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TRANSLATION FROM CROATIAN INTO ENGLISH:

TRANSLATION AND ANALYSIS OF TWO TEXTS

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ABSTRACT

The objective of this thesis is to examine the challenges and methodologies associated with translating specialized texts from Croatian into English, focusing on two distinct domains: medical nutrition and speleological rescue techniques. This study involves a detailed analysis of the translation processes for the texts titled *The Role of Diet in Cancer Prevention* and *Challenges of Performing Self-Rescue Techniques for an Injured Person in Descent*. By analyzing the translations this study highlights the specific difficulties and solutions associated with translating content that demands both high accuracy and contextual awareness. Through a combination of theoretical analysis and practical examples, this research provides insights into the intricacies of specialized translation and the findings emphasize the importance of subject matter expertise, precise terminology, and cultural awareness in producing high-quality translations.

Following the introduction, the source texts are presented with their respective introductory remarks. The challenges and issues encountered during the process of translation are explored in the subsequent commentary and analysis section, while the linguistic and cultural considerations imperative for translators are emphasized in the conclusion of this thesis.

Key words: Croatian, English, translation, specialized text, commentary, analysis, diet, cancer, caving

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1. INTRODUCTION

Without translation, I would be limited to the borders of my own country. The translator is my most important ally. He introduces me to the world.

– Italo Calvino

Translation is a process of conveying the meaning of words (written or spoken) from a source language into a target language. Translation is not merely about rearranging words; it involves the understanding of the subtleties, cultural context, and intended message of the original text. Essentially, translation bridges both linguistic and cultural differences, enabling effective communication and the exchange of ideas across different languages and cultures.

Translators do more than interpret languages; they act as bridges, connecting different cultures and facilitating the flow of ideas and information throughout the world. Translators are striving to maintain the essence of the source text while ensuring that it resonates with the intended audience and are also called cultural mediators. This metaphor of bridging highlights the importance of their work in creating connections and building relationships across linguistic and cultural divides. Their task requires a profound understanding of both source and target languages and their cultural backgrounds, as well as the ability to interpret texts in a manner that preserves their original intent, style and tone. Translators face innumerable challenges, many of which involve navigating linguistic ambiguity, decision making and interpreting nuanced meanings. Deciding which strategy, phrase or even which word to use represents a significant part of a translators' job.

Furthermore, translators act as editors and proofreaders, ensuring that the final text is accurate, coherent, and polished. The translated text must be grammatically correct, syntactically coherent, and stylistically appropriate for the target audience.

The first task translators face when presented with a text is making themselves familiar with the source text. The translators must recognize the intended meaning, the genre of the text, the level of formality, they must establish what is the target audience that will later read their translation, and then they can decide which approach is appropriate to use. Another important

task before starting the translation is getting themselves acquainted with the subject matter of the source text. This step is crucial for understanding the context and specific terminology that needs to be used (specialized texts).

For the purpose of writing this thesis, two texts of scientific genre were translated from Croatian into English, and the various problems encountered during the process of translation were highlighted in the analysis section. Each text is introduced with introductory remarks, followed by the translations, and lastly, a commentary and analysis section with examples of the issues and strategies which were used in order to obtain an accurate translation, along with explanations of the translators' decisions and choices.

2. SOURCE TEXT 1 – INTODUCTORY REMARKS

The first source text is a scientific paper titled written by *Valentina Rahelić, Josipa Matanić, Sandra Bival, Zrinka Šmuljić, Nikola Mesarić, Eva Pavić* and extracted from the journal *Hrana u zdravlju i bolesti: znanstveno-stručni časopis za nutricionizam i dijetetiku (Vol. 12 No. 1, 2023).*

Primary focus of the text is on cancer as a multifactorial disease with increasing global prevalence. The text addresses the significant impact of cancer on public health, highlighting its position as the second leading cause of mortality worldwide, following cardiovascular diseases. It delves into the contributing factors to the rise in cancer cases, emphasizing the influence of both metabolic and behavioural risk factors. The discussion also revolves around how evidence-based preventive strategies, early detection, and appropriate treatment can reduce cancer-related mortality. Additionally, lifestyle modifications, including proper nutrition and regular physical activity are emphasized as crucial components in the prevention of cancer development.

The scientific paper in question follows a formal structure and contains technical terminology closely related to nutrition, food and medicine. It falls in the category of specialized texts encompassing various fields such as medical, technical, and scientific texts. Translating such specialized content demands proficiency in each respective field, coupled with a profound understanding of the concepts and terminology employed.

2.1. Source text 1

Hrana u zdravlju i bolesti, znanstveno-stručni časopis za nutricionizam i dijetetiku (2023) 12 (1) 26-32 Food in Health and Disease, scientific-professional journal of nutrition and dietetics (2023) 12 (1) 26-32

ULOGA PREHRANE U PREVENCIJI KARCINOMA

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Sažetak

Karcinom postaje sve veći javnozdravstveni problem današnjice, čija prevalencija je u kontinuiranom porastu diljem svijeta. Među vodećim je uzrocima smrtnosti, a glavni rizični čimbenici su oni na koje zapravo možemo utjecati te time prevenirati od 30 do 50 % različitih vrsta karcinoma. Jedan od ključnih i glavnih koraka u prevenciji je održavanje normalne/zdrave tjelesne mase, pravilnom, uravnoteženom i raznolikom prehranom uz redovnu tjelesnu aktivnost. Ne postoji „super hrana“ za koju možemo reći da sprječava razvoj karcinoma, kao niti točno određena hrana koja ga uzrokuje, ali postoje načini prehrane koji mogu doprinijeti prevenciji odnosno razvoju ove bolesti u sklopu prevencije. Preporučuje se općenito dati prednost hrani biljnog podrijetla, što je najbolje obuhvaćeno principima Mediteranske prehrane. Takva prehrana obiluje povrćem (osobito zelenim lisnatim, crvenim i narančastim te krucifernim), voćem (bobičastim, citrusima, crvenim i narančastim), mahunarkama i cjelovitim žitaricama te maslinovim uljem. Od hrane životinjskog podrijetla preporučuje se češća konzumacija ribe i mliječnih proizvoda. S druge strane, preporučuje se izbjegavati konzumaciju industrijski procesirane hrane bogate solju, mastima niske nutritivne kvalitete i dodanim šećerom te ograničiti konzumaciju crvenog mesa i paziti na sam proces pripreme hrane kako ne bi došlo do stvaranja štetnih/kancerogenih spojeva. Preporučuje se izbaciti mesne

prerađevine, kao i prekomjernu konzumaciju alkohola. Usvajanje preporuka o promjeni načina života, što uključuje pravilnu prehranu i redovitu tjelesnu aktivnost, važan je dio prevencije razvoja karcinoma.

Ključne riječi: prevencija, hrana biljnog podrijetla, antioksidansi, karcinom, procesirana hrana

Uvod

Karcinom je multifaktorijalna bolest čija je prevalencija diljem svijeta u porastu. U većini zemalja karcinom je drugi među vodećim uzrocima smrtnosti; odmah nakon kardiovaskularnih bolesti. Prema podacima Svjetske zdravstvene organizacije (eng. *World Health Organization*, WHO) u 2020. godini zabilježeno je oko 10 milijuna smrtnih slučajeva kao posljedica različitih vrsta karcinoma, a među najčešćima ubrajaju se karcinomi dojke, prostate, pluća, debelog crijeva i rektuma (Ferlay i sur., 2020). Istraživanja su pokazala da su globalnom porastu karcinoma, u razdoblju od 2010. godine do 2019. godine, doprinijeli metabolički čimbenici rizika koji su rezultirali i visokim postotkom smrtnih ishoda (sa 643 000 umrlih u 2010. godini na 865 000 u 2019. godini (porast za 34,7 %)).

Suprotno, u 2019. godini bihevioralni čimbenici rizika imaju sve veću ulogu u nastanku različitih vrsta karcinoma. Općenito, rezultati dosadašnjih provedenih istraživanja pokazali su da smanjena izloženost promjenjivim rizičnim čimbenicima može utjecati na smanjenje nesposobnosti prilagođenih godina života (eng. *Disability-Adjusted Life Years,* DALY) povezanih s nekom bolešću kao i na smrtnost uzrokovanu karcinomima (GBD 2019 Cancer Risk Factors Collaborators, 2022). Vodeći čimbenici rizika u razdoblju od 2010. godine do 2019. godine uzimajući u obzir DALY prikazani su u tablici 1.
Danas je poznato da se od 30 do 50 % pojedinih vrsta karcinoma može prevenirati provođenjem preventivnih strategija utemeljenih na dokazima koji uključuju i rano otkrivanje te odgovarajuće liječenje u osoba sa postavljenom dijagnozom. Mnoge vrste karcinoma, ukoliko se pravovremeno dijagnosticiraju, imaju veću vjerojatnost pozitivnog ishoda liječenja (WHO, 2019).

Čimbenici koji utječu na prevenciju karcinoma

Poznato je da brojni čimbenici mogu utjecati na razvoj karcinoma. Postoje pojedini na koje ne možemo utjecati kao što su dob i genetski čimbenici te oni na koje možemo, kao što su način života koji uključuje i provođenje tjelesne aktivnosti te pravilna i uravnotežena prehrana (Tablica 2) koja predstavlja jedan od važnijih čimbenika kako u prevenciji, tako i u liječenju različitih vrsta karcinoma (Narimatsu i Yaguchi, 2022; Kerschbaum i Nüssler, 2019).

Tablica 1. Vodeći čimbenici rizika (bihevioralni, metabolički i okolišni) u razdoblju od 2010. godine do 2019. godine (GBD 2019 Cancer Risk Factors Collaborators, 2022)

	Vodeći čimbenici rizika, 2010. god.	**Vodeći čimbenici rizika, 2019. god.**
1.	Pušenje	Pušenje
2.	Konzumacija alkohola	Konzumacija alkohola
3.	Visok indeks tjelesne mase (ITM)	Visok indeks tjelesne mase (ITM)
4.	Rizični spolni odnosi	Rizični spolni odnosi
5.	Visoke koncentracije glukoze natašte	Visoke koncentracije glukoze natašte
6.	Zagađenje česticama iz okoline	Zagađenje česticama iz okoline
7.	Profesionalna izloženost azbestu	Profesionalna izloženost azbestu
8.	Smanjena konzumacija cjelovitih žitarica	Smanjena konzumacija cjelovitih žitarica
9.	Smanjena konzumacija mlijeka i mliječnih proizvoda	Smanjena konzumacija mlijeka i mliječnih proizvoda
10.	Smanjena konzumacija voća	Pasivno pušenje
11.	Pasivno pušenje	Smanjena konzumacija voća

BIHEVIORALNI METABOLIČKI OKOLIŠNI

Tablica 2. Uloga pojedine vrste hrane i nutrijenata u prevenciji i nastanku pet najčešćih karcinoma (prilagođeno prema: Chang i Hu, 2023; Herby i sur., 2023; Speciani i sur., 2023; Jin i Je, 2022; He i sur., 2021; Ubago-Guisado i sur., 2021; Sargsyan i Dubasi, 2021; Wajszczyk i sur., 2021; Key i sur., 2020; Nandini i sur., 2020; Rock i sur., 2020; Shin i sur., 2020; WCFR, 2018b; Mori i sur., 2017)

	Hrana i nutrijenti koji doprinose smanjenju rizika	**Hrana i nutrijenti koji doprinose povećanju rizika**	**Hrana za koju su dokazi ograničeni ili ih nema dovoljno**
Karcinom dojke	voće, neškrobno povrće, vlakna iz povrća, masna morska riba	alkohol, crveno i procesirano meso	vlakna iz voća, žitarica i mahunarki, mlijeko i mliječni proizvodi
	β-karoten, riboflavin, tiamin, folat, željezo, kalcij, magnezij, kalij, vitamin C i B6	Zasićene masne kiseline, hrana s visokim glikemijskim indeksom, niske koncentracije vitamina D	
Karcinom pluća	voće, neškrobno povrće (osobito kruciferno)	lošija nutritivna kvaliteta prehrane, voda koja sadrži arsen, procesirano meso	crveno meso, riba, alkohol
	vitamin B6, metionin, prehrambeni unos vitamina C i K2, hem željezo, hrana koja sadrži retinol, β-karoten i karotenoide	visoke doze β-karotena u obliku dodataka prehrani (kod pušača)	izoflavoni
Kolorektalni karcinom	vlakna iz voća i povrća, sjemenke i orašasti plodovi, mlijeko i jogurti, češnjak, mahunarke	alkohol, crveno i procesirano meso	riba
	prehrambeni unos Ca, koncentracija vitamina B2, B6 i retinola u plazmi, prehrambeni unos β-karotena i vitamina E	lošija nutritivna kvaliteta prehrane, prehrana s protuupalnim učinkom	koncentracija cirkulirajućeg vitamina D, unos vitamina C i karotena
Karcinom prostate	voće i povrće (osobito kruciferno), cjelovite žitarice, riba	procesirano meso, alkohol	mlijeko i mliječni proizvodi
	izoflavoni	niske koncentracije vitamina E i selena u plazmi, zasićene i trans masne kiseline	vitamin D i E, selen, likopen, β-karoten
Karcinom želuca	voće i povrće, žitarice	slana hrana, veće količine ukiseljenog povrća, procesirano meso, alkohol	zeleni čaj
	vitamin C, β-karoten, selen	infekcija *Helicobacter pylori*	

Pretilost, tjelesna aktivnost i održavanje normalne tjelesne mase

Pretilost se prema Svjetskoj zdravstvenoj organizaciji (eng. *World Health Organization*, WHO) definira kao pretjerano nakupljanje masti koje može imati negativan utjecaj na zdravlje. Općenito, kao jedan od glavnih uzročnika nastanka pretilosti navodi se neravnoteža između unosa i potrošnje energije (WHO, 2018).

Posljedice pretilosti povezane su s razvojem brojnih kroničnih nezaraznih bolesti gdje su najviše izražene šećerna bolest tipa 2 (44 %), ishemijska bolest srca (23 %) te pojedine vrste karcinoma (7 do 41 %) (EASO, 2020), uključujući karcinom kolona, jednjaka, gušterače i bubrega te karcinom dojke u postmenopauznom razdoblju života (Renehan i Soerjomataram, 2016). Redovita tjelesna aktivnost svojim djelovanjem na više sustava što uključuje imunološki, metabolički i endokrinološki, utječe na smanjenje rizika za razvoj pretilosti, a time i karcinoma osobito kolona, dojke i endometrija (Leitzmann i sur., 2015; Kerschbaum i Nüssler, 2019). Potencijalan mehanizam djelovanja uključuje povećanje protuupalne razine adiponektina, smanjenje koncentracije spolnih hormona, sistemske upale, inzulinu sličnog faktora rasta (IGF-1), hiperinzulinemije i citokina povezanih sa pretilošću te utječe na raznolikost crijevne mikrobiote (Jurdana, 2021). Stoga su preporuke WHO-a da bi se tjedno trebalo provoditi najmanje 150 minuta umjerene tjelesne aktivnosti ili 75 minuta tjelesne aktivnosti visokog intenziteta (Kerschbaum i Nüssler, 2019; WHO, 2022).

Uloga prehrane u prevenciji razvoja karcinoma

Do danas je provedeno mnogo istraživanja koja su pokazala da se pravilnom i uravnoteženom prehranom mogu osigurati sve potrebne hranjive tvari, a time i prevenirati razvoj brojnih kroničnih nezaraznih bolesti. Kada govorimo o karcinomima ne postoji „super hrana“ koja može spriječiti njihov razvoj, ali su istraživanja pokazala da konzumacija pojedine vrste hrane može smanjiti ili povećati rizik od razvoja pojedinih vrsta karcinoma (Grosso i sur., 2017).

Multicentrično prospektivno istraživanje *The European Prospective Investigation into Cancer and Nutrition* (EPIC study), provedeno u 10 europskih zemalja, istraživalo je povezanost čimbenika rizika povezanih s prehranom i pojave četiri najučestalija karcinoma u Europskoj populaciji (karcinom dojke, pluća, prostate i kolorektalni karcinom). Pokazalo se da odgovarajući unos voća i povrća može djelovati zaštitno na razvoj karcinoma dojke, pluća te debelog crijeva. Jednako je pokazano za unos voća i smanjeni rizik za karcinom prostate. Ujedno, dokazana je povezanost između nižeg unosa crvenog i prerađenog mesa te višeg unosa

ribe s manjim rizikom od karcinoma dojke. Unos alkohola povećava rizik od razvoja karcinoma dojke i crijeva, a odgovarajući unos fermentiranih mliječnih proizvoda, odnosno jogurta, a time i kalcija, može imati zaštitni učinak na razvoj karcinoma crijeva i prostate (Ubago-Guisado i sur., 2021).

Hrana koja može pomoći u prevenciji razvoja karcinoma

Hrana biljnog podrijetla

Kada je riječ o prevenciji karcinoma prednost se daje općenito hrani biljnog podrijetla upravo iz razloga jer se na taj način može osigurati odgovarajući unos esencijalnihnutrijenata, mikronutrijenata i antioksidansa (kao vitamina E i C, selena), fitokemikalija, biljnih sterola i vlakana za koje je dokazano da mogu imati zaštitni učinak u razvoju pojedinih vrsta karcinoma (Kerschbaum i Nüssler, 2019; Mentella i sur., 2019).
Brojna provedena istraživanja pokazala su da pojedine vrste povrća (pogotovo kruciferno povrće i češnjak) i voća u svom sastavu sadrže antioksidanse koje štite DNA od oštećenja te stanice od oksidativnog stresa (Mentella i sur., 2019; Aune i sur., 2017). Stoga su i preporuke Svjetskog fonda za istraživanje karcinoma (eng. *World Cancer Research Fund*, WCRF) da bi dnevni unos trebao biti najmanje 400 g raspoređen kroz 5 serviranja. Provedeno prospektivno kohortno istraživanje pokazalo je povezanost između unosa krucifernog povrća (npr. cvjetača, kupus, brokula, rotkvica), kao izvora izotiocijana te smanjenog rizika od razvoja karcinoma pluća u osoba koje su bili nepušači (Mori i sur., 2017). Dodatno provedena meta-analiza prospektivnih kohortnih istraživanja pokazala je kako je općenito unos povrća u pušača značajno povezan sa smanjenjem rizika od razvoja karcinoma pluća. Isto tako umjeren unos voća značajno smanjuje rizik od karcinoma pluća kod pušača, ali iznimno visok unos negativno je povezan s razvojem rizika u osoba koje su bile pušači te u pušača (Wang i sur., 2019), odnosno ne postiže se nikakva daljnja korist povećanjem dnevnog unosa voća iznad ~400 g (Vieira i sur., 2016).

Ovo povrće ujedno je i izvor antioksidansa sulforafana (npr. brokula), iz skupine izotiocijanata, za koje je dokazano da može imati ulogu u prevenciji i liječenju karcinoma dojke, kože, usne šupljine, debelog crijeva, mokraćnog mjehura i prostate (Nandini i sur., 2020). S druge strane, istraživanja su pokazala da ne postoji značajna povezanost između unosa narančastog i crvenog povrća i voća kao izvora karotenoida (npr. mrkva, rajčica, marelica) sa

smanjenim rizikom od razvoja karcinoma (WCFR, 2018a). Poznato je da mogu djelovati na smanjenje karcinogeneze, ali je potrebno provesti dodatna istraživanja kako bi se utvrdio točan mehanizam djelovanja (Rowles i Erdman, 2020).

Citrusi su izvor flavonoida za koje je znanstveno dokazano da imaju antikancerogeno, antioksidatvno, protuupalno i drugo biološko djelovanje (Cirmi i sur., 2017). Posebno se ističe naringerin za kojeg su istraživanja pokazala da može usporiti razvoj pojedinih vrsta karcinoma na način da modificira signalne puteve, inducira apoptozu, djeluje na stanične cikluse i angiogenezu (Motallebi i sur., 2022).

Voće, povrće, cjelovite žitarice i mahunarke smatraju se najboljim izvorom vlakana za koje je znanstveno dokazano da mogu smanjiti rizik za razvoj kolorektalnog karcinoma. Stoga su preporuke da bi dnevni unos vlakana prema WCFR trebao biti oko 30 g (WCFR, 2018b).

Cjelovite žitarice su značajan izvor antioksidansa i brojnih bioaktivnih spojeva kao što su fenolni spojevi, lignani i fitoestrogeni (Motallebi i sur., 2022). Provedene meta-analize pokazale su kako je dnevni unos cjelovitih žitarica od oko 30 g povezan s oko 7 % smanjenim rizikom od ukupne smrtnosti kao posljedica karcinoma, s najjačim dokazima za karcinom jednjaka, želuca, gušterače i debelog crijeva (Gaesser, 2020).

Orašasti plodovi i mahunarke dobar su izvor fitokemikalija, vlakana i antioksidansa. Provedena istraživanja pokazala su povezanost između dnevnog unosa mahunarki od 100 g (1 porcija/dan) te orašastih plodova od 28 g (1 porcija/dan) sa smanjenjem rizika za 21 %, odnosno 33 % za razvoj kolorektalnog karcinoma (Jin i Je, 2022). Ujedno, istraživanja su pokazala kako redoviti unos češnjaka može dodatno doprinijeti smanjenju rizika od razvoja ove vrste karcinoma (Speciani i sur., 2023).

Postoje brojna istraživanja koja su pokazala dobrobit maslinovog ulja na zdravlje. Maslinovo ulje izvor je brojnih antioksidansa među kojima se ističu oleokantal i hidroksitirozol za koje je utvrđeno da imaju antitumorsko djelovanje, a najbolji izvor je ekstra djevičansko maslinovo ulje (Markellos i sur., 2022). Tako je nedavno provedeno istraživanje dokazalo da svakodnevna konzumacija 1,5 žlice maslinova ulja može sniziti ukupnu smrtnost uzrokovanu karcinomima za 17 % (Guasch-Ferré i sur., 2022).

Hrana životinjskog podrijetla

Istraživanja su pokazala da svakodnevni visoki unos mliječnih proizvoda (oko 700 g odnosno 4 serviranja/dan) može smanjiti rizik od razvoja kolorektalnog karcinoma te karcinoma prostate što se pripisuje brojnim prisutnim nutrijentima kao što su kalcij, vitamin D, laktoferin,

linolna kiselina i probiotici (Ubago-Guisado i sur., 2021; Motallebi i sur., 2022; Jin i sur., 2020).

Međutim, postoje ograničeni dokazi da ova vrsta hrane može smanjiti rizik od razvoja karcinoma dojke u žena u perimenopauzi. Jednako vrijedi i za prehranu bogatu kalcijem u žena i perimenopauzi i postmenopauzi (He i sur., 2021; Wajszczyk i sur., 2021).

Postoje ograničeni dokazi da konzumacija ribe može smanjiti rizik od kolorektalnog karcinoma i karcinoma jetre. Masna plava riba bogata je omega-3 masnim kiselinama (eikosapentaenskom i dokosaheksaenskom masnom kiselinom) za koje je dokazano da mogu ublažiti oksidativni stres i upalne procese uzrokovane nealkoholnom masnom bolesti jetre (Jump i sur., 2015), dok su provedena eksperimentalna istraživanja pokazala da mogu smanjiti rizik od razvoja kolorektalnog karcinoma (Shin i sur., 2020). Visok unos masne morske ribe je povezan sa značajno smanjenim rizikom od razvoja karcinoma dojke (Ubago-Guisado i sur., 2021).

Hrana koja može doprinijeti razvoju karcinoma

Ne može se reći da određena hrana uzrokuje karcinom, ali svakako postoji dokazana povezanost između prekomjerne konzumacije određene vrste hrane (zbog njihovog utjecaja na organizam, načina njihove pripreme tj. obrade itd.) i povećanja rizika za razvoj karcinoma. Općenito, industrijski procesirana hrana (bogata dodanim šećerima, solju, trans masnim kiselinama, zasićenim masnim kiselinama, a s druge strane siromašna vlaknima) utječe na povećanje rizika za razvoj karcinoma (Rock, 2020). Prospektivno kohortno istraživanje provedeno od strane *UK Biobank*, na gotovo 200 tisuća ispitanika čije je zdravlje praćeno u narednom desetljeću, utvrdila je da konzumacija industrijski procesirane hrane povećava rizik za razvoj 34 različite vrste karcinoma (osobito jajnika i mozga). Povećanje konzumacije industrijski procesirane hrane za 10 % dovodi do 2 %-tnog povećanja rizika za razvoj karcinoma općenito te 19 %-tnog povećanja rizika za razvoj karcinoma jajnika, a povezana je i sa 6 % većom smrtnosti od karcinoma općenito, 16 % većom smrtnosti od karcinoma dojke i 30 % od karcinoma jajnika (Chang i Hu, 2023). Jedan od osnovnih puteva kojima i šećer utječe na razvoj karcinoma je doprinos razvoju pretilosti i drugih metaboličkih poremećaja (kardiometabolički, inzulinska rezistencija, šećerna bolest tipa 2 itd.), koji dalje predstavljaju čimbenike rizika za razvoj karcinoma (Malik i Hu, 2022). Važno je obratiti pozornost na tzv. „skriveni šećer“ u hrani, a to se ponajprije odnosi na: bezalkoholne zaslađene napitke, glukozno-fruktozni te kukuruzni sirup, rafinirane žitarice, pekarske proizvode itd. Kada govorimo o žitaricama, postoje istraživanja čije rezultate je za sad potrebno promatrati s

oprezom zbog potrebe za daljnjim istraživanjima, ali ukazuju na povećanje rizika za razvoj karcinoma uslijed konzumacije rafiniranih žitarica (Gaesser, 2020), budući da se u tom procesu rafinacije često dodaje šećer i druge komponente čime se povećava njihov glikemijski indeks i kalorijska vrijednost, a smanjuje se udio vlakana, vitamina i minerala (WCRFc, 2018). Osim toga, žitarice mogu biti kontaminirane mikotoksinima (npr. aflatoksin) od kojih su neki potvrđeni kancerogeni (aflatoksin se povezuje s razvojem karcinoma jetre) (WCRFc, 2018; Mentela i sur., 2019).

Međunarodna agencija za istraživanje karcinoma (eng. *International Agency for Research on Cancer*, IARC), svrstala je procesirano meso u skupinu kancerogena za ljude (skupina 1), a crveno meso u skupinu vjerojatnih kancerogena za ljude (skupina 2A) (Turesky, 2018). Potencijalni mehanizmi koji se najvjerojatnije nalaze u pozadini ovih povezanosti, odnose se zapravo na spojeve koji nastaju prilikom obrade mesa. Primjerice, nitriti i nitrati u prerađenom/sušenom mesu, nitrozamini u crijevima čije stvaranje je kataliziranо hem-željezom, a dovode do oksidativnih oštećenja DNA, zatim heterociklički aromatski amini (HAA) i policiklički aromatski ugljikovodici (PAH) koji nastaju prilikom toplinske obrade mesa na visokim temperaturama (prženje, roštiljanje i sl.) (Farvid i sur., 2021; Singh i sur., 2020). Osim toga, prekomjerna konzumacija crvenog (i procesiranog) mesa može poticati upalne procese i oksidativni stres u organizmu, što može inicirati karcinogenezu (Rock i sur., 2020).

Globalno, oko 41 % svih novih slučajeva karcinoma u 2020. godini može se pripisati prekomjernom unosu alkohola (Rumgay i sur., 2021). Američki institut za istraživanje karcinoma (eng. *American institute for cancer research*, AICR) klasificirao je konzumaciju alkohola kao treći glavni promjenjivi čimbenik rizika za razvoj karcinoma (nakon pušenja i pretilosti). Za pojedince koji ipak piju alkohol, preporuka je ograničiti konzumaciju na ne više od 1 pića dnevno za žene i ne više od 2 pića dnevno za muškarce (WCFR, 2018b).

Kada govorimo o mlijeku i mliječnim proizvodima, postoje oprečni rezultati istraživanja vezani uz utjecaj na karcinom dojke i prostate. Ova vrsta hrane je glavni prehrambeni izvor kalcija, čije visoke koncentracije smanjuju regulaciju sinteze biološki aktivnog vitamina D, a postoje ograničeni dokazi da tako utječu na povećanu proliferaciju stanica u prostati, odnosno povećavaju rizik za razvoj karcinoma (Herby i sur., 2023; WCRF, 2018b). Nedavno provedena populacijska istraživanja pokazala su da postoji moguća povezanost između karcinoma dojke i visokog unosa mlijeka (Herby i sur., 2023). Još uvijek nije u potpunosti razjašnjeno utječu li na taj rizik zasićene masne kiseline iz mlijeka ili druge komponente (npr. kalcij, estrogen koji

se nalazi u kravljem mlijeku kao posljedica industrijske proizvodnje, povećana koncentracija čimbenika rasta 1 sličnog inzulinu (eng. *insulin-like growth factor* 1, IGF-1)). Osim toga, mlijeko i mliječni proizvodi komponente su tzv. „zapadnjačke prehrane“ stoga se to povećanje rizika može pripisati i ukupnom štetnom/kancerogenom utjecaju ovakvog načina prehrane (Sargsyan i Dubsai, 2021) te su svakako potrebna daljnja istraživanja.

Zaključak

Danas je karcinom jedan od vodećih uzročnika smrti diljem svijeta. Ne postoji jedna vrsta hrane koja može spriječiti nastanak karcinoma nego se savjetuje raznovrsna, pravilna i uravnotežena cjeloživotna prehrana koja uključuje visok unos hrane biljnog podrijetla; voća, povrća, cjelovitih žitarica, mahunarki te hrane životinjskog podrijetla koja je izvor visokovrijednih nutrijenata kao što su riba i mliječni proizvodi. Glavni zaštitni učinak krije se u sinergiji hrane, a kao najbolji prehrambeni obrazac kojeg karakterizira unos ove vrste hrane je Mediteranska prehrana za koju je dokazano da može utjecati na prevenciju pojedinih vrsta karcinoma kao i na ukupnu smrtnost uzrokovanu karcinomima (Mentella i sur., 2019). Uz provođenje pravilne prehrane, a kako bi prevenirali razvoj brojnih kroničnih nezaraznih bolesti te pojedinih vrsta karcinoma, savjetuje se provođenje redovite tjelesne aktivnosti i održavanje normalne tjelesne mase.

2.2. Translation of source text 1

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THE ROLE OF DIET IN CANCER PREVENTION

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Abstract

review paper

Cancer is becoming an increasingly significant public health issue today, with its prevalence continuously rising worldwide. It ranks among the leading causes of mortality, with primary risk factors being those that we can actually influence, thereby preventing from 30 to 50% of various types of cancer. One of the key and primary steps in prevention is maintaining a normal/healthy body mass, with a proper, balanced and varied diet combined with regular physical activity. There is no 'superfood' that we can say prevents the development of cancer, nor is there any specific food that directly causes it, but there are dietary patterns that can contribute to its prevention or development within the framework of prevention. It is generally recommended to give preference to plant-based foods, which is ideally illustrated by the principles of the Mediterranean diet. Such a diet is rich in vegetables (especially leafy greens, red and orange varieties, and cruciferous vegetables), fruits (berries, citrus fruits, red and orange fruits), legumes, whole grains, and olive oil. When it comes to animal-based foods, it is recommended to consume fish and dairy products more frequently. On the other hand, it is recommended to avoid the consumption of industrially processed foods rich in salt, low-quality fats, and added sugar. Additionally, it is advised to limit the intake of red meat and pay attention to the food preparation process to prevent the formation of harmful/carcinogenic compounds. It is recommended to eliminate processed meat products, as well as excessive alcohol

consumption. Adopting recommendations for lifestyle changes, including a proper diet and regular physical activity, is an important part of preventing the development of cancer.

Key words: prevention, plant-based diet, antioxidants, cancer, processed food

Introduction

Cancer is a multifactorial disease with its prevalence increasing worldwide. In most countries, cancer is the second leading cause of mortality, immediately following cardiovascular diseases. According to the World Health Organization (WHO) data, in the year 2020, there were around 10 million deaths attributed to various types of cancer. Among the most common are breast, prostate, lung, colon and rectal cancers (Ferlay et al., 2020). Research has shown that metabolic risk factors contributed to the global increase of cancer, during the period from 2010 to 2019, resulting in a high percentage of fatal outcomes (from 643,000 deaths in 2010 to 865,000 deaths in 2019, an increase of 34.7%).

On the other hand, in 2019, behavioural risk factors played an increasingly significant role in the development of various types of cancer. In general, the results of the conducted research have shown that reduced exposure to modifiable risk factors can influence the reduction of Disability-Adjusted Life Years (DALYs) associated with a particular disease, as well as mortality caused by cancers (GBD 2019 Cancer Risk Factors Collaborators, 2022).

The leading risk factors in the period from 2010 to 2019, considering DALY, are presented in Table 1.

Currently, it is known that 30 to 50% of certain cancer types can be prevented by implementing evidence-based preventive strategies, including early detection and appropriate treatment in individuals with a confirmed diagnosis. Many types of cancer, if diagnosed in a timely manner, have a higher probability of a positive treatment outcome (WHO, 2019).

Factors Affecting Cancer Prevention

It is known that numerous factors can affect the development of cancer. There are certain factors that cannot be prevented, such as age and genetic factors, and those that can be prevented, such as lifestyle, including physical activity, and a well-balanced diet (Table 2). A well-balanced diet is considered one of the more significant factors in both the prevention and

treatment of various types of cancer (Narimatsu and Yaguchi, 2022; Kerschbaum and Nüssler, 2019).

Table 1. Leading risk factors (behavioural, metabolic, and environmental) in the period from 2010 to 2019 (GBD 2019 Cancer Risk Factors Collaborators, 2022)

	Leading risk factors, 2010.	**Leading risk factors, 2019.**
1.	Smoking	Smoking
2.	Alcohol consumption	Alcohol consumption
3.	High body mass index (BMI)	High body mass index (BMI)
4.	Risky sexual relations	Risky sexual relations
5.	High fasting glucose concentrations	High fasting glucose concentrations
6.	Pollution by particles from the environment	Pollution by particles from the environment
7.	Occupational exposure to asbestos	Occupational exposure to asbestos
8.	Reduced consumption of whole grains	Reduced consumption of whole grains
9.	Reduced consumption of milk and milk products	Reduced consumption of milk and milk products
10.	Reduced fruit consumption	Passive smoking
11.	Passive smoking	Reduced fruit consumption

Table 2: 2021; Wajszczyk et al., 2021; Key et al., 2020; Nandini et al., 2020; Rock et al., 2020; Shin et al., 2020; WCFR, 2018b; Mori et al., 2017)

	Food and nutrients that contribute to reducing risk	**Food and nutrients that contribute to increasing risk**	**Food with limited or insufficient evidence**
Breast cancer	fruit, non-starchy vegetables, vegetable fiber, fatty sea fish	alcohol, red and processed meat	fibers from fruits, grains and legumes, milk and dairy products
	beta-carotene, riboflavin, thiamine, folate, iron, calcium, magnesium, potassium, vitamin C and B6	saturated fatty acids, high glycemic index foods, low concentrations of vitamin D	
Lung cancer	fruits, non-starchy vegetables (especially cruciferous vegetables)	poorer nutritional quality of diet, water containing arsenic, processed meat	red meat, fish, alcohol
	vitamin B6, methionine, dietary intake of vitamins C and K2, heme iron, food containing retinol, β – carotene and carotenoids	high doses of *beta* – carotene in the form of supplements (for smokers)	isoflavones
Colorectal cancer	fiber from fruits and vegetables, seeds and nuts, milk and yogurts, garlic, legumes	alcohol, red and processed meat	fish
	dietary intake of Ca, plasma concentrations of vitamin B2, B6, and retinol, dietary intake of β – carotene, and vitamin E	poorer nutritional quality of diet, anty-inflammatory diet	concentration of circulating vitamin D, intake of vitamin C and Carotene
Prostate cancer	fruits and vegetables (especially cruciferous), whole grains, fish	processed meat, alcohol	milk and dairy products
	isoflavones	low concentrations of vitamin E and selenium in plasma, saturated and trans fatty acids	vitamin D and E, selenium, lycopene, β - carotene
Stomach cancer	fruits and vegetables, grains	salty food, large amounts of pickled vegetables, processed meat, alcohol	green tea
	vitamin C, β-carotene, selenium	*Heliobacter pylori* infection	

Obesity, physical activity and maintaining of normal body weight

Obesity, according to the World Health Organization (WHO), is defined as the excessive accumulation of fat that may have a negative impact on health. Generally, one of the main causes of obesity is the imbalance between energy intake and energy expenditure (WHO, 2018).

The consequences of obesity are associated with the development of numerous chronic non-communicable diseases, with the most prominent being type 2 diabetes (44%), ischemic heart disease (23%), and certain types of cancers (7 to 41%) (EASO, 2020), including colon, esophageal, pancreatic, and kidney cancers, as well as postmenopausal breast cancer (Renehan and Soerjomataram, 2016).

Regular physical activity, by affecting multiple systems including the immune, metabolic, and endocrine systems, contributes to reducing the risk of developing obesity and, consequently, cancer, especially colon, breast, and endometrial cancers (Leitzmann et al., 2015; Kerschbaum and Nüssler, 2019).
A potential mechanism of action involves increasing the anti-inflammatory levels of adiponectin, reducing concentrations of sex hormones, systemic inflammation, insulin-like growth factor (IGF-1), hyperinsulinemia, and obesity-related cytokines, and influencing the diversity of the gut microbiota (Jurdana, 2021).

Therefore, WHO recommends engaging in at least 150 minutes of moderate-intensity physical activity per week or 75 minutes of high-intensity physical activity (Kerschbaum and Nüssler, 2019; WHO, 2022).

The role of diet in preventing the development of cancer

To date, numerous studies have shown that a proper and balanced diet can provide all the necessary nutrients, thereby preventing the development of various chronic non-communicable diseases. When it comes to cancers, there is no "superfood" that can prevent their development, but research has shown that the consumption of certain types of food can reduce or increase the risk of developing specific types of cancers (Grosso et al., 2017).

The multicentric prospective study, *The European Prospective Investigation into Cancer and Nutrition* (EPIC study), conducted in 10 European countries, investigated the association between dietary risk factors and the occurrence of the four most common cancers in the

European population (breast, lung, prostate, and colorectal cancers). It has been shown that an adequate intake of fruits and vegetables can have a protective effect against the development of breast, lung, and colorectal cancers. The same has been shown for fruit intake and a reduced risk of prostate cancer. Furthermore, there is evidence of an association between lower intake of red and processed meat and higher intake of fish with a lower risk of breast cancer. Alcohol intake increases the risk of developing breast and colorectal cancer, while adequate intake of fermented dairy products, such as yogurt, and thus calcium, may have a protective effect on the development of colorectal and prostate cancer (Ubago-Guisado et al., 2021).

Food that can help prevent the development of cancer

Plant-based origin

When it comes to cancer prevention, advantage is generally given to plant-based food precisely because it can ensure an adequate intake of essential nutrients, micronutrients, and antioxidants (such as vitamins E and C, selenium), phytochemicals, plant sterols, and fibers that have been proven to have a protective effect in the development of certain types of cancer (Kerschbaum and Nüssler, 2019; Mentella et al., 2019).

Numerous studies have shown that certain types of vegetables (especially cruciferous vegetables and garlic) and fruits contain antioxidants that protect DNA from damage and cells from oxidative stress (Mentella et al., 2019; Aune et al., 2017). Therefore, the recommendations of the World Cancer Research Fund (WCRF) suggest that the daily intake should be at least 400 g distributed across 5 servings. A conducted prospective cohort study has shown an association between the consumption of cruciferous vegetables (e.g., cauliflower, cabbage, broccoli, radish), as a source of isothiocyanates, and a reduced risk of developing lung cancer in individuals who were non-smokers (Mori et al., 2017). Additionally, a meta-analysis of prospective cohort studies has shown that the overall intake of vegetables in smokers is significantly associated with a reduced risk of developing lung cancer. Similarly, moderate fruit consumption significantly reduces the risk of lung cancer in smokers. However, extremely high intake is negatively associated with increased risk in individuals who were smokers or are smokers (Wang et al., 2019). In other words, there is no further benefit in increasing daily fruit intake beyond ~400 g (Vieira et al., 2016).

Before mentioned vegetables are also a source of the antioxidant sulforaphane (e.g., broccoli), from the group of isothiocyanates, which has been proven to have a role in the prevention and

treatment of breast cancer, skin cancer, oral cavity cancer, colorectal cancer, bladder cancer, and prostate cancer (Nandini et al., 2020). On the other hand, research has shown that there is no significant association between the intake of orange and red vegetables and fruits as sources of carotenoids (e.g., carrots, tomatoes, apricots) and a reduced risk of developing cancer (WCRF, 2018a). It is known that carotenoids can contribute to reducing carcinogenesis, but additional research is needed to determine their exact mechanism of action (Rowles and Erdman, 2020).

Citrus fruits are a source of flavonoids, for which scientific evidence has demonstrated anticancerous, antioxidative, anti-inflammatory, and other biological effects (Cirmi et al., 2017). Particularly notable is naringenin, for which research has shown that it can slow down the development of certain types of cancer by modifying signaling pathways, inducing apoptosis, affecting cell cycles, and angiogenesis (Motallebi et al., 2022).

Fruits, vegetables, whole grains, and legumes are considered the best sources of fiber, which has been scientifically proven to reduce the risk of developing colorectal cancer. Therefore, the recommendations suggest that the daily intake of fiber, according to the WCRF, should be around 30 g (WCRF, 2018b).

Whole grains are a significant source of antioxidants and numerous bioactive compounds such as phenolic compounds, lignans, and phytoestrogens (Motallebi et al., 2022). Conducted meta-analyses have shown that a daily intake of around 30 g of whole grains is associated with approximately a 7% reduced risk of overall mortality due to cancer, with the strongest evidence for esophageal, stomach, pancreatic, and colorectal cancers (Gaesser, 2020).

Nuts and legumes are an effective source of phytochemicals, fibers, and antioxidants. Research has shown an association between a daily intake of 100 g of legumes (1 serving/day) and 28 g of nuts (1 serving/day) with a 21% and 33% reduced risk, respectively, for the development of colorectal cancer (Jin and Je, 2022). Furthermore, research has shown that regular consumption of garlic can contribute to reducing the risk of developing this type of cancer (Speciani et al., 2023).

There are numerous studies that have shown the health benefits of olive oil. Olive oil is a source of numerous antioxidants, particularly oleocanthal and hydroxytyrosol, both of which have been found to have anti-tumor effects, with extra virgin olive oil being the best source. (Markellos et al., 2022). Recently conducted research has shown that daily consumption of 1.5 tablespoons of olive oil can reduce overall cancer-related mortality by 17% (Guasch-Ferré et al., 2022).

Animal-Based Food

Studies has shown that a daily high intake of dairy products (approximately 700 g or 4 servings/day) can reduce the risk of developing colorectal and prostate cancer, due to the presence of various nutrients such as calcium, vitamin D, lactoferrin, linoleic acid, and probiotics (Ubago-Guisado et al., 2021; Motallebi et al., 2022; Jin et al., 2020).
However, there is limited evidence that this type of food can reduce the risk of breast cancer development in perimenopausal women. The same applies to a calcium-rich diet in perimenopausal and postmenopausal women (He et al., 2021; Wajszczyk et al., 2021).

Limited evidence suggests that consuming fish may reduce the risk of colorectal cancer and liver cancer. Oily fish rich in omega-3 fatty acids (eicosapentaenoic and docosahexaenoic acid) have been proven to alleviate oxidative stress and inflammatory processes caused by non-alcoholic fatty liver disease (Jump et al., 2015). Experimental research has also shown their potential to reduce the risk of colorectal cancer development (Shin et al., 2020). High intake of oily fish is associated with a significantly reduced risk of breast cancer development (Ubago-Guisado et al., 2021).

Food that can contribute to the development of cancer

It cannot be claimed that certain foods cause cancer, but there is certainly a proven connection between excessive consumption of certain types of food (due to their impact on the body, methods of preparation, processing, etc.) and an increased risk of developing cancer. In general, industrially processed food (rich in added sugars, salt, trans fatty acids, saturated fatty acids, and low in fiber) is associated with an increased risk of cancer development (Rock, 2020). Prospective cohort study conducted by the *UK Biobank*, involving nearly 200,000 participants whose health was monitored over the next decade, found that the consumption of industrially processed food increases the risk of developing 34 different types of cancer (particularly ovarian and brain cancer). An increase in the consumption of industrially processed food by 10% leads to a 2% increase in the overall risk of developing cancer, a 19% increase in the risk of ovarian cancer. Also, it is associated with a 6% higher cancer mortality overall, 16% higher breast cancer mortality, and 30% higher ovarian cancer mortality (Chang and Hu, 2023).
One fundamental way in which sugar contributes to the development of cancer is by contributing to the development of obesity and other metabolic disorders (cardiometabolic,

insulin resistance, type 2 diabetes, etc.), which are further risk factors for cancer development (Malik and Hu, 2022). It is important to pay attention to so-called 'hidden sugars' in foods, which primarily include: sugar-sweetened beverages, glucose-fructose and corn syrup, refined grains, bakery products, etc. When discussing grains, there are studies whose results should be interpreted with caution due to the need for further research, but they indicate an increased risk of cancer development due to the consumption of refined grains (Gaesser, 2020). This is because the refining process often involves the addition of sugar and other components, which increase their glycemic index and caloric value while reducing the fiber, vitamin, and mineral content (WCRF, 2018). Additionally, grains can be contaminated with mycotoxins (e.g., aflatoxin), some of which are confirmed carcinogens (aflatoxin is linked to the development of liver cancer) (WCRF, 2018; Mentela et al., 2019).

The International Agency for Research on Cancer (IARC) has classified processed meat as a carcinogen for humans (Group 1) and red meat as a probable carcinogen for humans (Group 2A) (Turesky, 2018). The potential mechanisms behind these associations actually relate to compounds generated during meat processing. For example, nitrites and nitrates in processed/dried meat, nitrosamines in the intestines catalyzed by heme-iron, leading to oxidative DNA damage, as well as heterocyclic aromatic amines (HAAs) and polycyclic aromatic hydrocarbons (PAHs) formed during the high-temperature meat cooking processes (frying, grilling, etc.) (Farvid et al., 2021; Singh et al., 2020). Furthermore, excessive consumption of red (and processed) meat may stimulate inflammatory processes and oxidative stress in the body, which can initiate carcinogenesis (Rock et al., 2020).

Globally, approximately 41% of all new cancer cases in 2020 can be attributed to excessive alcohol consumption (Rumgay et al., 2021). The American Institute for Cancer Research (AICR) has classified alcohol consumption as the third major modifiable risk factor for the development of cancer (after smoking and obesity). For individuals who still consume alcohol, the recommendation is to limit intake to no more than 1 drink per day for women and no more than 2 drinks per day for men (WCFR, 2018b).

When it comes to milk and dairy products, there are conflicting research results regarding their impact on breast and prostate cancer. This type of food is a primary dietary source of calcium, whose high concentrations reduce the regulation of the synthesis of biologically active vitamin D. There is limited evidence suggesting that this may impact increased cell proliferation in the prostate, thereby raising the risk of cancer development (Herby et al., 2023; WCRF, 2018b). Recent population studies have suggested a possible link between breast cancer and high milk intake (Herby et al., 2023). It is still not fully clarified whether the risk is influenced by

saturated fatty acids from milk or other components (such as calcium, estrogen found in cow's milk due to industrial production, increased concentration of insulin-like growth factor 1 (IGF-1)) (Herby et al., 2023). Furthermore, milk and dairy products are components of the so-called "Western diet." Therefore, this increased risk may also be attributed to the overall detrimental/carcinogenic impact of such dietary patterns (Sargsyan and Dubsai, 2021), and further research is certainly needed.

Conclusion

Nowadays, cancer is one of the leading causes of death worldwide. There is no single type of food that can prevent the onset of cancer. Instead, a diverse, proper, and balanced lifelong diet is recommended, including a high intake of plant-based foods such as fruits, vegetables, whole grains, legumes, and animal-based foods that are a source of high-quality nutrients, such as fish and dairy products. The main protective effect lies in the synergy of foods, with the Mediterranean diet being the best dietary pattern characterized by the intake of these types of foods. It has been proven to influence the prevention of certain types of cancer as well as overall cancer-related mortality (Mentella et al., 2019). In addition to adopting a proper diet, regular physical activity and maintaining a normal body weight are recommended to prevent the development of numerous chronic non-communicable diseases, including certain types of cancer.

2.3. Commentary and analysis

The first problem I encountered while translating this text is the word *prehrana* in the title (*Uloga prehrane u prevenciji karcinoma*). The reason why I struggled with it is because *prehrana* can be translated as *diet*, but also as *nutrition*. Those terms are related, but refer to different concepts:

Diet - typically refers to the foods and beverages a person consumes regularly. It can encompass a variety of eating regimens, from specific weight-loss regimens to cultural or religious practices. When people talk about being "on a diet", they often mean they are consciously restricting or regulating their food intake for a specific purpose, such as weight management or improving health.[1]

Nutrition - Nutrition, on the other hand, refers to the process by which the body obtains and utilizes nutrients from food. It involves the study of nutrients, their sources, functions in the body, and their relationship to health and disease. Good nutrition is essential for maintaining overall health and well-being, as it provides the body with the energy and nutrients it needs to function properly, support growth and development, and prevent chronic diseases.[2]

To summarize, while diet focuses on the specific foods and dietary patterns of individuals, nutrition encompasses the broader context of how nutrients from those foods nourish the body and influence health outcomes. In the translation of the sentence *Uloga prehrane u prevenciji karcinoma* I chose to translate *prehrana* as *diet* because it refers to the role of food and nutrition in preventing cancer. *Prehrana* in Croatian typically encompasses the concept of food intake, eating habits, and nutrition, which aligns well with the English term *diet* in this context.

Another problem concerning terminology was the term *karcinom* from the title (*Uloga prehrane u prevenciji karcinoma).* At the first glance it was easy, the word *karcinom* in Croatian translates to *carcinoma* in English. However, in the context of the title *Uloga prehrane u prevenciji karcinoma*, the emphasis is on cancer prevention rather than the specific type of cancer (carcinoma). While *carcinoma* refers to a type of cancer that arises from epithelial cells, such as skin, lung, breast, or prostate cancer, the title suggests a broader discussion about the role of diet in preventing cancer in general, rather than focusing solely on

[1] *Cambridge dictionary* https://dictionary.cambridge.org/dictionary/english/diet
[2] *Cambridge dictionary* https://dictionary.cambridge.org/dictionary/english/nutrition

carcinoma. Therefore, *cancer* is a more appropriate and encompassing translation in this context because it refers to all types of cancer, not just carcinoma.

Another term that I had trouble with was *nezarazna bolest* in the sentence *Posljedice pretilosti povezane su s razvojem brojnih kroničnih nezaraznih bolesti gdje su najviše izražena šećerna bolest tipa 2 (44%), ishemijska bolest srca (23%) te pojedine vrste karcinoma (7 do 41%) (EASO, 2020), uključujući ...* At first I chose to translate the term *zarazno* as *infectious*. After looking up the term *infectious* I came upon the term *communicable* in various articles.[3] I decided to use the term *communicable* because of the statement in one of the articles stating that *while all communicable diseases are infectious, not all infections are communicable.* In the context of the source text, I concluded that the emphasis is on diseases that can spread from one person to another, and not on diseases that come from a virus or bacteria (infection).

Another semantic challenge I encountered was in the sentence *Danas je karcinom jedan od vodećih uzročnika smrti diljem svijeta*, the challenging term in question being *danas.* The choice of the term *nowadays* emphasizes the broader, general prevalence of cancer as a leading cause of death in contemporary times, suggesting its ongoing and pervasive nature in today's world. On the other hand, opting for the term *today*, would bring into focus more narrowly the specific day or immediate timeframe when the statement is made, potentially excluding the broader societal context and trends related to cancer as a global health issue. Therefore, the selection of *nowadays* serves to underscore the current, ongoing significance of cancer as a major global health concern. This highlights how a seemingly ordinary word like *danas* can pose translation challenges and lead to inaccuracies if not considered within its broader cultural and temporal contexts.

For the translation of the title *Hrana životinjskog podrijetla* I found several options such as *Food of animal origin, animal – derived food, animal – based food.* A lot of articles use *animal-derived food* but I decided to use *animal-based food* because of the title we had before, *Plant-based food.* I wanted the titles to correspond with each other and be connected.

Problems concerning ambiguity can be found in sentences *S druge strane, istraživanja su pokazala da ne postoji značajna povezanost između unosa narančastog i crvenog povrća i voća kao izvora karotenoida (npr. mrkva, rajčica, marelica) sa smanjenim rizikom od razvoja*

[3] https://www.verywellhealth.com/the-difference-between-communicable-and-infectious-diseases-4151985
https://www.dictionary.com/e/contagious-vs-infectious-the-difference-can-be-important/

karcinoma (WCFR, 2018a). Poznato je da mogu djelovati na smanjenje karcinogeneze, ali je potrebno provesti dodatna istraživanja kako bi se utvrdio točan mehanizam djelovanja (Rowles i Erdman, 2020). I translated it as *On the other hand, research has shown that there is no significant association between the intake of orange and red vegetables and fruits as sources of carotenoids (e.g., carrots, tomatoes, apricots) and a reduced risk of developing cancer (WCRF, 2018a). It is known that carotenoids can contribute to reducing carcinogenesis, but additional research is needed to determine their exact mechanism of action (Rowles and Erdman, 2020).* In the source sentence, the phrase *kako bi se utvrdio točan mehanizam djelovanja* can be considered as ambiguous because it does not specify exactly what it refers to - whether it is carotenoids or some other subjects in the context of the research. Also, what kind of mechanism of action? This ambiguity can present a challenge in translation as it requires additional clarification or interpretation to clarify to the reader what the phrase in question refers to. In this case, adding the word *carotenoids* at the beginning of the second sentence was necessary to emphasize that this part of the sentence concerns carotenoids. Additionally, inserting *their* was essential for clarity and grammatical correctness, while ensuring that the meaning of the original text is preserved without introducing ambiguity or lack of clarity in the translation.

To ensure clarity in my translation, I made certain syntactic adjustments to several sentences. One example can be found in the translation of the sentence *S druge strane, preporučuje se izbjegavati konzumaciju industrijski procesirane hrane bogate solju, mastima niske nutritivne kvalitete i dodanim šećerom te ograničiti konzumaciju crvenog mesa i paziti na sam proces pripreme hrane kako ne bi došlo do stvaranja štetnih/kancerogenih spojeva.* I decided to divide the sentence to facilitate readability and comprehension of the English version. Sometimes, dividing a sentence is necessary to maintain clarity, rhythm, and grammatical structure in the target language. In this instance, segmenting the sentence enhanced the organization of information, resulting in a more fluid and easier-to-read English version. The translation I chose is *On the other hand, it is recommended to avoid the consumption of industrially processed foods rich in salt, low-quality fats, and added sugar. Additionally, it is advised to limit the intake of red meat and pay attention to the cooking process to prevent the formation of harmful/carcinogenic compounds.*

Another example of segmenting a sentence is the translation of the source sentence *Postoje pojedini na koje ne možemo utjecati kao što su dob i genetski čimbenici te oni na koje možemo, kao što su način života koji uključuje i provođenje tjelesne aktivnosti te pravilna i uravnotežena*

prehrana (Tablica 2) koja predstavlja jedan od važnijih čimbenika kako u prevenciji, tako i u liječenju različitih vrsta karcinoma (Narimatsu i Yaguchi, 2022; Kerschbaum i Nüssler, 2019). To ensure my translation reads clearly I divided the sentence into two: *There are certain factors that cannot be prevented, such as age and genetic factors, and those that we can, such as lifestyle, including physical activity, and a well-balance diet (Table 2). A well-balanced diet is considered one of the more significant factors in both the prevention and treatment of various types of cancer (Narimatsu and Yaguchi, 2022; Kerschbaum and Nüssler, 2019).*

Furthermore, I had to make more syntactic adjustments in the sentence *Provedena istraživanja pokazala su povezanost između dnevnog unosa mahunarki od 100 g (1 porcija/dan) te orašastih plodova od 28 g (1 porcija/dan) sa smanjenjem rizika za 21 %, odnosno 33 % za razvoj kolorektalnog karcinoma (Jin i Je, 2022).* While translating this sentence I had trouble with connecting percentages with their corresponding data, so I had to add the word *respectively* to make the meaning clearer. Using the term *respectively* in the English language is not absolutely necessary but it can help to improve clarity and precision of expression. At first I translated this sentence as *Research has shown an association between daily intake of 100 g of legumes (1 serving/day) and 28 g of nuts (1 serving/day) with a reduction in the risk of developing colorectal cancer by 21% and 33%.* To make it clearer I chose *Research has shown an association between a daily intake of 100 g of legumes (1 serving/day) and 28 g of nuts (1 serving/day) with a 21% and 33% reduced risk, respectively, for the development of colorectal cancer.*

3. SOURCE TEXT 2 – INTRODUCTORY REMARKS

Translation of speleological instructions is quite demanding due to the technical nature of the manuals and the critical importance of accurately conveying nuanced details for ensuring the safety and efficiency of rescue operations. The English version of the instructor's manual aims to provide non-Croatian speaking cavers with a comprehensive understanding of the techniques and safety protocols essential for effective cave rescuing.

Special emphasis has been given to the precision of speleological terminology in this translation. Terms have been selected to conform with the standard usage in the English-speaking caving community, ensuring that the technical advice remains clear. Furthermore, phrases and idiomatic expressions have been adapted to the target language while still maintaining their original meaning, making them accessible to a broader audience.

The translation also covers the equipment requirements of cave rescues and the procedural maneuvers, providing a comprehensive explanation of the important processes involved. Translating this type of texts helps overcome language barriers and creates a better understanding of lifesaving caving methods for a diverse group of cavers.

3.1. Source text 2

HRVATSKI SPELEOLOŠKI SAVEZ

Dolores Hribar

Problematika izvođenja tehnika samospašavanja unesrećene osobe u spuštanju

Instruktorski rad

Karlovac, 12.03.2022.

1.UVOD

Speleologija kao jedan od oblika ljudske aktivnosti, obzirom na sve svoje specifičnosti, od svojih početaka nosi u sebi određene opasnosti. Razvoj speleološke opreme i tehničkih mogućnosti omogućava istraživanje kompleksnijih i po svojim dimenzijama sve zahtjevnijih speleoloških objekata. Kako interes za speleologijom zadnjih godina raste, stvaraju se preduvjeti za nastanak nesreće u speleološkom objektu. Ukoliko bi do nesreće došlo, važno je djelovati iznimno brzo i sigurno, vodeći računa o unesrećenoj osobi, ali i o sigurnosti osobe koja pruža pomoć te ostatku ekipe koja se nalazi u speleološkom objektu. Preporučuje se učiti i uvježbavati tehnike samospašavanja kako bi svaki speleolog bio sposoban na brz, siguran i adekvatan način, u što kraćem vremenu evakuirati unesrećenog speleologa.

1.1.O tehnikama samospašavanja

Tehnike samospašavanja predstavljaju prvi i najbrži oblik pomoći koja se može pružiti unesrećenom speleologu, a izvode je članovi njegove ekipe sve do dolaska spašavateljske službe. Cilj izvođenja tehnika samospašavanja je unesrećenu osobu u što kraćem vremenu maknuti s užeta za napredovanje te je skloniti na sigurno mjesto i pružiti adekvatnu medicinsku pomoć u skladu s mogućnostima.

S obzirom na to da su tehnike samospašavanja tehnički i fizički zahtjevnije od samih tehnika kretanja, samospašavanje treba izvoditi isključivo najiskusnija osoba. Prije samog djelovanja spašavatelj treba uzeti u obzir sve okolnosti i uvjete u speleološkom objektu te s obzirom na navedeno odabrati najprikladniju tehniku.

1.2.Suspenzijski sindrom

Brzina uklanjanja unesrećene osobe s užeta je od iznimne važnosti budući je ona izložena suspenzijskom sindromu (eng. Harness hang syndrome). Suspenzijski sindrom je povezan s duljim nepomičnim vertikalnim položajem tijela osobe koja se nalazi u pojasu i miruje. Zbog gravitacije se određena količina krvi zadržava u venama nogu i donjeg dijela tijela pa je smanjen protok krvi u mozak te zbog nedostatka kisika može doći do nesvjestice. Srce tada počinje brže kucati i imati snažnije kontrakcije, a da bi se osigurao dovoljan dotok krvi u mozak i vitalne organe, krvne žile se stisnu. Pod djelovanjem gravitacije krv odlazi u noge koje slobodno vise, a mišići (koji imaju važnu ulogu u povratku venske krvi) miruju, stoga je povratak krvi otežan. Osim toga, sami pojas svojim pritiskom na bedra dodatno otežava cirkulaciju i uzrokuje smanjeni povratni krvni volumen prema srcu.

Suspenzijski sindrom je opasan po život i u svega 10 minuta može uzrokovati smrt, stoga se nesvjesnu osobu treba na siguran način i u što kraćem vremenu maknuti s užeta.

1.3.Edukacija i razvoj tehnika

Sve većim razvojem speleologije kao sportsko-tehničke i znanstvene discipline, javila se potreba za unapređivanjem opreme, odnosno spravica koje služe u svrhu kretanja po speleološkom objektu. U današnjem svijetu postoji veliki izbor spravica kojima je uloga ista, no princip rada im se neznatno razlikuje. Shodno tome, pojavom raznih varijanti i modela spravica dolazi se do ubrzanog razvoja tehnika za napredovanje i spašavanje.

U Hrvatskoj se na seminarima za pripadnike speleoloških udruga te na tečajevima za članove Hrvatske gorske službe spašavanja najčešće uči i usavršava nekoliko vrsti tehnika samospašavanja. To su redom tehnike spašavanja unesrećenog speleologa u descenderu pristupom odozdo i odozgo, spašavanje speleologa koji visi u blokeru i crollu pristupom odozdo i odozgo tehnikom „dugačka pupčana vrpca- croll“ i pristupom odozdo tehnikom „croll do crolla“, penjanje s unesrećenim speleologom ukopčanim dugačkom pupčanom vrpcom u centralni karabiner spašavatelja te podizanje unesrećenog speleologa tehnikom protuutega. Na seminarima i tečajevima samospašavanja radi se u kontroliranim uvjetima (spravice za spuštanje su uvijek zakočene, preferira se rad s Petzl stop descenderom), stoga nastaje problem nedovoljnog upoznavanja s načinom rada drugih modela spuštalica koje koriste članovi pojedinih hrvatskih speleoloških udruga ili sudionici međunarodnih ekspedicija u Republici Hrvatskoj.

U daljnjem će se tekstu pobliže opisati postupak samospašavanja unesrećenog speleologa u spuštanju koristeći nekoliko različitih vrsta spravica za spuštanje te će se istaknuti prednosti i nedostaci svakog modela.

2. TEHNIKE SAMOSPAŠAVANJA UNESREĆENOG SPELEOLOGA U SPUŠTANJU

Prilikom spuštanja u speleološki objekt u svijetu se koriste spuštalice raznih proizvođača i modela. Sve one imaju istu ulogu, omogućiti speleologu savladavanje visinske razlike, no princip rada im se razlikuje. U speleološkoj zajednici u Hrvatskoj najčešće se koriste sljedeći modeli spravica za spuštanje: kombinacija Petzl shunta i Petzl simple descendera, kombinacija Petzl shunta i Repetto spider descendera, Petzl stop descender (stari i novi model) te Petzl rack (Slika 1).

Slika 1: Različite inačice spravica za spuštanje

Svaka od navedenih spuštalica ima svoje prednosti i nedostatke koji svakako dolaze do izražaja tijekom izvođenja tehnika samospašavanja.

2.1. Osnovne karakteristike spravica za spuštanje

2.1.1. Simple descender

Simple descender proizvođača opreme Petzl koristi se za spuštanje po užetu debljine od 9 do 12 mm. Radi na principu trenja užeta koje se između dvije koloture stavlja u obliku slova S. Uz njega je obavezno koristiti dodatni karabiner za trenje te se preporučuje upotrebljavati u kombinaciji sa shuntom koji služi kao dodatno osiguranje u slučaju ispuštanja užeta iz ruke. Dodatni karabiner za trenje treba biti manjih dimenzija od standardnih ovalnih karabinera te se preporučuje da nema vratašca s maticom kako bi ukapčanje užeta bilo jednostavnije. Može se postaviti na centralni karabiner pojasa ili na karabiner simple descendera, no svaki položaj ima svoje prednosti i mane. Ako je postavljen na centralnom karabineru pojasa svakako treba biti manjih dimenzija kako uslijed nepravilnog opterećenja descendera dodatni karabiner ne bi mogao proći kroz njega, dok je prednost iznimno lako ukapčanje užeta za napredovanje u njega. Dodani karabiner postavljen na karabineru *simple descendera* bolje preuzima opterećenje descendera u nepravilnom položaju, no nedostatak se javlja prilikom razblokiravanja užeta gdje se pod opterećenjem dodatni karabiner i uže pritisnu o gornju pločicu descendera. Razvojem opreme, 2019. godine je proizvođač opreme Petzl modificirao

model simple descendera te u uputstvima navodi na korištenje freino karabinera kao adekvatnu zamjenu umjesto dosadašnjih pomoćnih karabinera bez matice. Uvođenjem freino karabinera, na donjoj pločici novog modela simple descendera je povećana (izdužena) ovalna rupa kako bi se freino karabiner mogao lakše okretati. Također se preporučuje koristiti uže debljine od 8,5 do 11 mm. Freino karabiner se ukapča na centralni karabiner pojasa te je razvijen s dodatnim podupiračem za kontroliranje i dodavanje trenja prilikom spuštanja. Uže se lagano stavlja u njega, bez potrebe za otvaranjem twist-lock vratašca karabinera. Usporedbom freino karabinera s pomoćnim karabinerima bez matice konstatirala se znatna razlika prilikom prenošenja opterećenja iz nepravilno opterećenog simple descendera. Utvrđeno je kako freino karabiner najbolje prenosi opterećenje descendera u nepravilnom položaju, no zbog asimetričnog izlaska užeta iz descendera prema freino karabineru uže trenjem haba gornju pločicu descendera toliko intenzivno da nakon češće uporabe simple descender postane neuporabljiv i opasan za korištenje.

2.1.2. Spider descender

Spider descender proizvođača opreme Repetto koristi se za spuštanje po užetu debljine od 9 do 12 mm. Radi na principu trenja užeta koje se između dvije koloture stavlja u obliku slova S. Uz njega je obavezno koristiti dodatni karabiner za trenje te ga se preporučuje upotrebljavati u kombinaciji sa shuntom koji služi kao dodatno osiguranje u slučaju ispuštanja užeta iz ruke. Dodatni karabiner za trenje trebao bi biti manjih dimenzija od standardnih ovalnih karabinera te se preporučuje da nema vratašca s maticom kako bi ukapčanje užeta bilo jednostavnije. Na donjoj pločici spider descendera nalazi se izbočenje s rupom u koju se postavlja dodatni karabiner za trenje. Navedeno izbočenje pozitivno je utjecalo na smanjenje broja spravica na centralnom karabineru pojasa, brzina spuštanja i zaustavljanja je bolje kontrolirana, te u slučaju većeg opterećenja na descender i dodatni karabiner, ono ne može proći kroz tijelo spider descendera. Bez obzira na izbočenje, dodatni karabiner se može koristiti i u varijanti na centralnom karabineru pojasa.

2.1.3. Shunt

Shunt proizvođača opreme Petzl koristi se kao dodatno osiguranje pri spuštanju descenderom. Povezuje se s dugom pupčanom vrpcom i postavlja se na uže iznad descendera. Desnom rukom se kontrolira spuštanje descenderom, dok se palcem i kažiprstom lijeve ruke shunt lagano povlači prema dolje. U slučaju ispuštanja užeta za napredovanje speleolog ostaje visiti u shuntu budući da djeluje kao mehanički prusik te se pod njegovim opterećenjem uže savija (lomi), a

djeluje i na blatnom i zaleđenom užetu. Prikladan je za jednostruko uže debljine od 10 do 11 mm, te dvostruko uže debljine od 8 do 11 mm. Osim kao dodatno osiguranje pri spuštanju koristi se i kao samoosiguranje pri postavljanju prečnica te prilikom abseila po dvostrukom užetu nakon tehničkog penjanja.

2.1.4. Stop descender

Stop descender proizvođača opreme Petzl koristi se za spuštanje po užetu debljine od 9 do 12 mm. Konstruiran je tako da radi trenje užeta koje se između dvije koloture stavlja u obliku slova S, a stiskanjem ručice (kočnice) koja se nalazi na bočnoj strani stop descendera omogućuje se spuštanje po užetu. Kod pravilnog spuštanja po užetu, lijevom se rukom ručica (kočnica) stop descendera stisne do kraja, a desnom se rukom kontrolira brzina spuštanja koje treba biti polagana i ujednačena, bez trzaja.

U slučaju puštanja ruke koja drži ručicu, ona blokira uže i zaustavlja eventualni pad speleologa. Uz descender je obavezno koristiti dodatni karabiner za trenje koji kao i kod simple te spider descendera treba biti manjih dimenzija od standardnih ovalnih karabinera. Preporučuje se korištenje Petzl freino karabinera koji već ima predviđeno trenje na sebi, a osim njega u Hrvatskoj se najčešće koriste i karabineri tipa Petzl spirit ili Raumer handy. Glavni nedostatak stop descendera je instinktivno stiskanje njegove ručice (kočnice) uslijed proklizavanja ili ispuštanja užeta iz desne ruke speleologa jer tada može doći do nekontroliranog spuštanja i slobodnog pada po užetu. Proizvođač opreme Petzl je 2019. godine modificirao i stop descender. Novi model preporučuje koristiti uže debljine od 8,5 do 11 mm, te ima ručicu (kočnicu) orijentiranu prema gore koja se sklapa uz pomoć opruge te zbog toga radi veću polugu nego ručica u starijem modelu. Uz pomoć nove ručke sprava se lakše rasterećuje, posebice na suhom i debljem užetu, dok je način uporabe kočnice ostao isti (ručica se povuče – spuštanje, ručica se pusti - kočenje). Novina je i to da nema rupe za dodatni karabiner koji je mogao od stop descendera napraviti simple.

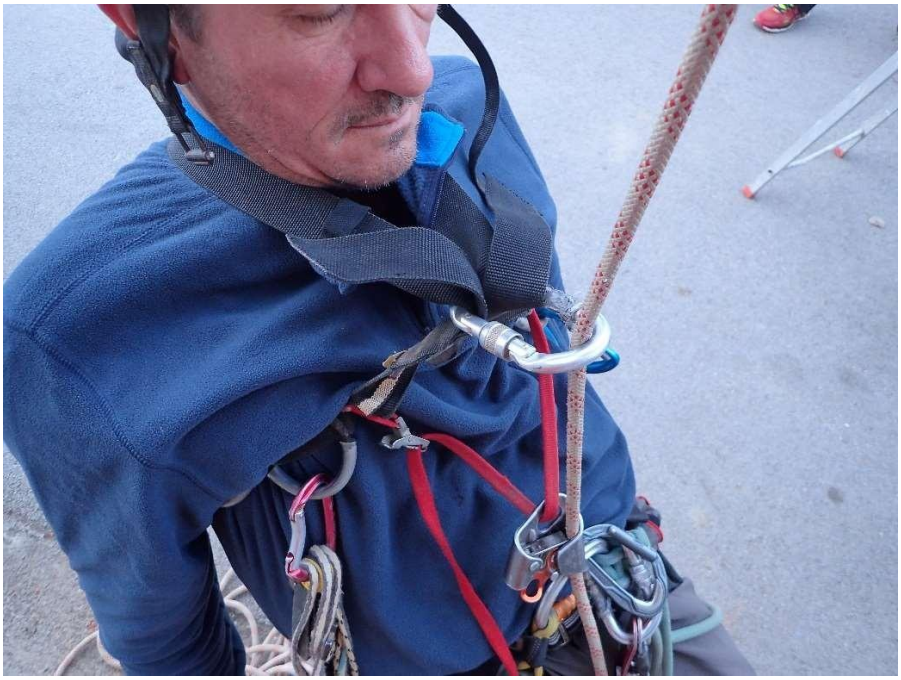
2.1.5. Rack

Rack proizvođača opreme Petzl koristi se za spuštanje po jednostrukom užetu debljine od 9 do 13 mm ili po dvostrukom užetu debljine od 8 do 11 mm. Prikladan je za spuštanje po dugačkim vertikalama s malo međusidrišta. Konstruiran je tako da radi trenje užeta njegovim uplitanjem između prečkica, a dodavanjem prečki se utječe na povećanje trenja, odnosno na brzinu spuštanja. Uglavnom ga koriste ruski i ukrajinski speleolozi, dok se u Hrvatskoj rijetko koristi prvenstveno radi nepoznavanja rukovanja, a time i nepovjerenja u samu spravicu. Ovisno o

proizvođaču, postoje različiti oblici racka (J i U oblik) s različitim brojem prečkica. Najveću opasnost pri njegovu korištenju predstavlja ispuštanje užeta iz ruke, budući da tada dolazi do nekontroliranog spuštanja i slobodnog pada po užetu. Iz navedenog razloga preporučuje se uporaba shunta kao osiguranje od pada.

2.2. Osnovni postupci prije izvođenja tehnika samospašavanja

Temeljna stvar koja se treba napraviti prilikom dolaska spašavatelja do unesrećene osobe, posebice ukoliko ona nije pri svijesti, je pokušati postaviti osobu u što je moguće uspravniji položaj. Najjednostavniji način za napraviti navedeno je što jače zategnuti prsni pojas unesrećene osobe te pomoću karabinera povezati uže za napredovanje i prsni pojas (Slika 2).



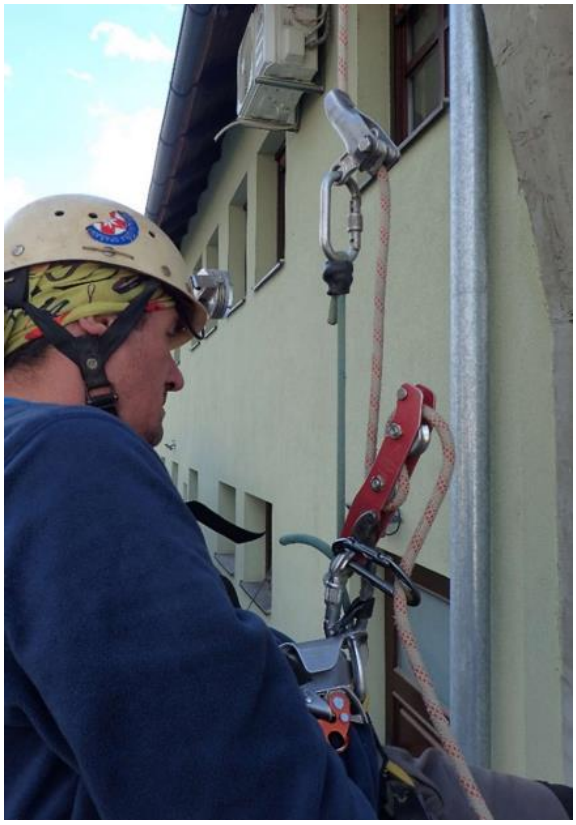
Slika 2: Postavljanje unesrećene osobe u uspravniji položaj

Pri dolasku do unesrećenog utvrđuje se njegovo opće fizičko i psihičko stanje te se u skladu s ustanovljenim pristupa određenim tehnikama samospašavanja s užeta. Odabir adekvatne tehnike ovisi o znanju i iskustvu spašavatelja te o prirodi same ozljede. Ako je unesrećeni pri svijesti, spašavatelj treba konstantno komunicirati s njime i smirivati ga te težiti što bržem i sigurnijem transportu unesrećenog do sigurnog mjesta za zbrinjavanje ozljede.

2.3. Unesrećeni speleolog u shuntu i simple descenderu – pristup odozdo

Prije početka penjanja do unesrećenog speleologa, spašavatelj pokušava komunicirati s njime kako bi odredio njegovo stanje svijesti i provjerio da li je zablokirao svoju spravicu za spuštanje. Koristi se pretpostavka da unesrećeni speleolog nije pri svijesti te da visi u shuntu,

a simple descender nije blokiran, stoga spašavatelj treba oprezno i uz što manje trzaja doći do njega. Ovakav način spašavanja treba koristiti jedino u slučaju ako iznad unesrećenog nema iskusnog speleologa koji mu na siguran način može pružiti potrebnu pomoć spuštajući ga do najbliže police ili sigurnog mjesta za zbrinjavanje.



Slika 3: Unesrećeni speleolog visi u shuntu i simple descenderu

Postupak tehnike samospašavanja unesrećenog speleologa pristupom odozdo:

1. Spašavatelj se po užetu za napredovanje popne do unesrećenog koji visi u shuntu i simple descenderu i ukopča svoju kratku pupčanu vrpcu u njegov centralni karabiner tako da je bravica karabinera okrenuta od njegovog tijela

2. Premjesti svoj bloker i postavi ga na dio užeta iznad simple descendera, a ispod shunta

3. Ustaje u stremen, iskopča svoj croll te ga ukopča iznad simple descendera unesrećenog, a ispod svojeg blokera

4. Iskopča simple descender unesrećenog, okreće ga prema sebi, ukopča ga na desni kraj centralnog karabinera (gledano iz perspektive spašavatelja) i zablokira

5. Stavi dodatni karabiner u gornji otvor blokera

6. Ukopča karabiner svoje dugačke pupčane vrpce u gornji otvor crolla unesrećenog, a sredinu dugačke pupčane vrpce ubaci u karabiner na gornjem otvoru blokera te bloker gurne prema gore za onoliko koliko dužina pupčane vrpce to omogućuje

7. Stane u stremen i iskopča svoj croll s užeta i lagano sjedne u pojas. Tada spašavatelj i unesrećeni preko spašavateljevog blokera i dugačke pupčane vrpce vise u protuutegu

8. Spašavatelj ukruti noge u kukovima te radi potisak svojim nogama prema gore (bedrima gurne unesrećenog prema gore), rastereti shunt i iskopča ga s užeta

9. Dodatno zateže i blokira simple descender

10. Staje u svoj stremen blokera i lagano se podiže dok se istovremeno unesrećeni spušta i opterećuje simple descender

11. Iskopča svoju dugačku pupčanu vrpcu

12. Stojeći u stremenu blokera, spašavatelj ukopča svoj croll u svoju kratku pupčanu vrpcu ukopčanu u centralni karabiner unesrećenog

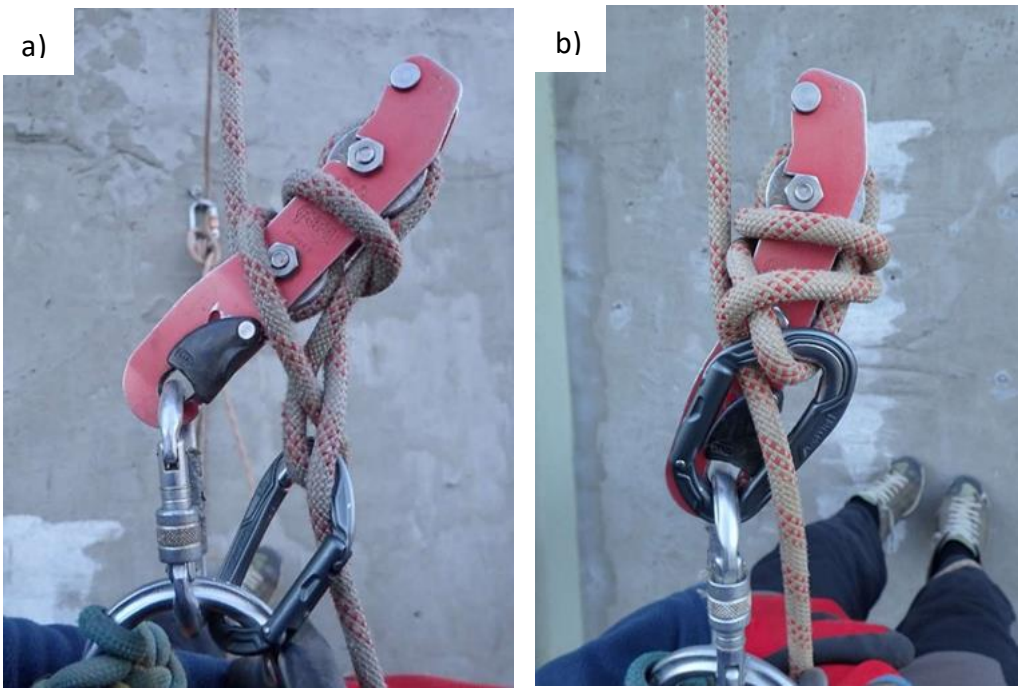
13. Iskopča bloker s užeta

14. Razblokira simple descender i počne se spuštati do najbliže police, odnosno do najbližeg mjesta za sigurno zbrinjavanje unesrećenog. Najbolji je položaj kada se spašavatelj nalazi između nogu unesrećenog (ako ozljeda to dozvoljava).

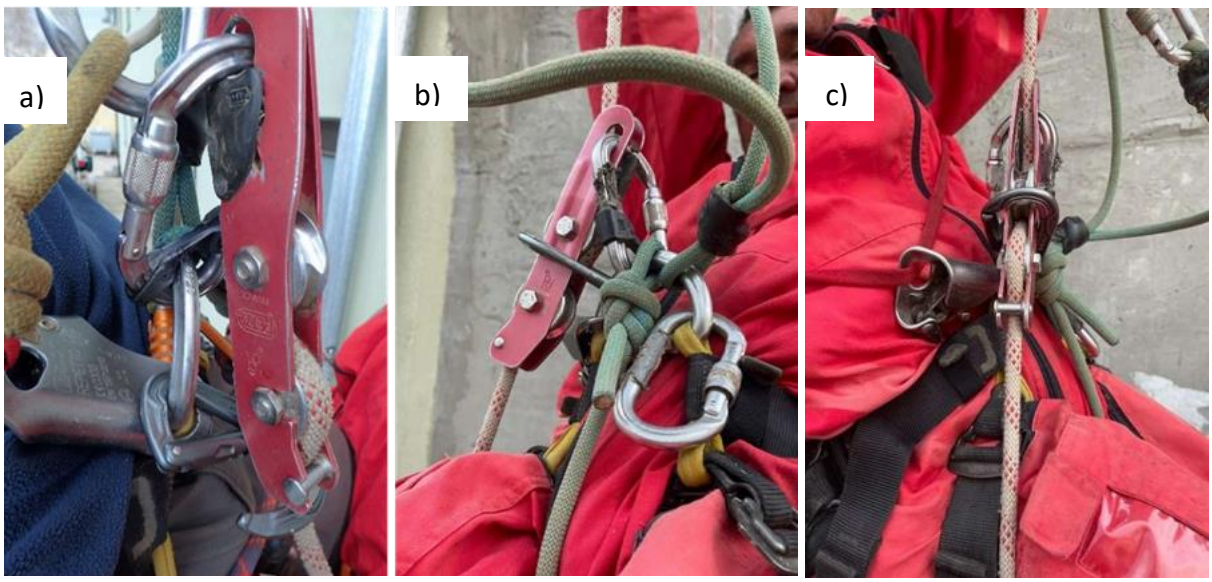
Prilikom izvođenja navedene tehnike samospašavanja nailazi se na nekoliko problema koji su detaljnije razrađeni u nastavku teksta.

Penjući se prema unesrećenom speleologu, spašavatelj opterećuje uže ispod unesrećenog te se opterećujući njegov neblokirani simple descender i dodatni karabiner za trenje oboje izlažu situaciji iznimno opasnoj po život. Dodatni karabiner za trenje može biti ukopčan u karabiner simple descendera ili u centralni karabiner pojasa. Ukoliko se on nalazi na centralnom karabineru pojasa, tada se prema preporuci proizvođača treba koristiti freino karabiner, umjesto običnog pomoćnog karabinera. U slučaju korištenja freino karabinera nepravilno opterećeni simple descender ne trpi veliki otklon od užeta te sile koje djeluju na njega su pravilnije raspoređene. Umjesto freino karabinera, korištenjem spirit karabinera s neblokiranim simple descenderom, postoji vrlo velika opasnost od pucanja nepravilno opterećenih spravica, gdje je varijanta s dodatnim spirit karabinerom na karabineru simple descendera (Slika 4a) ipak neznatno povoljnija. U tome se slučaju simple descender nalazi u prihvatljivijem položaju

budući se ne lomi pod velikim kutem kao što je to u varijanti s dodatnim spirit karabinerom postavljenim na centralnom karabineru (Slika 4b).



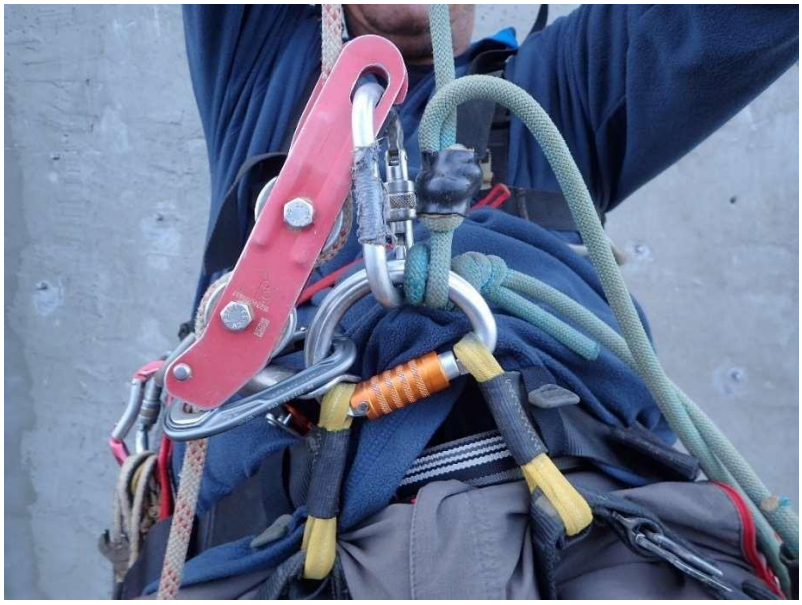
Slika 4: Mogući položaji dodatnog karabinera (Slika 4a: dodatni karabiner na centralnom karabineru pojasa; Slika 4b: dodatni karabiner na karabineru simple descendera)



Slika 5: Opasnosti nepravilno opterećenog simple descendera i dodatnog karabinera (Slika 5a: otvaranje bravice dodatnog karabinera; Slika 5b: prolazak simple descendera kroz dodatni karabiner; Slika 5c: uže deformira bočne ploče simple descendera)

Kako se spašavatelj penjanjem približava unesrećenom tako se sila koja djeluje na simple descender i dodatni karabiner povećava te dolazi do opasnih situacija u kojima se riskira pucanje nepravilno opterećenih spravica. Neki od kritičnih položaja spravica su otvaranje bravice dodatnog karabinera (Slika 5a), prolazak simple descendera kroz dodatni karabiner (Slika 5b) te deformiranje bočnih ploča simple descendera istezanjem užeta za napredovanje (Slika 5c).

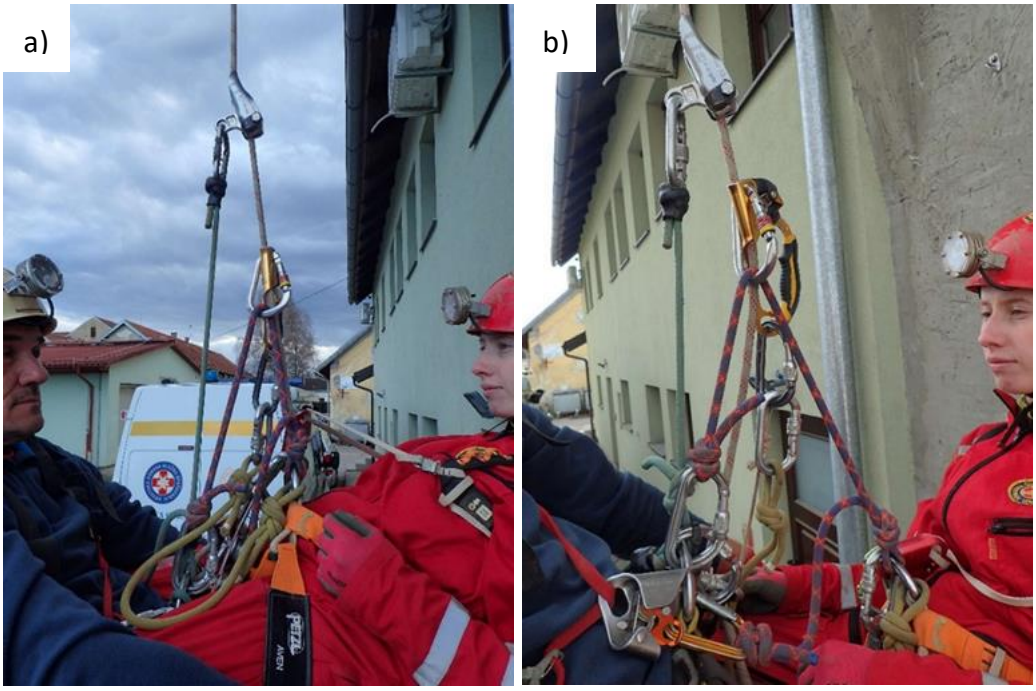
Sljedeća poteškoća koja proizlazi iz nepravilno opterećenih spravica (u slučaju kada se dodatni karabiner za trenje nalazi na centralnom karabineru pojasa) je zbijanje simple descendera i dodatnog karabinera, a samim time i crolla (Slika 6), što rezultira nemogućnošću ukapčanja kratke pupčane vrpce spašavatelja u lijevu stranu centralnog karabinera (gledano iz perspektive spašavatelja). Njezino ukapčanje s desne strane centralnog karabinera može tijekom spuštanja spašavatelja i unesrećenog nepovoljno utjecati na ograničeni manevarski prostor, posebice prilikom prelaska sidrišta.



Slika 6: Zbijanje spravica uslijed nepravilnog opterećenja simple descendera

Na spomenuti postupak samospašavanja značajnu ulogu ima i dužina pupčanih vrpci na kojima se nalazi shunt. Ukoliko su one podešene prema pravilu, nailazi se na problem u veličini manevarskog prostora prilikom izvođenja procesa samospašavanja. Logično je za zaključiti da će unesrećeni speleolog koji je puno viši imati dužu pupčanu vrpcu na kojoj se nalazi shunt, te će se spašavatelj bez problema prekopčati na dio užeta između simple descendera i shunta unesrećenog (Slika 7a), dok se kod nižeg speleologa pojavljuje nešto kraća pupčana vrpca te se razmjerno tome manevarski prostor smanjuje (Slika 7b). Smanjeni manevarski prostor zahtijeva spretnost speleologa spašavatelja prilikom prekopčavanja crolla iznad simple

descendera unesrećenog te prilikom izrade protuutega. Također je poželjno imati podešavajući stremen kako bi se kasnije, prilikom izvođenja radnji za protuuteg, spašavatelj mogao dovoljno izdignuti i ukopčati sredinu svoje pupčane vrpce u karabiner na gornjem otvoru blokera.

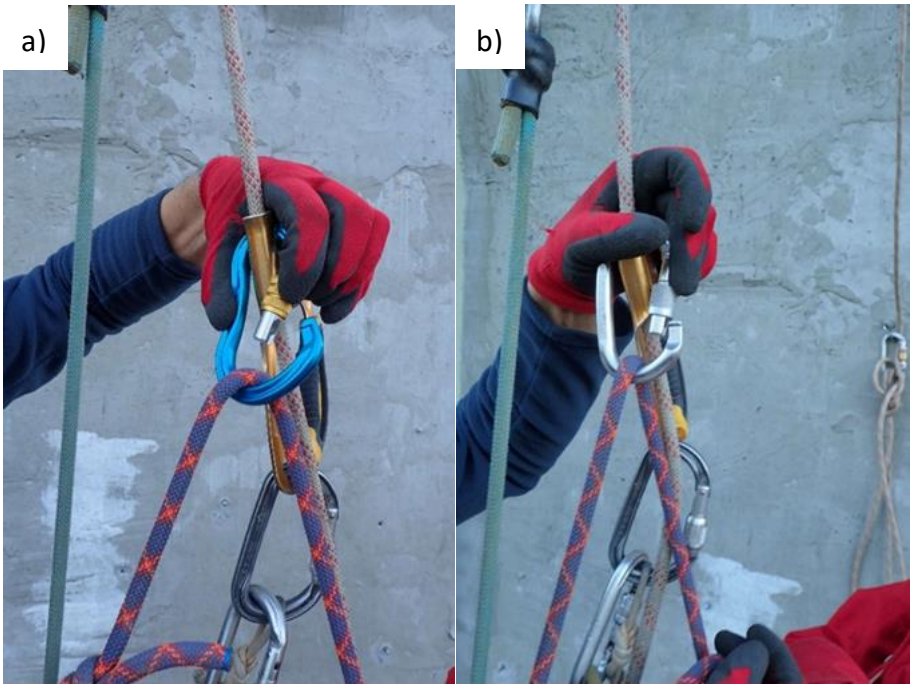


Slika 7: Odnos manevarskog prostora s različitim duljinama pupčanih vrpci (Slika 7a: Varijanta sa shuntom na dužoj pupčanoj vrpci; Slika 7b: Varijanta sa shuntom na kraćoj pupčanoj vrpci)

Važno je napomenuti da je za izvođenje tehnike samospašavanja unesrećene osobe koja visi u shuntu i simple descenderu u slučaju kraće pupčane vrpce potreban jedan dodatni karabiner (ovalni ili HMS karabiner) koji spašavatelj mora imati sa sobom, a koji je potreban za izradu protuutega. Budući da je manevarski prostor ograničen i ovisi o dužini pupčane vrpce shunta, protuuteg se treba napraviti na najvišoj točki blokera, odnosno na njegovom gornjem otvoru. Iako se u gornji otvor blokera može staviti više vrsti karabinera, preporučuje se raditi s HMS karabinerom. Zbog njegova kruškolikog oblika koji mu omogućuje veći radni prostor za otvaranje vratašca karabinera, jednostavnije je i brže staviti/izvaditi uže duge pupčane vrpce spašavatelja nego u slučaju ovalnog karabinera (Slika 8).

Ako je pupčana vrpca shunta iznimno kratka nastaje problem tijekom izrade protuutega budući da nema dovoljno prostora za njegovo potpuno rasterećenje. U tome se slučaju bloker spašavatelja postavlja iznad shunta unesrećenog i radi se protuuteg prema ranije navedenom postupku. Ukoliko je pupčana vrpca shunta iznimno dugačka manevarski prostor je izrazito

velik te se u tome slučaju ostavlja najmanje 10 cm prostora između karabinera na donjem otvoru blokera i sredine dugačke pupčane vrpce spašavatelja, te se potom radi protuuteg prema ranije navedenom postupku.



Slika 8: Radni prostor karabinera na gornjem otvoru blokera (Slika 8a: HMS karabiner; Slika 8b: ovalni karabiner)

Nakon što je protuuteg izvršen, a *simple descender* je preuzeo unesrećenog, spašavatelju preostaje spustiti ga do najbliže police ili sigurnog mjesta za zbrinjavanje. U slučaju korištenja dodatnog karabinera za trenje postavljenog na karabineru simple descendera, nailazi se na poteškoću razblokiranja užeta za napredovanje iz dodatnog karabinera. Uže se pod težinom dviju osoba zategne i pritisne dodatni karabiner uz simple descender, a zbog debljine užeta može doći i do problema otvaranja vratašca dodatnog karabinera (*Slika 9*). U tome slučaju razblokiranju *simple descendera* treba pristupiti veoma oprezno.

Slika 9: Problem razblokiranja užeta tijekom korištenja dodatnog karabinera na karabineru simple descendera

2.4. Unesrećeni speleolog u shuntu i simple descenderu – pristup odozgo

Koristi se pretpostavka da unesrećeni speleolog nije pri svijesti. Spašavatelj pretpostavlja da unesrećeni visi u shuntu, a simple descender nije blokiran, stoga treba oprezno i uz što manje trzaja doći do njega. Spašavatelj koristi tehniku otpenjavanja kako bi se približio unesrećenom.

Slika 10: Unesrećeni speleolog visi u shuntu i simple descenderu, a spašavatelj tehnikom otpenjavanja prilazi do njega

Postupak tehnike samospašavanja unesrećenog speleologa pristupom odozgo:

1.Spašavatelj odozgo, po užetu za napredovanje, otpenje do unesrećenog koji visi u shuntu i simple descenderu

2. Dolazi do shunta unesrećenog i prelazi ga kao uzao na užetu (Slika 11) (ukopča svoju pupčanu vrpcu u karabiner koji se nalazi na shuntu, a koji pripada dugoj pupčanoj vrpci unesrećenog, prekopča svoj croll i bloker ispod shunta te iskopča svoju pupčanu vrpcu iz njega)

3. Ukopča svoju kratku pupčanu vrpcu u njegov centralni karabiner tako da je bravica karabinera okrenuta od njegovog tijela

4. Iskopča simple descender unesrećenog, okreće ga prema sebi, ukopča ga na desni kraj centralnog karabinera (gledano iz perspektive spašavatelja) i zablokira

5. Stavi dodatni karabiner u gornji otvor blokera

6. Ukopča karabiner svoje dugačke pupčane vrpce u gornji otvor crolla unesrećenog, a sredinu dugačke pupčane vrpce ubaci u karabiner na gornjem otvoru blokera te bloker gurne prema gore za onoliko koliko dužina pupčane vrpce to omogućuje

7. Stane u stremen i iskopča svoj croll s užeta i lagano sjedne u pojas. Tada spašavatelj i unesrećeni preko spašavateljevog blokera i dugačke pupčane vrpce vise u protuutegu

8. Spašavatelj ukruti noge u kukovima te radi potisak svojim nogama prema gore (bedrima gurne unesrećenog prema gore), rastereti shunt i iskopča ga s užeta

9. Dodatno zateže i blokira simple descender

10. Staje u svoj stremen blokera i lagano se podiže dok se istovremeno unesrećeni spušta i opterećuje simple descender

11. Iskopča svoju dugačku pupčanu vrpcu

12. Stojeći u stremenu blokera, spašavatelj ukopča svoj croll u svoju kratku pupčanu vrpcu ukopčanu u centralni karabiner unesrećenog

13. Iskopča bloker s užeta

14. Razblokira simple descender i počne se spuštati do najbliže police, odnosno do najbližeg mjesta za sigurno zbrinjavanje unesrećenog. Najbolji je položaj kada se spašavatelj nalazi između nogu unesrećenog (ako ozljeda to dozvoljava).

Spašavanjem unesrećenog speleologa koji visi u shuntu i simple descenderu pristupom odozgo, izuzet je problem dovođenja simple descendera u nepovoljan položaj, a time i pod nepravilno opterećenje čime je uklonjena opasnost od pucanja nepravilno opterećenih spravica. Kratka

pupčana vrpca spašavatelja se, za razliku od pristupa odozdo, može bez poteškoća ukopčati u lijevu stranu centralnog karabinera unesrećenog speleologa, dok je problem dužine pupčane vrpce na kojoj se nalazi shunt te problem razblokiranja užeta za napredovanje iz dodatnog karabinera ukoliko se on nalazi na karabineru simple descendera i dalje prisutan.

Slika 11: Prelazak shunta metodom prelaska uzla

Kao moguću opasnost prilikom prelaska shunta u otpenjavanju može se naznačiti ukapčanje pupčane vrpce u karabiner koji se nalazi na shuntu, a koji pripada dugoj pupčanoj vrpci unesrećenog. Navedenu radnju je potrebno dobro isplanirati i izvesti, kako u slučaju naglog izdizanja spašavatelja ne bi došlo do trzaja, a time i do deblokade shunta, čime bi unesrećena osoba i spašavatelj opteretili samo jednu spravicu.

3.2. Translation of source text 2

CROATIAN SPELEOLOGICAL ASSOCIATION (HRVATSKI SPELEOLOŠKI SAVEZ)

Dolores Hribar

Challenges of performing self-rescue techniques for an injured person in descent

Instructors' manual

Karlovac, 12.03.2022.

1. Introduction

Since its beginnings, caving, as one of the forms of human activity, inherently involves certain risks due to its specific characteristics. The exploration of more complex and dimensionally demanding speleological objects is enabled by the development of speleological equipment and technical capabilities. With the growing interest in caving in recent years, conditions have been created that could lead to accidents in speleological sites. In case of an accident, it is important to act extremely quickly and safely, while considering the injured person, as well as the safety of the rescuer and the rest of the team present in the speleological object. It is recommended that every caver learns and trains self-rescue techniques to quickly and safely evacuate a distressed caver in a timely manner.

1.1. Self-Rescue Techniques

Self-rescue techniques represent the first and the fastest form of aid that can be provided to an injured caver, and are performed by the members of the caver's team until the arrival of rescue services. The goal of performing self-rescue techniques is to remove the victim from the progression rope as quickly as possible, relocate them to a safe location, and provide adequate medical assistance in accordance with the circumstances.

Since self-rescue techniques are technically and physically more demanding than movement techniques themselves, self-rescue should be performed only by the most experienced person. Before acting, the rescuer should consider all circumstances and conditions in the cave and choose the most suitable technique accordingly.

1.2 Harness hang syndrome

The speed of removing the victim from the rope is of critical importance as injured people are susceptible to suspension syndrome. Harness hang syndrome occurs due to prolonged immobility in a vertical position, where the individual is in a harness and remains motionless. Due to gravity, a certain amount of blood accumulates in the veins of the legs and lower part of the body, reducing blood flow to the brain. This lack of oxygen can lead to unconsciousness. To ensure sufficient blood flow to the brain and vital organs, the blood vessels constrict, causing the heart to then beat faster and contract more forcefully. Under the influence of gravity, blood flows into freely hanging legs, while muscles (which play a crucial role in venous blood return) are at rest, making the return of blood more difficult. Furthermore, the

harness itself, by exerting pressure on the thighs, additionally hampers circulation and causes a reduced return blood volume to the heart.

Harness hang syndrome is life-threatening and can cause death in just 10 minutes, therefore an unconscious person should be safely removed from the rope as quickly as possible.

1.3 Education and development of rescue techniques

With the increasing development of speleology as both a sport and scientific discipline there arose a need for improving equipment, specifically devices used for technical navigation through speleological objects. In the modern world, there is a wide range of devices serving the same purpose in the field of speleology, but their operational principles slightly vary. Accordingly, with the emergence of various variants and models of devices, there has been accelerated development in techniques for progression and rescue.

In Croatia, during seminars for members of speleological associations and in courses for members of the Croatian Mountain Rescue Service, several types of self-rescue techniques are commonly taught and perfected. These are, in order, the techniques for rescuing a distressed caver using a descender by approaches from both below and above, the rescue of a caver hanging in a blocker and croll via approaches from both below and above using the "long cowstail-croll" technique, and from below using the "croll to croll" method, ascending with a distressed caver attached via a long cowstail to the rescuer's central carabiner, and lifting a distressed caver using the counterbalance technique. In self-rescue seminars and courses, operations are conducted in a regulated environment; descent devices are always in a locked state, with a bias towards utilizing the Petzl Stop descender. Therefore, there arises the problem of insufficient practice with other types of descenders that some Croatian caving groups or international expedition participants in Croatia might use.

The following text will detail the self-rescue process for a caver during descent, using several different types of descent devices. It will also highlight the advantages and disadvantages of each device.

2. SELF-RESCUE TECHNIQUES FOR A DISTRESSED CAVER IN DESCENT

Descent devices from various manufacturers and models are used worldwide during descents into speleological objects. They all serve the same purpose - enabling a caver to overcome vertical distances - but their operating principles vary. Within the caving community in Croatia, the following descent device models are most used: a combination of the Petzl Shunt and Petzl Simple descender, a combination of the Petzl Shunt and Repetto Spider descender, the Petzl Stop descender (both old and new models), and the Petzl Rack (Figure 1).

Figure 1: Different versions of descent devices

Each of these descenders has specific features, with advantages and disadvantages that become especially apparent during the execution of self-rescue techniques.

2.1. Basic Characteristics of Descent Devices

2.1.1. Simple Descender

The Petzl Simple descender is used for descending on ropes with diameters ranging from 9 to 12 mm. It operates on the principle of friction, with the rope threaded between two pulleys in an S-shape. It is essential to use an additional carabiner for friction when using it and is recommended to be used in combination with a shunt, which adds extra security in case the rope is accidentally released from the hand. The extra carabiner for friction should be smaller than the standard oval carabiners, and it is recommended to use one without a screw gate to make clipping the rope in easier. It can be attached to the central carabiner of the harness or to

the carabiner of the Simple descender itself, but each position has its own pros and cons. If the additional carabiner is placed on the central carabiner of the harness, it needs to be smaller so that in case of improper load on the descender, the additional carabiner cannot slip through it. The advantage is that it is extremely easy to clip the rope in for progression. When the added carabiner is placed on the Simple descender's carabiner, it better distributes the descender's load when in an irregular position. However, a disadvantage arises during the unlocking of the rope; under load, the additional carabiner and rope press against the upper plate of the descender.

With the development of equipment, in 2019, the equipment manufacturer Petzl modified the Simple descender model. In the instructions, they now recommend using a Freino carabiner as a suitable replacement for the previous auxiliary carabiners without nuts. With the introduction of the Freino carabiner, the oval hole on the lower plate of the new model of the Simple descender was made larger (elongated) to allow the Freino carabiner to rotate more easily. It is also recommended to use rope with a thickness between 8.5 to 11 mm. The Freino carabiner clips onto the central carabiner of the harness and is designed with an extra support feature for controlling and adding friction during descent. The rope is easily placed into it without the need to open the twist-lock gate of the carabiner. When comparing the Freino carabiner with secondary carabiners without nuts, a significant difference was observed in the load transfer from an improperly loaded Simple descender. It was found that the Freino carabiner transfers the load from the descender in an awkward position most effectively. However, due to the rope exiting the descender asymmetrically towards the Freino carabiner, the friction wears down the upper plate of the descender so intensely that after frequent use, the Simple descender becomes unusable and dangerous.

2.1.2. Spider descender

The Spider descender by Repetto is used for descending on ropes with thicknesses ranging from 9 to 12 mm. It operates on the principle of rope friction, where the rope is threaded between two pulleys in an S-shape. It is essential to use an additional carabiner for friction when using it and is recommended to be used in combination with a shunt, which adds extra security in case the rope is accidentally released from the hand. The extra carabiner for friction should be smaller than the standard oval carabiners, and it is recommended to use one without a screw gate to make clipping the rope in easier. The lower plate of the Spider descender features a protrusion with a hole where an additional friction carabiner is placed. The protrusion positively impacts the reduction in the number of devices on the central harness carabiner, as

well as improves control over descent speed and stopping. It also prevents the descender and additional carabiner from passing through the body of the Spider descender under higher loads. Despite the protrusion, the additional carabiner can still be used in the version on the central harness carabiner.

2.1.3. Shunt

The Shunt, made by Petzl, is used as an additional safety device during rope descents. It connects with a long cowstail and is placed on the rope above the descender. The descent with the descender is controlled by the right hand, while the shunt is gently pulled downward with the thumb and index fingers of the left hand. If the progression rope is accidentally released, the caver remains hanging in the shunt because it acts as a mechanical Prusik. Under its load, the rope bends (breaks), and it also works on muddy and frozen ropes. It is suitable for a single rope with a thickness of 10 to 11 mm, and a double rope with a thickness of 8 to 11 mm. Besides being used as additional security during descent, it is also used for self-protection when installing traverses and for abseiling on a double rope after technical climbing.

2.1.4. Stop descender

The Stop descender by Petzl is used for descending on ropes with thicknesses ranging from 9 to 12 mm. It is designed to create friction on the rope, which is threaded between two pulleys in an S-shape, and by pressing the handle (brake) located on the side of the Stop descender, descent on the rope is facilitated. For proper descent on the rope, the left hand fully presses the handle (brake) of the Stop descender, while the right hand controls the speed of descent, which should be slow and steady, without sudden movements.

If the hand holding the lever is released, it locks the rope and prevents any potential fall of the caver. Along with the descender, it is mandatory to use an additional friction carabiner, which, like with the Simple and Spider descenders, should be smaller than standard oval carabiners. It is recommended to use the Petzl Freino carabiner, which has built-in friction already. Besides this, carabiners like the Petzl Spirit or Raumer Handy are also commonly used in Croatia. The main drawback of the Stop descender is the instinctive pressing of its lever (brake) during slippage or if the rope slips from the caver's right hand, which can lead to uncontrolled descent and free-falling along the rope. In 2019, the equipment manufacturer Petzl also modified the Stop descender. The new model recommends using a rope with a thickness of 8.5 to 11 mm and features an upward-facing lever (brake) that folds with the help of a spring, creating a larger leverage than the lever on the older model. With the new lever, the device is easier to

unload, especially on dry and thicker ropes, while using the brake remains the same (pull the lever to descend, release it to brake). Another new feature is the absence of a hole for an additional carabiner, which previously used to convert the Stop descender into a Simple.

2.1.5. Rack

The Petzl equipment manufacturer's Rack is used for descending on a single rope with a diameter of 9 to 13 mm or on a double rope with a diameter of 8 to 11 mm. It is suitable for descending long verticals with few intermediate anchors. It is designed to generate friction on the rope by weaving it between the bars, while adding bars increases friction, affecting the descent speed. It is primarily used by Russian and Ukrainian cavers, while in Croatia it is rarely used, mainly due to a lack of familiarity with its operation, leading to distrust in the device itself. Depending on the manufacturer, there are different shapes of racks (J and U shapes) with varying numbers of bars. The greatest danger when using it is rope slippage from the hand, as it can lead to uncontrolled descent and free-fall along the rope. For this reason, the use of a shunt as a backup against falls is recommended.

2.2. Basic procedures before executing self-rescue techniques

The fundamental action that must be taken when a rescuer reaches a victim, especially if they are unconscious, is to attempt to position the person in as upright a position as possible. The simplest way to achieve this is to tightly fasten the victim's chest harness and use a carabiner to connect the progression rope and the chest harness (see Figure 2).

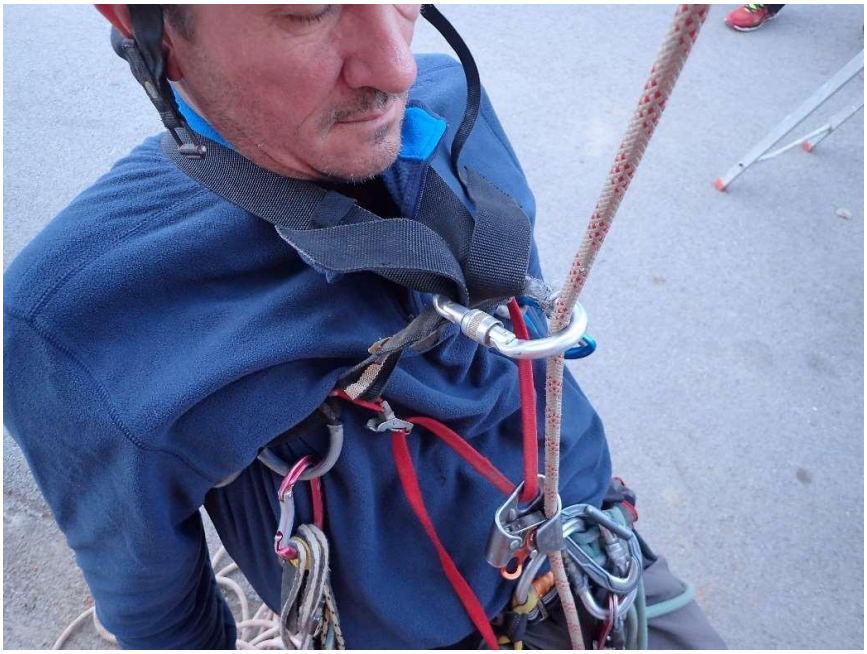


Figure 2: Positioning the victim in a more upright position

Upon reaching the victim, their general physical and mental condition is assessed, and based on the assessment, specific self-rescue techniques using ropes are applied. The selection of the appropriate technique depends on the rescuer's knowledge and experience, as well as on the nature of the injury itself. If the victim is conscious, the rescuer should continuously communicate with them, providing reassurance, and aim for the quickest and safest transport of the victim to a secure location for injury care.

2.3 Injured Caver in a Shunt and Simple Descender – Approach from Below

Before beginning the ascent to the injured caver, the rescuer attempts to communicate with them to assess their state of consciousness and verify whether they have locked their descending device. It is assumed that the victim is unconscious and hanging in a shunt, with the simple descender not locked. Therefore, the rescuer needs to reach them carefully and with as little sudden movement as possible. This method of rescue should only be used if there is no experienced caver above the victim who can safely assist by lowering them to the nearest ledge or a safe spot for care.

Figure 3: Injured Caver Hanging in a Shunt and Simple Descender

Procedure for Self-Rescue Technique of an Injured Caver Approaching from Below:

1. The rescuer ascends the progression rope to reach the injured caver hanging in a shunt and simple descender and clips their short cowstail into the victim's central carabiner, ensuring the carabiner gate is oriented outward.
2. The rescuer moves their blocker and positions it on the rope above the simple descender and below the shunt.
3. The rescuer steps into the stirrup, unclips their Croll, and clips it above the victim's simple descender and below their own blocker.
4. The rescuer unclips the victim's simple descender, turns it towards themselves, clips it to the right end of the central carabiner (from the rescuer's perspective), and locks it.
5. The rescuer places an additional carabiner in the upper opening of the blocker.
6. The rescuer clips the carabiner of their long cowstail into the upper opening of the victim's Croll, inserts the middle of the long cowstail into the carabiner at the upper opening of the blocker, and pushes the blocker upwards as far as the length of the cowstail allows.

7. The rescuer stands in the stirrup and unclips their Croll from the rope and gently sits in the harness. At this point, both the rescuer and the victim hang in counterbalance from the rescuer's blocker and long cowstail.
8. The rescuer straightens their legs at the hips and pushes upward with their legs (pushing the victim upwards with their thighs), relieves the shunt, and unclips it from the rope.
9. The rescuer further tightens and locks the simple descender.
10. The rescuer steps into the blocker's stirrup and slowly ascends, while simultaneously lowering the victim and loading the simple descender.
11. The rescuer unclips their long cowstail.
12. Standing in the stirrup of the blocker, the rescuer clips their Croll into their short cowstail clipped into the central carabiner of the victim.
13. The rescuer unclips the blocker from the rope.
14. The rescuer unlocks the simple descender and begins to descend to the nearest ledge or the closest safe spot for care of the victim. The recommended position for the rescuer is to place themselves between the victim's legs (if injuries allow).

Several problems, which are further elaborated in the text below, are encountered while performing the described self-rescue technique.

As the rescuer climbs toward the victim, they place a load on the rope below the victim. This action strains the caver's unlocked Simple descender and the additional friction carabiner, creating a potentially life-threatening situation for both. The additional friction carabiner can be clipped into the carabiner of the simple descender or into the central carabiner of the harness. If it is attached to the central harness carabiner, the manufacturer recommends using a Freino carabiner instead of a standard auxiliary carabiner. An improperly loaded simple descender does not suffer a large deviation from the rope, and the forces acting on it are more evenly distributed when using a Freino carabiner. Instead of using a Freino carabiner, using a Spirit carabiner with an unblocked Simple descender carries a high risk of breaking due to improper loading. However, the setup where an additional Spirit carabiner is attached to the Simple descender's carabiner (Figure 4a) is somewhat safer. In this case, the simple descender is in a more acceptable position as it does not break under a sharp angle like it does in the version with an additional Spirit carabiner placed on the central carabiner (Figure 4b).

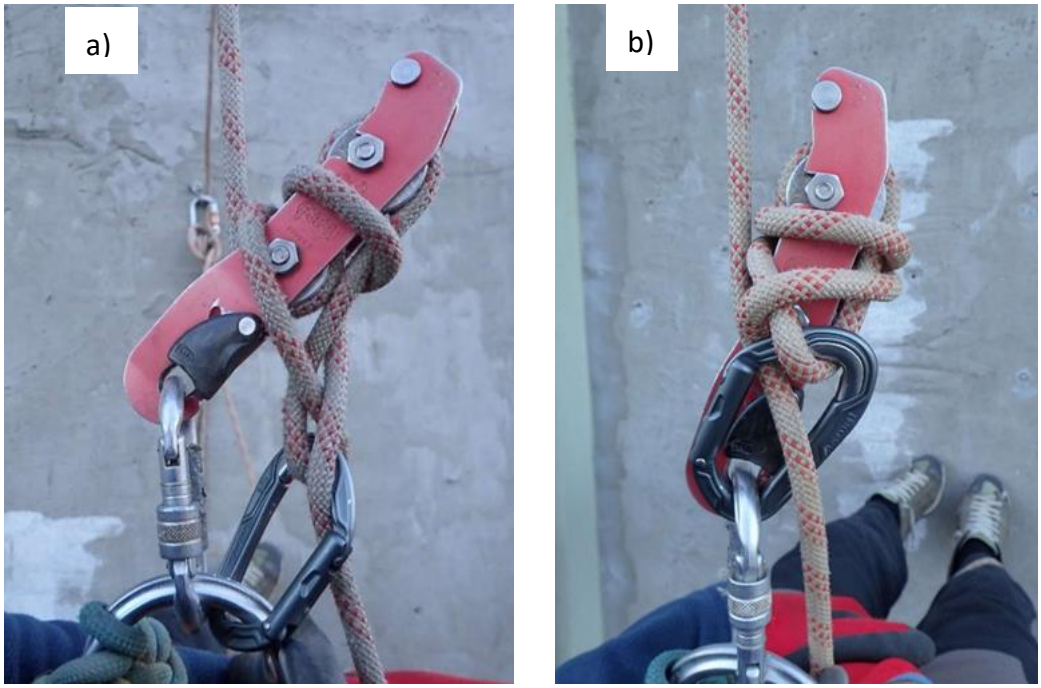


Figure 4: Possible Positions of the Additional Carabiner (Figure 4a: Additional carabiner on the central harness carabiner; Figure 4b: Additional carabiner on the carabiner of the simple descender)

As the rescuer climbs closer to the victim, the force on the Simple descender and the additional carabiner increases, creating dangerous situations where improperly loaded devices are at higher risk of breaking. Some of the critical positions of the devices include the opening of the gate of the additional carabiner (Figure 5a), the passage of the Simple descender through the additional carabiner (Figure 5b), and the deformation of the side plates of the Simple descender due to the stretching of the progression rope (Figure 5c).

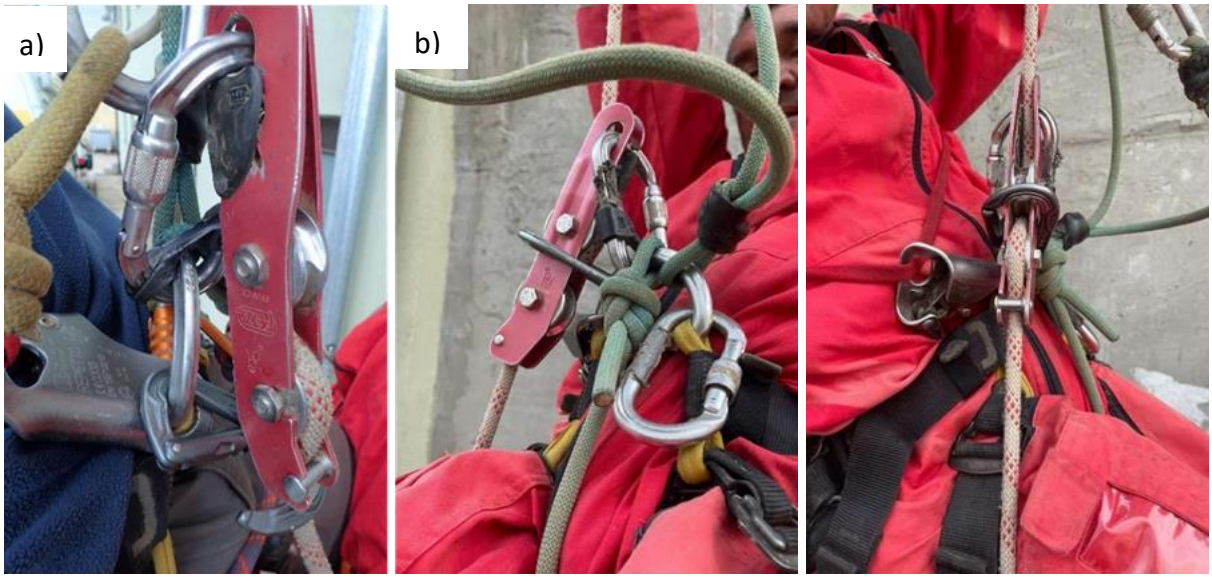


Figure 5: Hazards of Improperly Loaded Simple Descender and Additional Carabiner (Figure 5a: Opening of the additional carabiner's gate; Figure 5b: Passing of the simple descender through the additional carabiner; Figure 5c: Rope deforming the side plates of the simple descender)

The next difficulty arising from improperly loaded devices (in cases where the additional friction carabiner is located on the central harness carabiner) is the compression of the Simple descender and the additional carabiner, and consequently the Croll (Figure 6). This results in the inability to clip the rescuer's short cowstail into the left side of the central carabiner (from the rescuer's perspective). Clipping it to the right side of the central carabiner can adversely affect the limited maneuvering space during the descent of the rescuer and the victim, especially when crossing anchors.

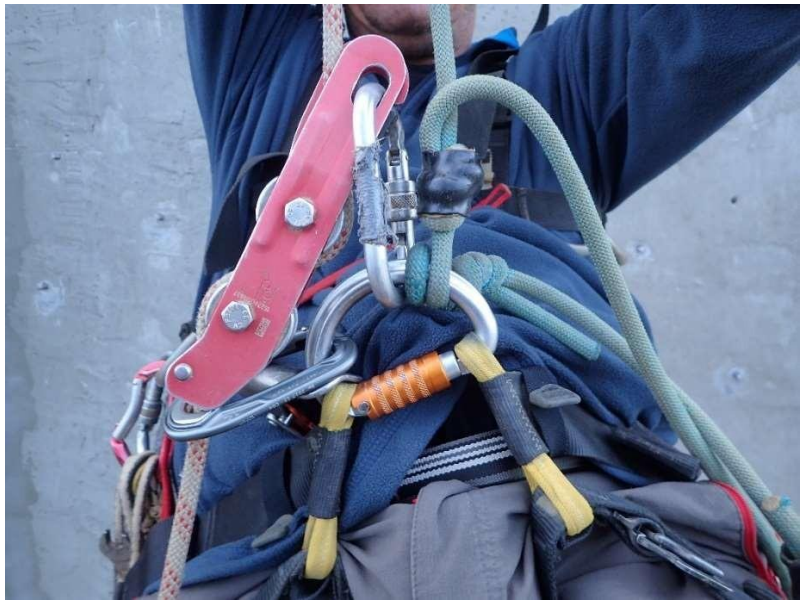


Figure 6: Compression of Devices Due to Improper Loading of the Simple Descender

The length of the cowstails on which the shunt is positioned plays a significant role in the before mentioned self-rescue procedure. If they are adjusted correctly, a problem arises with the size of the maneuvering space during the self-rescue process. It is logical to conclude that a taller victim will have a longer cowstail with the shunt on it, allowing the rescuer to easily clip onto the section of rope between the victim's simple descender and shunt (Figure 7a). Conversely, a shorter caver will have a somewhat shorter cowstail, thereby reducing the maneuvering space proportionately (Figure 7b). This reduced space requires the rescuing caver to be skillful when transferring the croll above the victim's Simple descender and when creating a counterbalance. It is also advisable to have an adjustable stirrup so that later, during the counterweight setup, the rescuer can elevate sufficiently and clip the middle of their cowstail into the carabiner at the upper opening of the blocker.

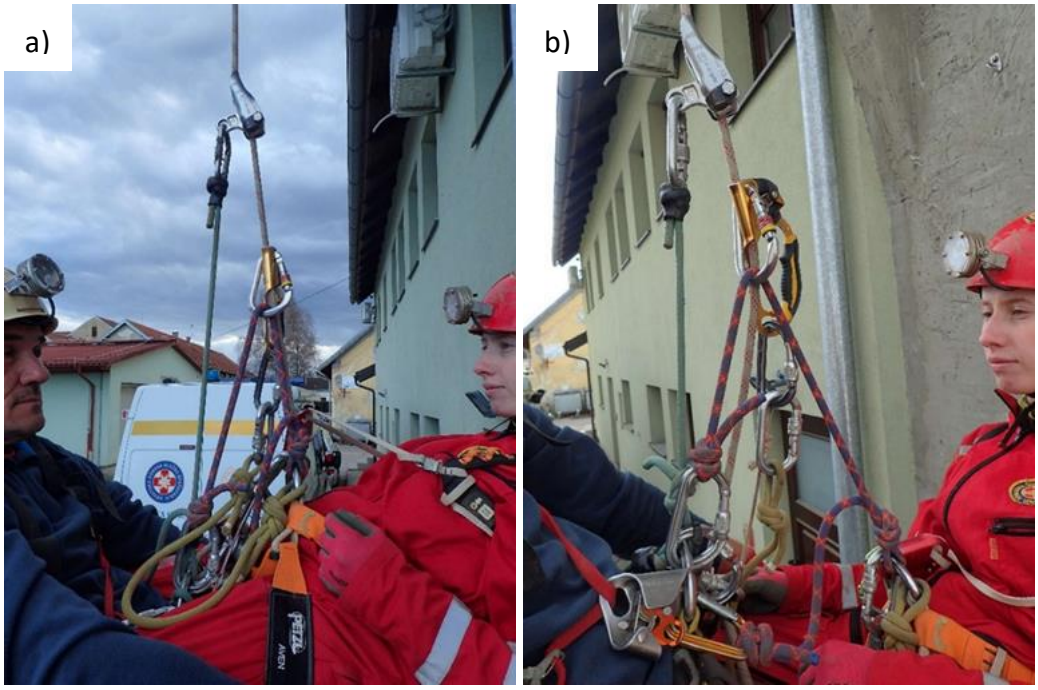


Figure 7: The Relationship of Maneuvering Space with Different Lengths of Cowstails (Figure 7a: Option with a Shunt on a Longer Cowstail; Figure 7b: Option with a Shunt on a Shorter Cowstail)

It is important to note that for performing the self-rescue technique of a person hanging in a shunt and simple descender, in the case of a shorter cowstail, an additional carabiner (either oval or HMS) is required. The rescuer must carry this with them, as it is necessary for creating a counterweight. Since the maneuvering space is limited and depends on the length of the shunt's cowstail, the counterweight should be created at the highest point of the blocker, specifically at its upper opening. Using an HMS carabiner is recommended even though various types of carabiners can be placed in the upper opening of the blocker. Due to its pear-shaped design, which provides a larger working space for opening the carabiner gate, it is simpler and quicker to insert/remove the rope of the rescuer's long cowstail then with an oval carabiner (Figure 8).

If the shunt's cowstail is exceptionally short, creating a counterweight becomes problematic because there isn't enough space to fully unload the tension. In that case, the rescuer's blocker is positioned above the victim's shunt, and the counterweight is created according to the previously mentioned procedure. If the shunt's cowstail is exceptionally long, the maneuvering space is considerably large. In such cases, at least 10 cm of space should be left between the carabiner on the lower opening of the blocker and the middle of the rescuer's long cowstail. Subsequently, the counterweight is created according to the previously mentioned procedure.

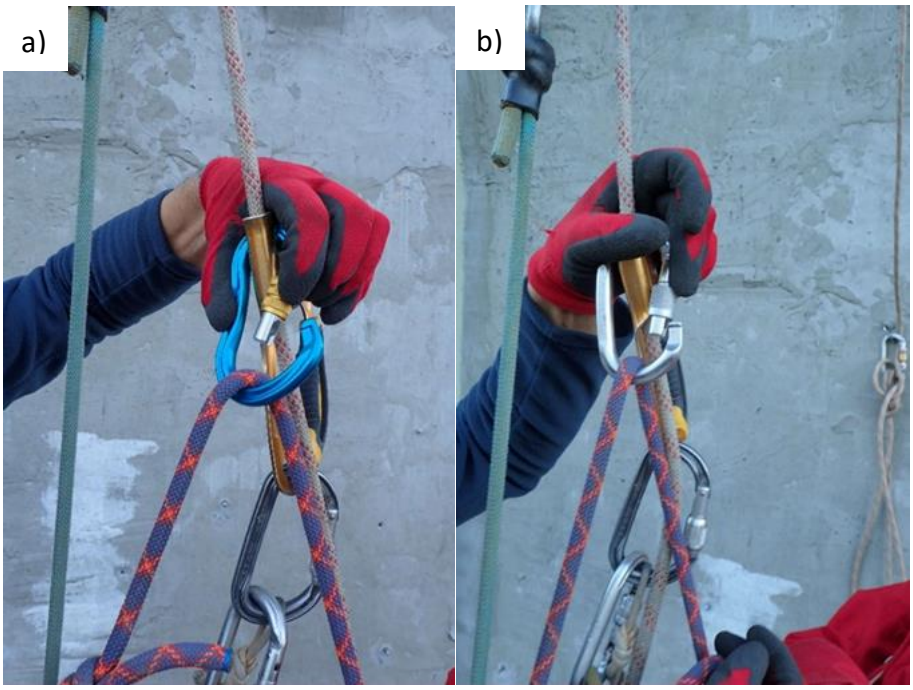


Figure 8: Working space of the carabiner at the upper opening of the blocker (Figure 8a: HMS carabiner; Figure 8b:oval carabiner)

Once the counterweight is in place and the simple descender has taken over supporting the victim, the rescuer's next step is to lower them to the nearest ledge or a safe location for care. A challenge arises in releasing the progression rope from the additional carabiner when using an additional friction carabiner attached to the Simple descender's carabiner. Under the weight of two people, the rope tightens and presses the additional carabiner against the simple descender. Due to the thickness of the rope, there can also be issues with opening the gate of the additional carabiner (Figure 9). In this case, unlocking the Simple descender requires careful handling.

Figure 9: Issue with Releasing the Rope When Using an Additional Carabiner on the Carabiner of the Simple Descender

2.4. Injured Caver in a Shunt and Simple Descender – Approach from Above

It is assumed that the injured caver is unconscious. The rescuer assumes that the victim is hanging in a shunt, and the simple descender is not locked, therefore, they need to approach carefully and with as little jolting as possible. The rescuer uses a technique of rappeling to get closer to the victim.

Figure 10: Injured Caver Hanging in a Shunt and Simple Descender, with the Rescuer Approaching via Rappelling Technique

Procedure for Self-Rescue Technique of an Injured Caver Approaching from Above:

1. The rescuer rappels down the progression rope to the injured caver hanging in a shunt and simple descender.
2. The rescuer reaches the victim's shunt and bypasses it like a narrow rope passage (Figure 11) (clips their cowstail into the carabiner on the shunt, which belongs to the victim's long cowstail, transfers their Croll and blocker below the shunt, and unclips their cowstail from it).
3. The rescuer clips their short cowstail into the victim's central carabiner, ensuring the carabiner faces away from the victim's body.
4. The rescuer unclips the victim's simple descender, turns it towards themselves, clips it onto the right end of the central carabiner (from the rescuer's perspective), and locks it.
5. The rescuer places an additional carabiner in the upper opening of the blocker.
6. The rescuer clips the carabiner of their long cowstail into the upper opening of the victim's Croll, inserts the middle of the long cowstail into the carabiner at the upper opening of the blocker, and pushes the blocker upwards as far as the length of the cowstail allows.
7. The rescuer stands in the stirrup, unclips their Croll from the rope, and gently sits in the harness. At this point, both the rescuer and the victim hang in counterbalance from the rescuer's blocker and long cowstail.
8. The rescuer stiffens their legs at the hips and makes a push with their legs upwards (pushing the victim upwards with their thighs), relieves the shunt, and unclips it from the rope.
9. The rescuer further tightens and locks the simple descender.
10. The rescuer stands in the foot loop of their ascender and gradually lifts themselves as the injured person descends, thereby loading the simple descender.
11. The rescuer unclips their long cowstail.
12. Standing in the stirrup of the blocker, the rescuer clips their Croll into their short cowstail attached to the central carabiner of the victim.
13. The rescuer unclips the blocker from the rope.
14. The rescuer unlocks the simple descender and begins to descend to the nearest ledge, or the closest safe spot appropriate for the care of the victim. The recommended position for the rescuer is to place themselves between the victim's legs (if injuries allow).

Rescuing an injured caver from above, who is hanging in a shunt and a Simple descender, prevents the Simple descender from being positioned unfavorably and subjected to improper loading. This approach eliminates the risk of equipment failure caused by incorrectly loaded devices. Unlike the approach from below, the rescuer's short cowstail can easily be clipped into the left side of the victim's central carabiner. However, the issue of the length of the

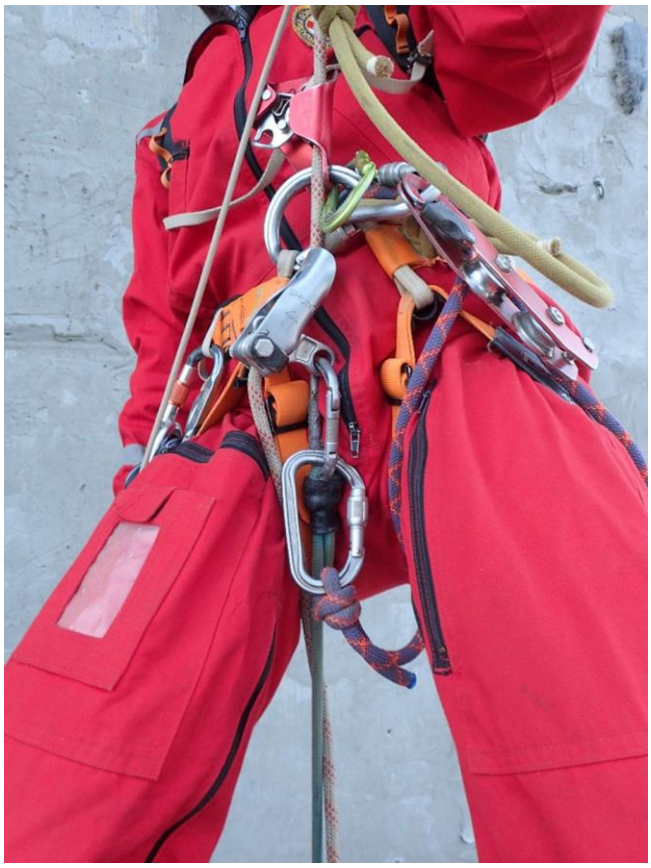


Figure 11: Crossing the Shunt Using the Knot Passing Method

cowstail on which the shunt is located and the problem of unlocking the progression rope from an additional carabiner if it is attached to the Simple descender's carabiner remain.

A potential hazard during the shunt crossing in rappelling can be noted as clipping the cowstail into the carabiner that is on the shunt, belonging to the victim's long cowstail. This action must be well planned and executed, in case of a sudden rise of the rescuer, there is no sudden movements that could result in the shunt becoming unlocked, which would lead both the victim and the rescuer to load only one device.

3.3. Commentary and analysis

The first problem I encountered was the term *Instruktorski rad*. While researching the *Hrvatski speleološki savez (Croatian speleological association)*[4] and their publications, I came across more seminars done under the title *instruktorski rad*. In the larger context of the text we've been translating, dealing with speleological rescue techniques, *instruktorski rad* can easily translate back as *instructor's manual* or *training manual*. These terms accurately reflect the instructional and educational intent of the document, given that the content is intended to teach and to guide future rescuers who are learning about cave rescue operations. I chose the term *instructor's manual* because it felt more true to the source text.

The next problem I came across was the correct translation of the term *speleologija*. Speleology is *the scientific study or exploration of caves* [5], but by doing research on speleology I came across other terms like *caving, spelunking, potholing.* Those terms have a slightly different meaning, but are used interchangeably; *spelunking* is used more commonly in North America, and *potholing* in the United Kingdom.[6] *In the Croatian language, the term* used for both *caving* and *speleology* is *speleologija*. It is used for scientific purposes, and for *the sport of exploring caves*[7]. I chose the term *caving* in my translation of this instructor's manual, aimed for people who are learning and preparing to become speleologists, but who are not scientists, and it is focused on the sport of exploring caves.

However, in the sentence *Sve većim razvojem speleologije kao sportsko-tehničke i znanstvene discipline, javila se potreba za unapređivanjem opreme, odnosno spravica koje služe u svrhu kretanja po speleološkom objektu,* I chose to translate the term *speleologija* as *speleology* because it has a wider meaning in this context. It encompasses both the scientific and the sport part of the term. The final translation of this sentence reads: *With the increasing development of speleology as both a sport and scientific discipline there arose a need for improving equipment, specifically devices used for technical navigation through speleological objects.*

[4] https://www.speleo.hr/

[5] https://www.merriam-webster.com/dictionary/speleology

[6] https://blog.peli.com/areas-of-interest/outdoor-adventure-travel/caving-spelunking-and-potholing-explained

[7] https://www.merriam-webster.com/dictionary/caving

The next problem I encountered was in the sentence *Razvoj speleološke opreme i tehničkih mogućnosti omogućava istraživanje kompleksnijih i po svojim dimenzijama sve zahtjevnijih speleoloških objekata,* the term being *speleološki objekti.* At first, I chose with no doubt *cave systems*, but later on I learned that there are many types of *speleological objects,* for example underground caverns, tunnels, and other natural formations[8].

This text includes a lot of technical terms used in speleology and caving. I will earmark the ones I had the most trouble with.

Vratašca s maticom – screw gate

The term that I had trouble with while translating is *pupčana vrpca*. I came across terms *tether, lanyard*, and finally *cowstail* which I chose to use. When discussing climbing or caving equipment, the term *cowstail* is quite specific and understood among practitioners for referring to the short ropes or straps used for quick attachments. However, the term *tether* would be a better option if this text was translated for broader purposes and audience. Given that this is an instructor's manual, written by a student getting a license for rescuing in speleology, the term *cowstail* is more accurate.

Uže za napredovanje – progression rope

Dvije koloture – two pulleys

There is one term that would be easy to miss, but it has great significance for the caving and climbing community. The term is *polica*, in Croatian *shelf,* but in speleological terminology it is *a ledge*[9].

Otpenjavanje – This term can be translated as *rappelling* or *unhooking*, depending on the context. *Unhooking* describes the action of detaching or releasing from an attachment or connection, such as unclipping from safety equipment. *Rappelling* specifically refers to the controlled descent down a vertical surface using a rope, which is described here.

Another term I found problematic while translating this text was in the sentence *Tehnike samospašavanja predstavljaju prvi i najbrži oblik pomoći koja se može pružiti unesrećenom*

[8] https://www.geotech.hr/en/speleological-objects-in-flysch/#:~:text=Speleological%20objects%20are%20natural%20underground,speleology%20(Bo%C4%8Di%C4%87%2C%202009).

[9] https://dictionary.cambridge.org/dictionary/english/ledge

speleologu, a izvode je članovi njegove ekipe sve do dolaska spašavateljske službe, the term being *najbrži oblik pomoći.* I struggled with *help, assistance* and finally *aid.* The translation of *najbrži oblik* would be *first*, so in that case I decided to use *aid* because the English term for *prva pomoć* is *first aid*. The final translation of this sentence reads: *Self-rescue techniques represent the first and fastest form of aid that can be provided to an injured caver, and are performed by the members of caver's team until the arrival of rescue services.*

An example which illustrates where I had to intervene in order to avoid ambiguity is the translation of the title *Edukacija i razvoj tehnika*. If translated as *Education and Development of Techniques,* the title sounds quite ambiguous and it is unclear what kind of techniques are being referred to - educational techniques, technical techniques, or something else entirely. To avoid this problem, it was necessary to revise the title to *Education and Development of Rescue Techniques*, adding the word *rescue* in order to clarify the focus of the text. Adding words in translation poses certain dangers, such as altering the intended meaning, causing ambiguity, or disrupting the natural flow and clarity of the text, but sometimes this is necessary to ensure accuracy in translation.

The source version of the text in Croatian contains long, complex sentences which are normal in technical and formal writing. However, the English language often favours shorter and more direct sentences. The task I had to deal with was breaking down sentences from the source language into shorter ones in the target language. Here is a few examples:

- *Koristi se pretpostavka da unesrećeni speleolog nije pri svijesti te da visi u shuntu, a simple descender nije blokiran, stoga spašavatelj treba oprezno i uz što manje trzaja doći do njega.*

  It is assumed that the injured caver is unconscious and hanging in a shunt, with the simple descender not locked. Therefore, the rescuer needs to reach them carefully and with as little sudden movements as possible.

- *Penjući se prema unesrećenom speleologu, spašavatelj opterećuje uže ispod unesrećenog te se opterećujući njegov neblokirani simple descender i dodatni karabiner za trenje oboje izlažu situaciji iznimno opasnoj po život.*

  As the rescuer climbs toward the victim, they place a load on the rope below the victim. This action strains the caver's unlocked Simple descender and the additional friction carabiner, creating a potentially life-threatening situation for both.

- *Sljedeća poteškoća koja proizlazi iz nepravilno opterećenih spravica (u slučaju kada se dodatni karabiner za trenje nalazi na centralnom karabineru pojasa) je zbijanje simple descendera i dodatnog karabinera, a samim time i crolla (Slika 6), što rezultira nemogućnošću ukapčanja kratke pupčane vrpce spašavatelja u lijevu stranu centralnog karabinera (gledano iz perspektive spašavatelja).*

  The next difficulty arising from improperly loaded devices (in cases where the additional friction carabiner is located on the central harness carabiner) is the compression of the Simple descender and the additional carabiner, and consequently the Croll (Figure 6). This results in the inability to clip the rescuer's short cowstail into the left side of the central carabiner (from the rescuer's perspective).

- *Važno je napomenuti da je za izvođenje tehnike samospašavanja unesrećene osobe koja visi u shuntu i simple descenderu u slučaju kraće pupčane vrpce potreban jedan dodatni karabiner (ovalni ili HMS karabiner) koji spašavatelj mora imati sa sobom, a koji je potreban za izradu protuutega.*

  It is important to note that for performing the self-rescue technique of a person hanging in a shunt and simple descender, in the case of a shorter cowstail, an additional carabiner (either oval or HMS) is required. The rescuer must carry this with them, as it is necessary for creating a counterweight.

- *Ukoliko je pupčana vrpca shunta iznimno dugačka manevarski prostor je izrazito velik te se u tome slučaju ostavlja najmanje 10 cm prostora između karabinera na donjem otvoru blokera i sredine dugačke pupčane vrpce spašavatelja, te se potom radi protuuteg prema ranije navedenom postupku.*

  If the shunt's cowstail is exceptionally long, the maneuvering space is considerably large. In such cases, at least 10 cm of space should be left between the carabiner on the lower opening of the blocker and the middle of the rescuer's long cowstail. Subsequently, the counterweight is created according to the previously mentioned procedure.

In order to ensure that my translation is not under the influence of linguistic interference I had to adjust several sentences, for example: *Srce tada počinje brže kucati i imati snažnije kontrakcije, a da bi se osigurao dovoljan dotok krvi u mozak i vitalne organe, krvne žile se stisnu.* An example of translation with clear language interference is *Then the heart begins to beat faster and with stronger contractions to ensure an adequate blood supply to the brain and vital organs, causing blood vessels to constrict.* This way, the sentence contains structural and lexical elements directly transferred from the source language, which can lead to awkward phrasing and potential misunderstandings. To avoid this, I translated it as *To ensure sufficient blood flow to the brain and vital organs, the blood vessels constrict, causing the heart to then beat faster and contract more forcefully*. This translation maintains the intended meaning while adapting the sentence structure to fit the natural English syntax, ensuring clarity and readability.

Another example can be found in the phrase *nosi određene opasnosti* in the sentence *Speleologija kao jedan od oblika ljudske aktivnosti, obzirom na sve svoje specifičnosti, od svojih početaka nosi u sebi određene opasnosti.* I had to tread carefully to choose the right translation because *carries certain dangers* would be a perfect example of interlinguistic interference known as *Cronglish* (a mix of Croatian and English, translation made in the spirit of the source language instead of the target language). The term *nosi opasnosti* is commonly used in Croatian to express that something includes certain risks or dangers, but in English, the verb *carries* can sound awkward and overly literal in this context. I decided to use the phrase *involves certain risks* wich is a more idiomatic and clear way to express the meaning of the phrase, while adapting it to the natural flow and usage of English language. The translation of the whole sentence is: *Since its beginnings, caving, as one of the forms of human activity, inherently involves certain risks due to its specific characteristics.* Additionally, this sentence had another possible issue with linguistic interference, specifically in the phrase *od svojih početaka* which is placed at the end of the sentence in the source text. By placing *since its beginnings* at the end of the sentence in English the natural flow would be disrupted. English sentences often read more naturally with temporal phrases placed at the beginning. Temporal phrases set the stage for the statement, providing temporal context upfront, which helps emphasize historical context.

Another problem I encountered while translating this text was the sentence *Navedeno izbočenje pozitivno je utjecalo na smanjenje broja spravica na centralnom karabineru pojasa, brzina spuštanja i zaustavljanja je bolje kontrolirana, te u slučaju većeg opterećenja na descender i*

dodatni karabiner, ono ne može proći kroz tijelo spider descendera, where the first part of the sentence required a change in tense. By using the same tense that was used in the source text, the translation would be *The protrusion had a positive impact on…* which highlights the past influence of the protrusion up to the present, suggesting completed effects. To ensure a high-quality translation, I opted to change the tense to *The protrusion positively impacts…,* which implies a general or ongoing influence of the protrusion without specifying a particular timeframe, focusing more on the continuous action or state, which was intended in the source text.

4. CONCLUSION

In this thesis, the challenges encountered during the process of translation of two specialized text from English into Croatian, both of scientific nature but unrelated in topic, were examined. The majority of issues encountered pertained more to semantics than syntax.

The primary issues include technical terminology, especially in source text 2 (*Challenges of Performing Self-rescue Techniques for an Injured Person in Descent*). The translation of this text benefited from the expertise of members of the Riječki Alpinistički Klub (RAK), who are experienced in caving, as well as a firefighter licensed in caving rescue. The focus during this translation was on accurately rendering technical terms and justifying the choices that were made. Although I located two Croatian-English dictionaries online, they were of limited assistance due to the highly specific and equipment-related terminology in the source text.

Nonetheless, the problems encountered in source text 1 (*The Role of Diet in Cancer Prevention)* were significant and required careful attention to detail. This text, being a scientific document, demanded adherence to the conventions of academic writing, which include precise language, clear formatting, and systematic presentation of information. The challenges primarily involved ensuring that complex scientific concepts and terminologies were accurately conveyed in Croatian. Furthermore, the translation necessitated the use of appropriate scientific terminology that would be both accurate and comprehensible to the target audience.

Finally, this thesis reflects the complexities of translation and underscores the translator's role as a mediator between cultures and languages. It is evident that conveying the meaning of the source text into the target language is the essence of translation. However, reasonable adjustments in syntax or style, provided they do not alter the meaning of the text, are permissible. The journey of a translator is one of continuous learning and adaptation, as languages are constantly evolving. This ongoing commitment to professional development is essential for maintaining the high standards required in the field of specialized translation.

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