, 2011

### Characteristics of Communication Innovation and its Light and Shade

The three characteristics of communication innovation through ICTs can be summarized as the combination of information, change in the subjects of information generation, and diversification of information delivery platform. The expression “data deluge” occurred largely because ordinary individuals freely generate information, which in turn is swiftly transmitted through diverse media. Such changes have given birth to the “homo informaticus.” Individuals have come to cultivate the ability to understand, use, and transmit information while living amidst an enormous amount of information every



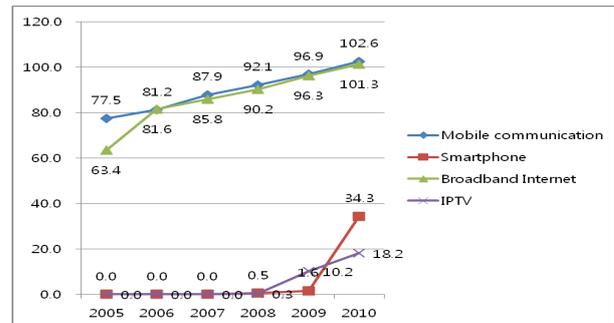
**Figure 3. The Penetration Rate of High-Speed Broadband among OECD Countries, 2012 (%).** Note: The high-speed broadband refers to the mobile wireless Internet speeding 256 kbit/s or more such as 3G, 4G, WiBro, and Wi-Fi, etc. Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in households and by individuals, June 2012; and for non-OECD countries: International Telecommunication Union (ITU), World Telecommunication/ICT Indicators 2011 database, December 2012

day.

First, the development of ICTs has generated meta-information through the combination of data on a massive scale and created new services. The amount of information generated by humanity per year has amounted to 1,200 exabytes in 2010 (The Economist, 2010). The books housed in the Library of Congress are assumed to amount to 150 million. One exabyte is one-hundred thousand times that number (Ashenfelder and Transferring, 2011). The generation of information on such a massive scale has been considerably driven by the fact that the combination of information produces yet another type of new information or observations. For example, digital data accumulated in the sphere of public health promote patient-provider communication and increase tailored treatment, thus ultimately improving the quality of medical services (Viswanath et al., 2012).

Second, if the existing subjects of the information generation were the mass media, the subjects today are ordinary individuals in the private sphere. Cancer patients were previously a large body of information recipients. By enhancing individuals' access to and ability to use information, ICTs have presented the possibility for cancer patients to actively change according to common interests and information needs. When trends in the use of the media by the public are examined, such changes have been especially noticeable online (Viswanath et al., 2012). While the online audience increased by five times that of broadcast television and twelve times that of regional broadcasts, respectively, during 2010-11, the readers of traditional media such as newspapers and magazines have continued to decrease (Korea Communications Commission, 2011). In other words, individuals who possess digital media are opening new horizons in the exchange and transmission of information as they become accustomed to two-way communication and voice their opinions.

The final characteristics are the dramatic increase in the channels through which information can be accessed and exchanged, and the increase of information and communication tools used by consumers. For example, nine out of ten adult Americans possess mobile phones, and over half of them possess desktop or laptop computers (Zickuhr and Smith, 2012). Similarly, in the case of South Korea, the mobile phone penetration rate exceeds 101% and the Internet penetration rate amounts to 97.2%, which are the highest figures among member nations of the Organization for Economic Cooperation and Development (OECD, 2012; Figure 3). Over the past five years, there has been a steadily increase of ultra high-speed Internet, Internet protocol television (IPTV), wireless broadband (WiBro) subscribers, and smartphone penetration rate (Figure 4). In particular, the smartphone penetration rate amounts to 58.5%, the highest worldwide (Korea Communications Commission, 2011). Consequently, many adults possess one or more ICTs. ICTs have infiltrated deep into the daily lives of adults and are now seen as indispensable (Viswanath et al., 2012). ICTs have enabled people to access and consume information whenever and wherever they want and turned them into active subjects who produce and exchange information.



**Figure 4. Adult Communication Gadgets Ownership Overtime, 2005 to 2010.** Source: Korea Communications Commission. The Annual Report on the Broadcasting Industry Statistics, 2011

In the management of cancer survivors, communication innovation can bring either positive or negative results. From a negative perspective, while the influx of medical information inevitably reduces the time that can be wasted on information search, it can also result in 'cognitive overload' of a patient. In fact, even if cancer survivors are able to obtain a lot of information on cancer that is available through public access, they often feel lost or confused when it comes to understanding the information (Arora et al., 2008). In other words, while information technology innovation enables the production, use, and supply of massive information, it also creates problems for patients in the matter of how to handle the overload of information.

However, from a positive perspective, communication innovation such as social media or blogging provides opportunities for cancer survivors to engage in two-way communication with their medical service providers or with other survivors, given that it fosters communicating democracy in terms of information production and use (Viswanath and Ackerson, 2011). Presently, the National Cancer Institute and other medical institutions are encouraging communication through online activities by systematically providing health information and guidelines for cancer patients through online postings (Viswanath et al., 2012).

Cancer survivors or patients engage in online communication, also known as 'medical consumers.' Online communication has changed the practice of health communication from the 'command-and-control approach' (practice of traditional media subjects) to the 'grassroots participatory model' (the newly emerging practice of communication innovation subjects) (Viswanath et al., 2012). In the past, patients had to struggle accepting whatever information that was provided to them. Presently, the public can actively demand health information that they specifically need, write their experiences online, and share it with anyone in the virtual community. As opposed to the previous form of information use, in which a patient was forced to either accept or reject given information, this shared form of information use acts to restructure health information use according to the needs of each medical consumer. Online communication can adapt health information for easier to understand information. It can also help clarify information that may be ambiguous to certain medical consumers by receiving and answering any

questions. This type of health communication can increase the acceptance level of information use by patients, and can motivate medical 'service providers' supply health information in terms of quantity and quality. In other words, ICTs have influenced medical service providers to adapt their information from the perspective and needs of their patients and other consumers.

In the case of South Korea, the abundance of online information is influencing patients and medical service providers to engage in a mutual relationship and interaction (NCC, 2011). For example, 'peer-to-peer health care' is a system of sharing health information obtained from a caregiver in one's area or from one's peers and is actively managed by many participants. Mutual interaction between patients and their medical service providers are mediated. In particular, patients of chronic diseases (i.e. cancer) are shown to exchange information online twice more often than patients of non-chronic diseases (Viswanath et al., 2012). Also, patients who actively seek advice online and exchange words of social encouragement are shown to result in better health outcome (Wicks et al., 2010). Therefore, by supporting cancer survivors to take advantage of the communication innovation by using the 'grassroots participatory model,' the management of patients' cancer across their cancer continuum can greatly assist the patient. In general, the changed environment of ICT can assist cancer treatment patients maximize their capacity for decision-making. ICT can also satisfy the information needs of patients in the last stage of cancer treatment (Hiatt and Rimer, 1999; Viswanath, 2005).

Consequently, communication innovation can encourage patients to access information on cancer prevention and to use that information. By doing so, communication innovation encourages active decision-making on the part of the patients with respect to the discovery, diagnosis, and treatment of their diseases. Communication innovation also helps cancer survivors to monitor their lifestyle. Moreover, from the perspective of health communication, it ultimately helps increase the health-related quality of life (HRQOL) of cancer survivors (Jung et al., 2013). However, in order to allow patients to take full advantage of all the benefits promised by the development of ICT that have not yet been developed, it would first be necessary to discuss communication inequality.

## **Cancer Disparities and Communication Inequalities**

It is well-documented that the burden of cancer differs by race and socioeconomic status (SES; Viswanath et al., 2012). Changing trends in the United States for the last decade illustrate that although cancer incidence rate and mortality rate recorded a steady decline, its benefit existed disproportionately according to race and SES (Eheman et al., 2012). Korea's cancer epidemiology has similar features compared with the United States. For this reason, mutual discussion is ongoing about health inequalities due to the gap in SES (Khang and Kim, 2006; Park et al., 2010; Jung-Choi et al., 2011). In particular, low income and

uneducated citizens do not fully benefit from anti-smoking programs, early cancer screenings, and technological development of medical treatment. Thus, more attention is required for increasing patient cancer survival rate (Park et al., 2010; Viswanath et al., 2012). Cancer disparities refer to the health inequalities in cancer incidence and mortality that occur through social determinants (Viswanath et al., 2012). Apparently, cancer disparities appear as an individual choice such as not smoking, or eliminating obesity. Medical use or medical check-ups can also make a difference. However, these factors can actually occur by class and structural inequalities (Institute of Medicine, 1999; 2003a; 2003b; Viswanath et al., 2012). Diagnosis of smoking-related diseases and obesity is prevalent in the African American Communities and low SES groups (ACS, 2009; Foulds et al., 2010; Colditz et al., 2012). Therefore, cancer incidence rate or mortality rate has a high possibility for slow improvement. Recent studies suggest that when backward attributes overlap and converge together, the concerned group's disease burden is very high (Williams et al., 2012). For example, African American females with low educational backgrounds may have a high probability of smoking and obesity (Bowleg, 2012). Therefore, this group may be the most vulnerable to cancer incidences as they manifest an intersection of three life-threatening of critical features (Williams et al., 2012). Cancer disparities in race and SES also intersect with communication inequalities because race and SES show differences in access, use, and processing of cancer information (Viswanath and Ackerson, 2011).

A few studies have so far focused on the mechanisms behind the complex operation for diverse types of social inequalities. For example, health communication researchers believed that all populations could benefit from technological development of information and communication, and its daily penetration (Viswanath et al., 2012). However, there are differences within populations for information access and interpretation, and differences between social classes in generation, manipulation, and diffusion of information (Viswanath, 2006). Communication inequalities primarily appear in five areas: ICT plus media access and utilization; information processing; attention to health information; information seeking; and the effect of communication on health outcomes (Viswanath et al., 2012). Actually, the Health Information National Trend Survey data reported significant differences in health communication behaviors according to social classes (Viswanath, 2006; Blake et al., 2011; Viswanath and Ackerson, 2011). This study suggests hypotheses that communication inequalities have the effect of mediating the relationship between social determinants and the health outcomes of cancer survivors (Viswanath et al., 2007). For example, there are considerable social disparities in smart phone utilization, internet access, and broadband subscription (Yu, 2002; Chen and Wellman, 2004). The low SES group excluded from communication is expected to have a relatively poorer health status. This also applies to cancer survivors (Jung et al., 2013). Therefore, it is difficult to believe that ICT development will fairly ensure information equality for everyone. In practice, very few

citizens have diverse methods and tools to freely access health information. Moreover, telecommunications providers may reduce benefits for low-volume users, which may exist among low income class citizens. On the other hand, telecommunications providers may expand benefits for some high-volume users (Viswanath et al., 2012). The digital divide will deepen differences among cancer survivors in their capacity for cancer information utilization and health management. Consequently, the digital divide can cause disproportionate health status.

In fact, with a focus on diverse and substantial information sourced from communication innovation and new media, a critical review of the public's information acceptability or quality of information have seldom been conducted. With regard to information acceptability, many citizens do not fully understand health information (Kontos and Viswanath, 2011). The public often has difficulty with information-based medical decision-making (Klein and Stefanek, 2007; Han et al., 2009; Reyna et al., 2009). In terms of the intersectionality of inequalities, it is more prevalent in low income cancer survivors or low educated non-white groups (Kontos and Viswanath, 2011). Therefore, we can reduce health inequalities when we consider how to share quality rather than quantity of information (Armstrong et al., 2002; Garcia-Retamero and Galesic, 2010). For example, the low SES groups usually have difficulty with the comprehension of statistical information. Thus, narrative-style provision of cancer information can contribute in lowering communication inequality (Kreuter et al., 2007). Provided that free supply of cancer screening opportunities for the low SES groups refers to intervention based on social inequality, the intervention based on communication inequality can pertain to such activity for reducing gaps among SES groups in understanding and exposure of cancer-related information, technology, and treatment (Viswanath, 2005; Kontos and Viswanath, 2011).

Regarding the quality of information, the public often receives contradictory information about certain health issues from numerous sources of information (Viswanath et al., 2013). From the perspective of communication inequality, social classes show differences in their information handling capacity when they are exposed to contradictory health information. For example, citizens who are less educated feel greater confusion than more educated citizens about contradictory recommendations on the benefits and risks of fish, wine, and coffee consumption (Nagler, 2013). A controversy grows over nutritional recommendation and contradictory cancer information. In 2009, the U.S. Preventive Services Task Force (USPSTF) recommendation on mammography conflicted with recommendations from the ACS and the American College of Radiology (ACR). This example illustrates information inconsistency that may be attributed to a conflict between parties of interest (Woolf, 2010; U.S. Preventive Services Task Force, 2010; Chou et al., 2011; Squiers et al., 2011; Weeks et al., 2012). In South Korea, media covered a controversy over the anti-cancer effect of beans or vitamins, thereby raising the necessity of evidence-based information presented and certified by an authoritative institution (Kwon et al., 2005). Of course, communication

innovation can narrow down the digital divide between high SES groups and low SES groups (Viswanath, 2006). However, in terms of continuum of cancer disparities, it is necessary to evaluate how contradictory information enables low SES groups without full access to healthcare service obtain low conviction about cancer preventability and avoid screening behaviors (Han et al., 2006; 2007).

Consequently, communication innovation needs to push for cultivation and promotion of informed or shared decision-making capacity across all social classes. Some medical sociologists have pointed out that low SES groups are less likely to voluntarily seek information outside their medical encounters, in comparison to higher SES groups (Ramanadhan and Viswanath, 2006). Similarly, while relatively wealthy patients are motivated to seek second opinions or necessary information on their own, patients who are relatively impoverished are passive about seeking such information, and have a tendency to avoid the process (Galarce et al., 2011; Barbour et al., 2012). However, a cancer survivor's active search for information can greatly contribute in helping them exercise 'informed decision-making,' and at the same time improving health behavior and increasing HRQOL (Rutten et al., 2005; Nagler et al., 2010). If the benefits of ICT can be used to reduce communication inequalities between the two SES patient groups, the moderating effect can be used to help reduce cancer disparities between them. For example, a recent study has reported that, in comparison to other types of media, social media is used relatively evenly among different racial/ethnic groups (Kontos et al., 2010). Also, those who belong to low SES groups are deeply interested in it. Similarly, African Americans and Hispanics show a greater tendency to use smartphones than high SES groups (Fox, 2012; Zickuhr and Smith, 2012). Therefore, it would be necessary to activate social media platforms such as "Patient Like Me," so that cancer survivors who belong to the low SES group can readily find medical information at hand, and possibly gain more social support. While South Korea's wired broadband network is one of the best worldwide, it can be used to establish online patient communities to more efficiently satisfy the information needs of cancer survivors. Accordingly, by balancing communication inequalities among cancer survivors, it would be necessary to build a system for the integrated supportive care for cancer survivors by using the advantages of communication innovation across a cancer continuum.

## Conclusions

Advancement of ICTs opens up various new opportunities in the production and consumption of information. Customized information can help cancer patients to make decisions after due consideration, while enhancing the quality of life of terminally ill cancer patients. Moreover, ICTs allow patients, caregivers, and the general public to share information, thereby broadening the horizon of social support. At the same time, this allows for patients and caregivers to participate in two-way caregiving with the help of increased information that they have. However, ICTs can deepen the gap between

communication inequalities among patients, which must be prevented. On the other hand, the development of ICTs must be used wisely in order to control cancer (Viswanath and Ackerson, 2011). Medical institutions that provide cancer information must do so with consistent and reliable information of high quality and manageable quantity. The government must help the low SES groups to easily access medical information. Moreover, in order to promote the exchanges of support among cancer survivors, and stimulate the sharing of information, it would be necessary to establish partnerships with online patient communities or community-based organizations. By maximizing the frequency for proper usage of ICTs and minimizing dysfunctions globally, we can expect communication innovation to expedite the lowering of mortality rate and the suppression of cancer incidence rate.

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