

Reviewer 1 | 15 Jul 2022 | 22:57 1. The whole manuscript needs excessive English editing 2. Updating the reference throughout the manuscript 3. The authors should add the chemical composition of the Black solo garlic 4. Didi the authors examine the safety of the Black solo garlic 5. What is the specification of the experimental animals 6. Please, write in detail STZ-induced diabetes with references 7. How the authors examine the animals for diabetes induction 8. On what basis, the doses of black solo chosen 9. 2.6. variable measurement is strange ......please, reorganize the materials and methods section 10. How the authors examine the data for homogeneity 11. The marks and the significant differences in figures 1, and 2 are not included please, add This study is a preliminary study, and needs extra work to be able to publish (No histopathological, immunohistochemistry, protein expression and molecular study)

Corresponding Author: Saryono Saryono | 29 Jul 2022 | 16:21 #2 1. We have improved the language of our manuscript, as shown in the attached manuscript. 2. Yes, it has also been updated. 3. We have added lines 123-124 4. It is what we performed in this study, examine the safety of the liver and kidney. 5. Yes, we have added in line 427. 6. Thank you, have added in line 437. 7. Diabetes induction is examined by the higher level of blood urea, creatinine, and b2-microglobulin in the negative control. 8. It is based on the previous research, https://www.sciencedirect.com/science/article/pii/S2405844021025962?via%3Dihub, that we categorized as low, medium, and high doses. 9. Yes, thank you. We have reorganized the sentences to be more understandable, as attached below. 10. We did the Levene test on Anova; p>0.05 means homogenous. 11. We have added in Figure captions. 12. Thank you for your suggestion. It is a brief report and your suggestion is much appreciated for next our project. Corresponding Author: Saryono Saryono | 29 Jul 2022 | 16:25 #3

It is a revised manuscript, shown as track changes Review supporting file – 354049 Reviewer 1 | 02 Aug 2022 | 00:27 1. The authors did not respond well to most of the comments, and there is no improvement to the manuscript Most of the lines mentioned in the authors response not present 2. the experimental design and measurement have severe shortages; for example Did the authors examine the safety of the Black solo garlic......... I mean the substance itself How the authors examine the animals for diabetes induction..... This study is preliminary, and needs extra work to be able to publish Do not promote on this journal Corresponding Author: Saryono Saryono | 07 Aug 2022 | 11:59 #5 1. We are afraid the reviewer did not receive the most recent revision. We have modified the manuscript as shown in the track changes file. 2. We did not evaluate the safety of the substance itself, but the purpose of this study is to evaluate the safety of BSG extract.

3. We employed STZ as an inducer and focused on the protective effect of BSG on rats. We refer to our earlier research regarding this model. 4. Our purpose in doing this research is to contribute to the understanding that black solo garlic is useful as an in vivo protective agent. No intention to do as the reviewer suggests. Thank you for your comments. Reviewer 1 | 10 Aug 2022 | 08:38 I have the recent version, but the authors did not respond to my previous comment. the manuscript is a preliminary study that needs more investigation. in addition, the experimental design for induction diabetes is not appropriate. This manuscript is not appropriate for publication.

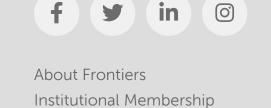
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**#1** 

#2

Q 2 Check List Reviewer 1 | 15 Jul 2022 | 22:57 a. Is the quality of the figures and tables satisfactory? Not Applicable b. Does the reference list cover the relevant literature adequately and in an unbiased manner? c. Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test) Not Applicable d. Is a statistician required to evaluate this study? - No e. Are the methods sufficiently documented to allow replication studies? - No Corresponding Author: Saryono Saryono | 29 Jul 2022 | 16:21 Thank you for your comments. **▼** QUALITY ASSESSMENT Q 3 Rigor

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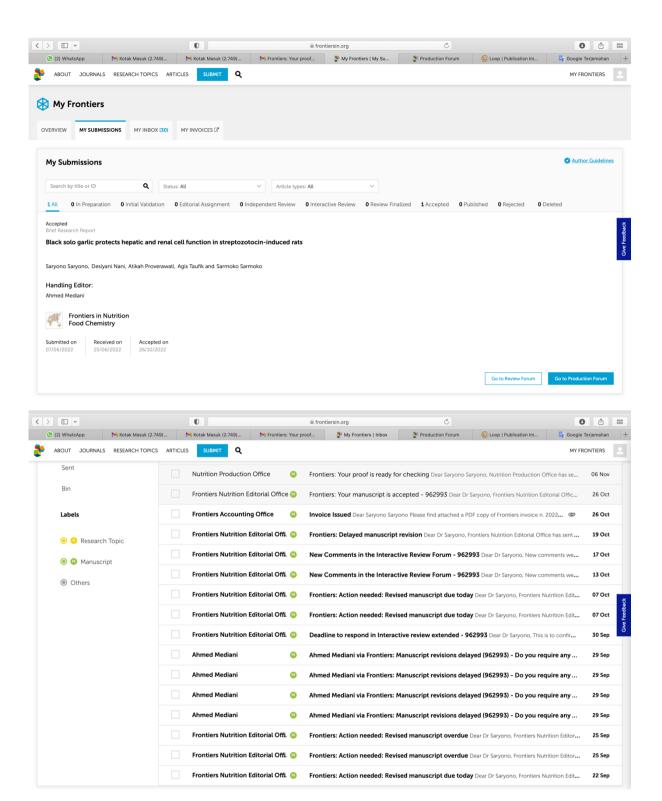
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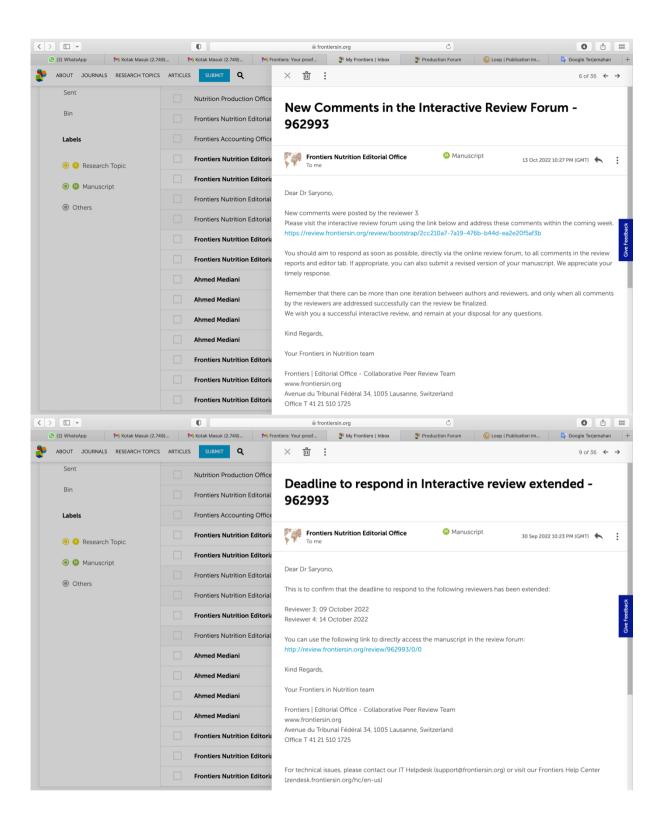
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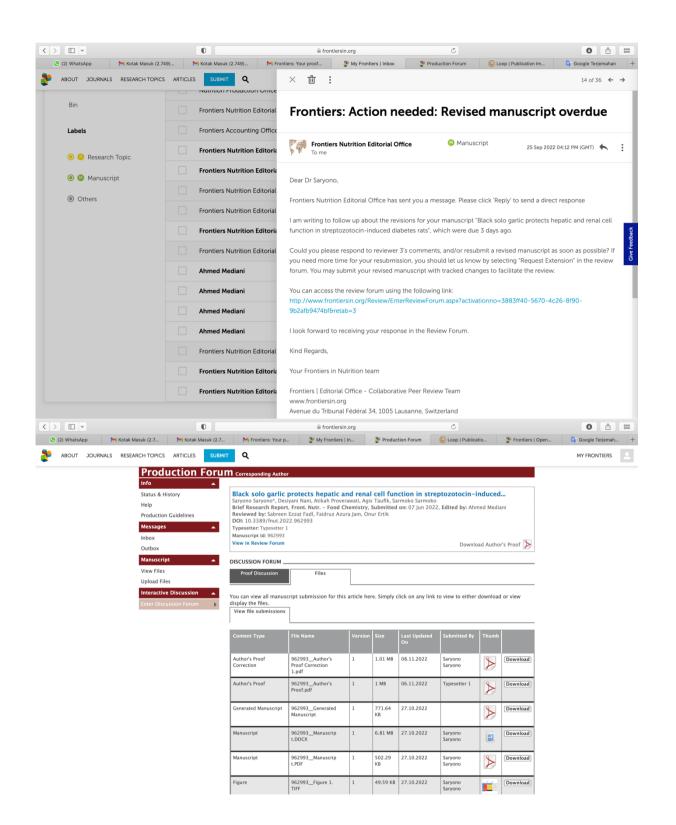
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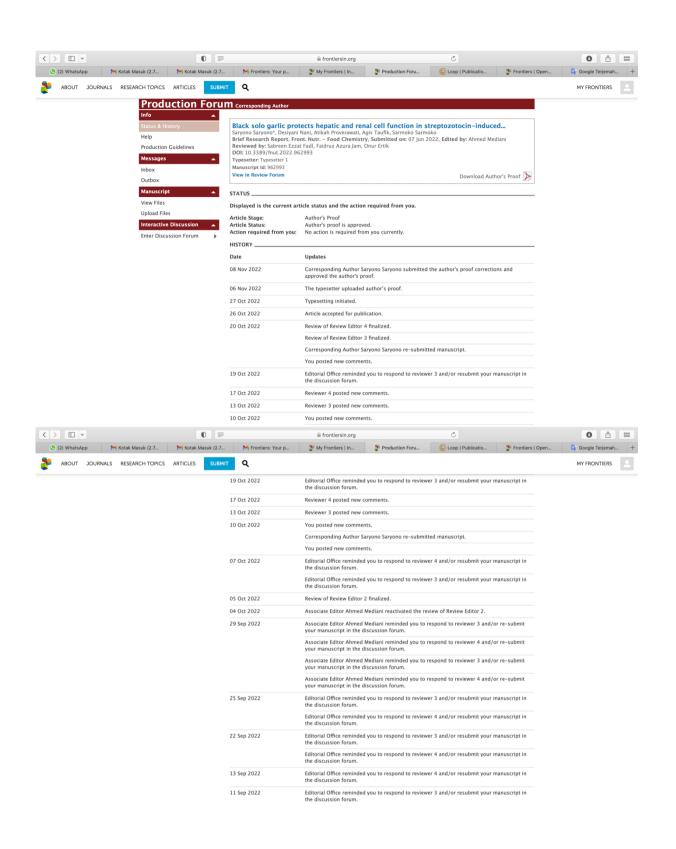
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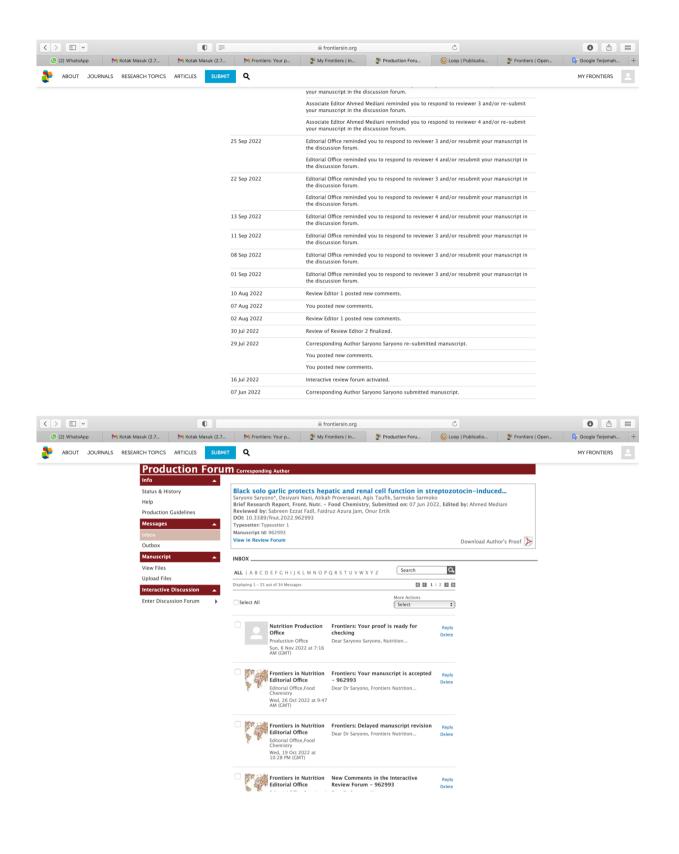
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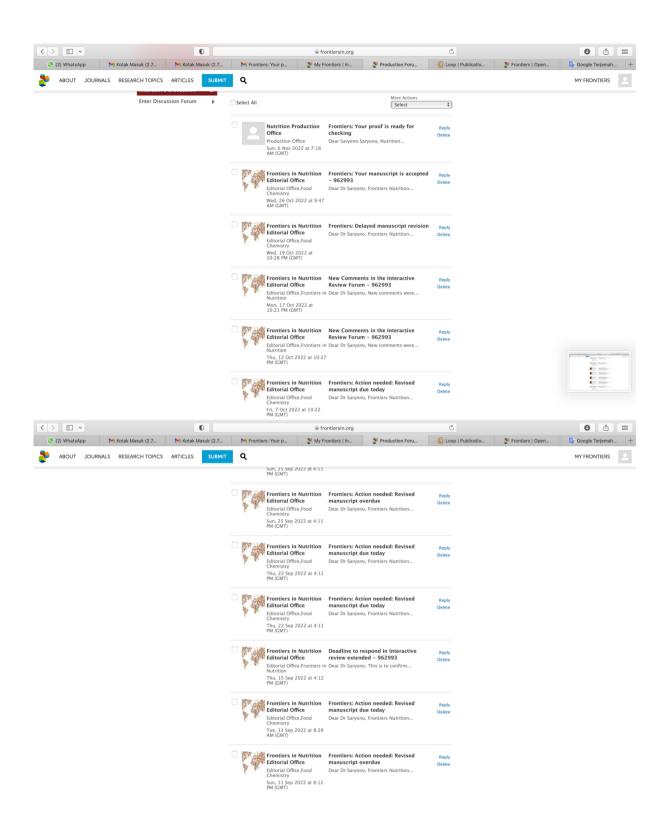


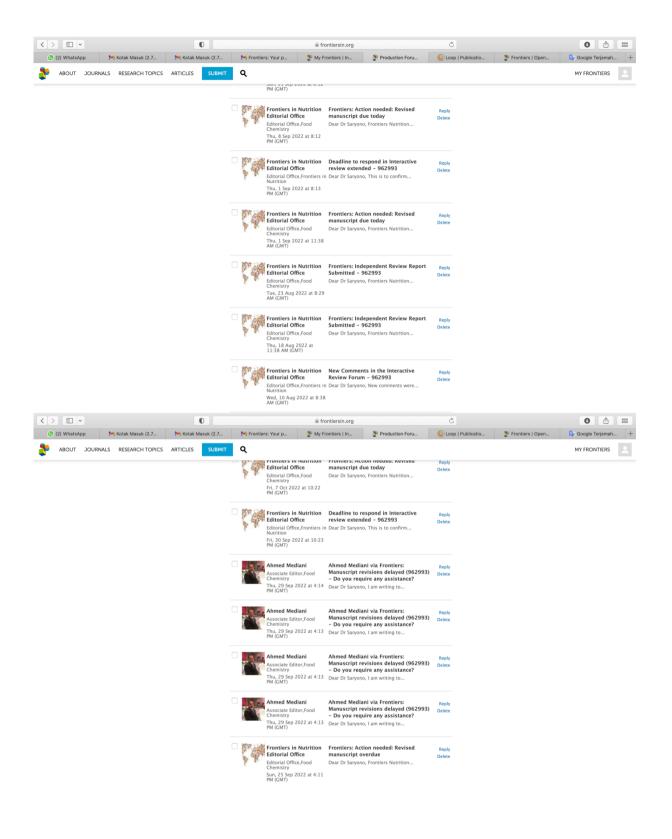


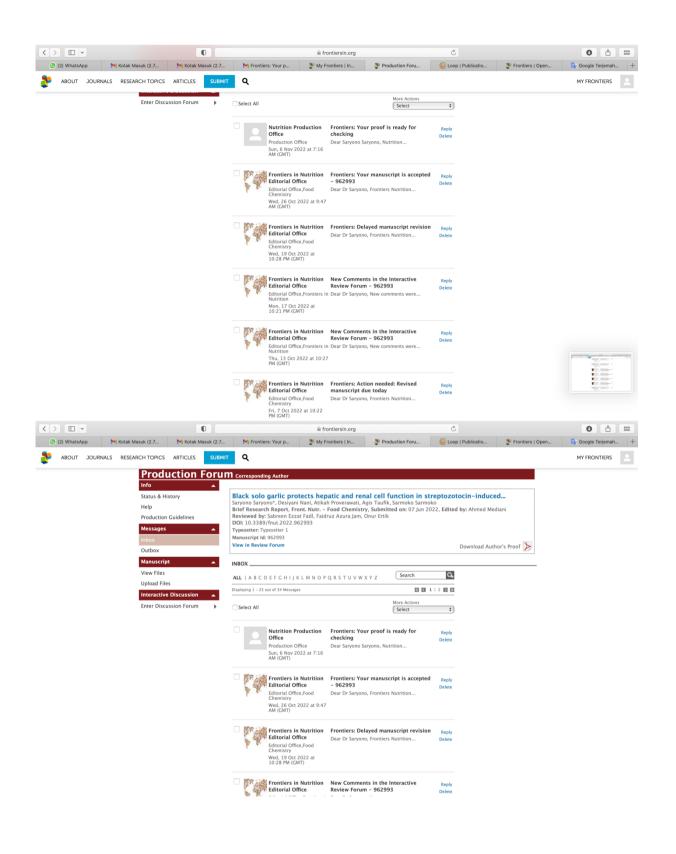


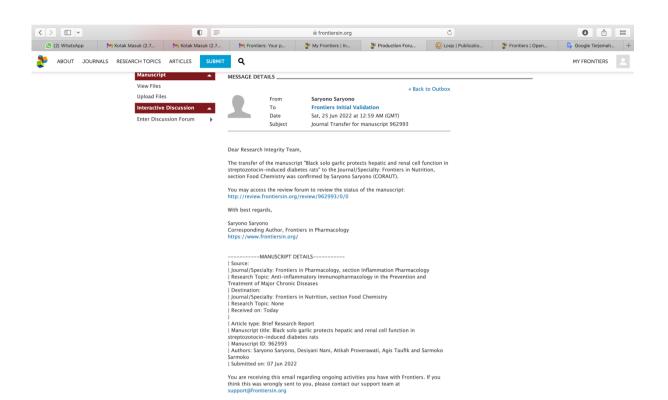










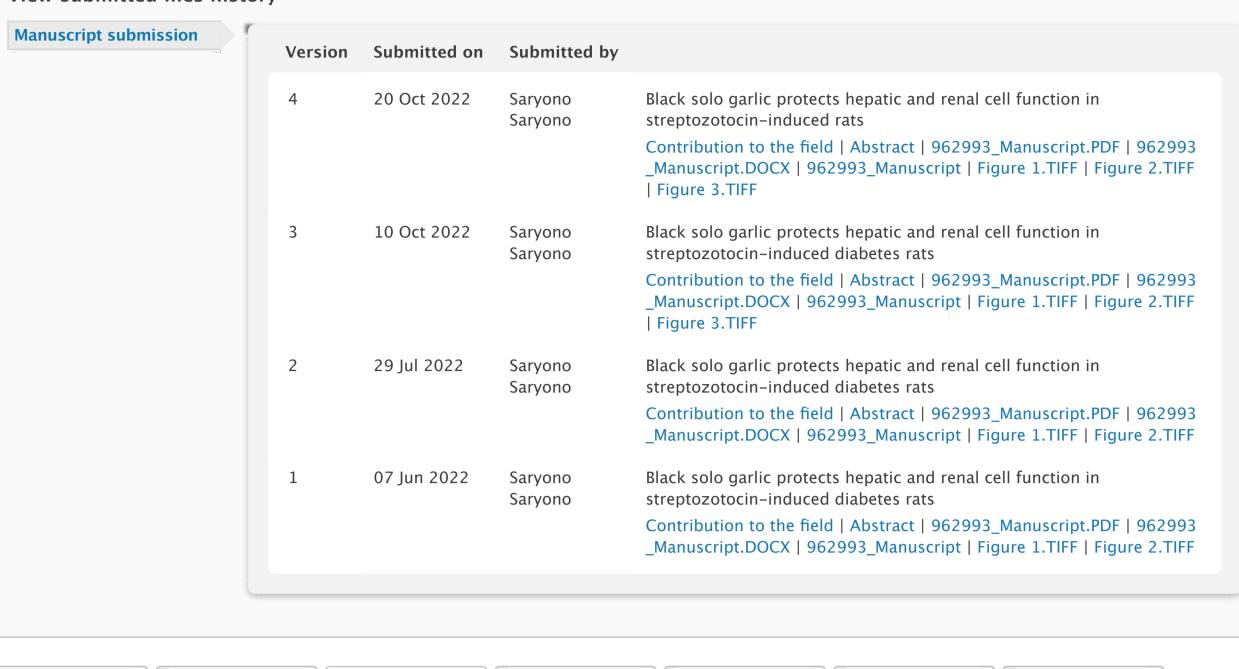


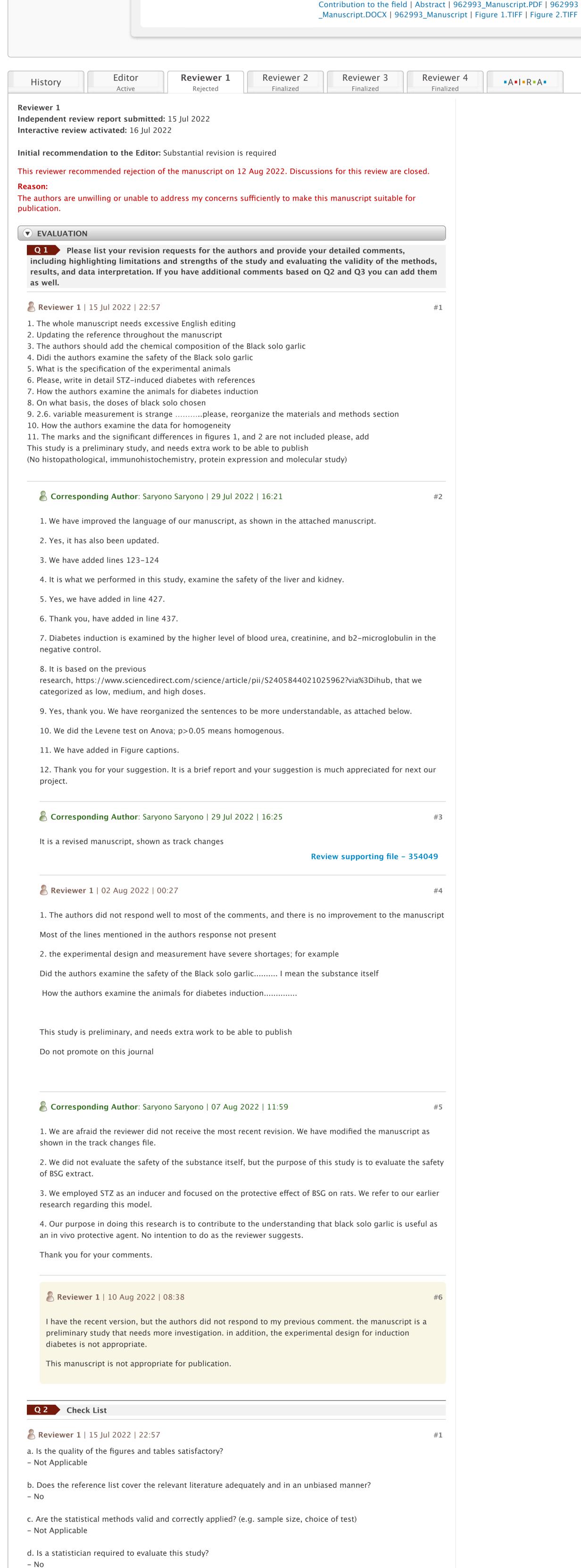
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Review

Received on: 25 Jun 2022, Edited by: Ahmed Mediani ≥

Manuscript ID: 962993

Keywords: Black garlic, black solo garlic, Kidney function, antioxidant, Liver function

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Review finalized: 20 Oct 2022

**Initial recommendation to the Editor:** Revision is required

**▼** EVALUATION Q 1 Please list your revision requests for the authors and provide your detailed comments, including highlighting limitations and strengths of the study and evaluating the validity of the methods, results, and data interpretation. If you have additional comments based on Q2 and Q3 you can add them

as well. Reviewer 3 | 18 Aug 2022 | 11:38 **#1** 

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Review supporting file – 367422

#2

Corresponding Author: Saryono Saryono | 10 Oct 2022 | 03:39

1. Thank you have revised that part, see line 15.

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Reviewer 3 | 13 Oct 2022 | 22:27

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The current manuscript.

Review supporting file - 402431

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Yes c. Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test)

d. Is a statistician required to evaluate this study?

- No

Yes

e. Are the methods sufficiently documented to allow replication studies?

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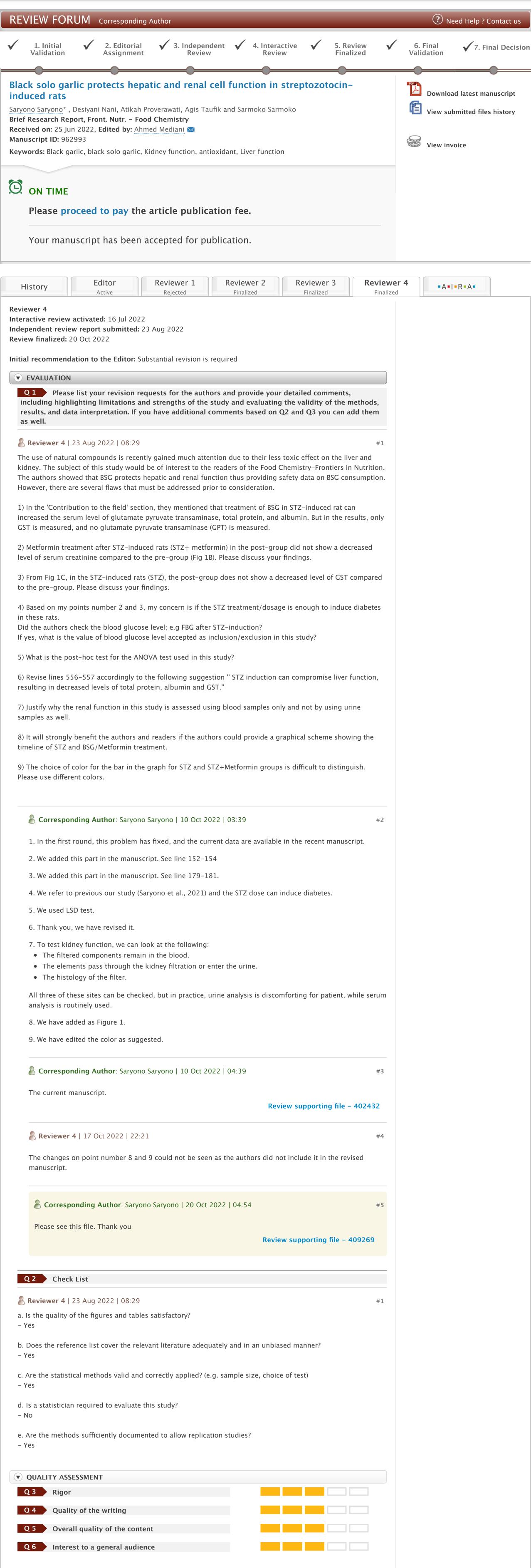
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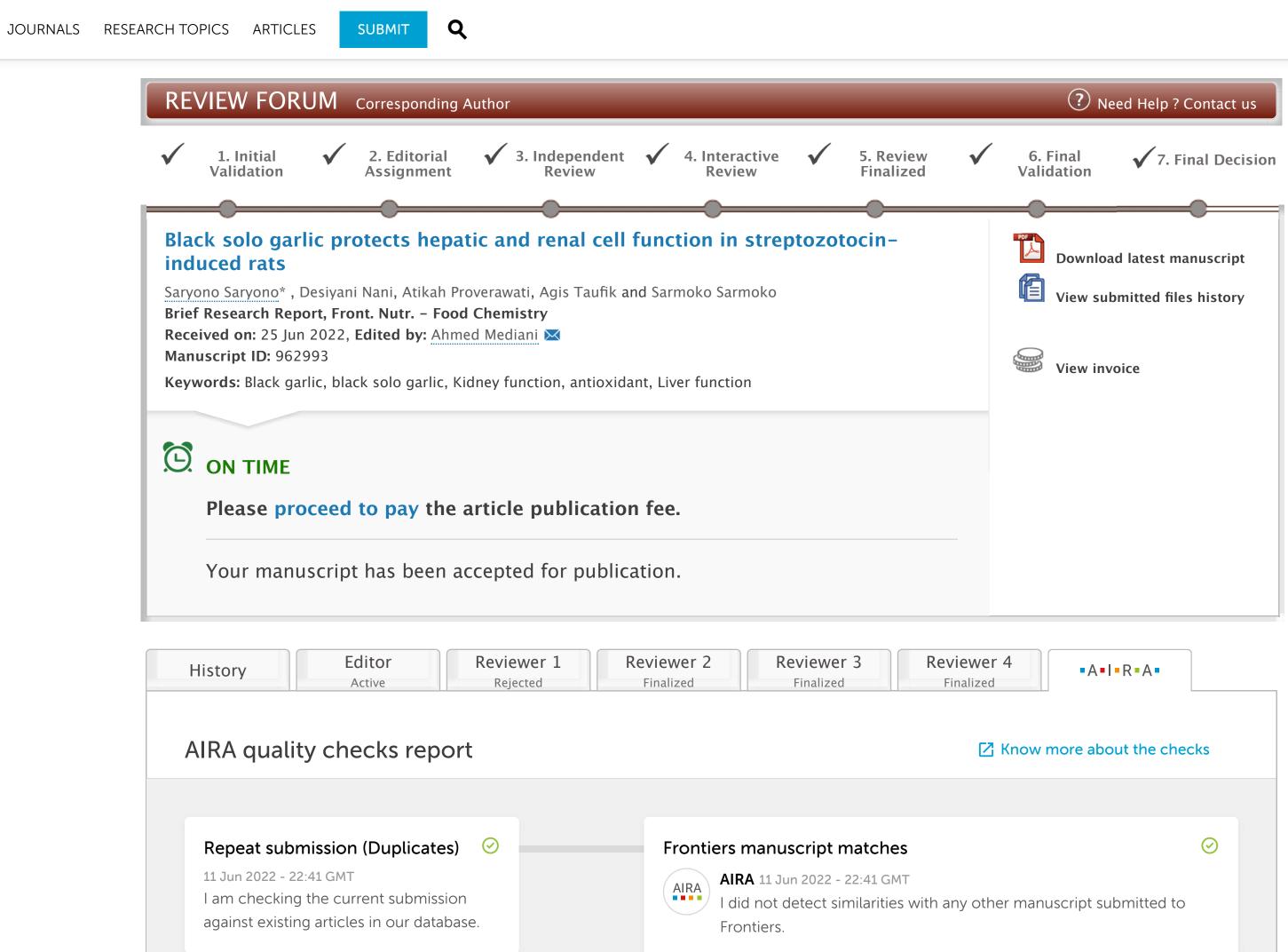
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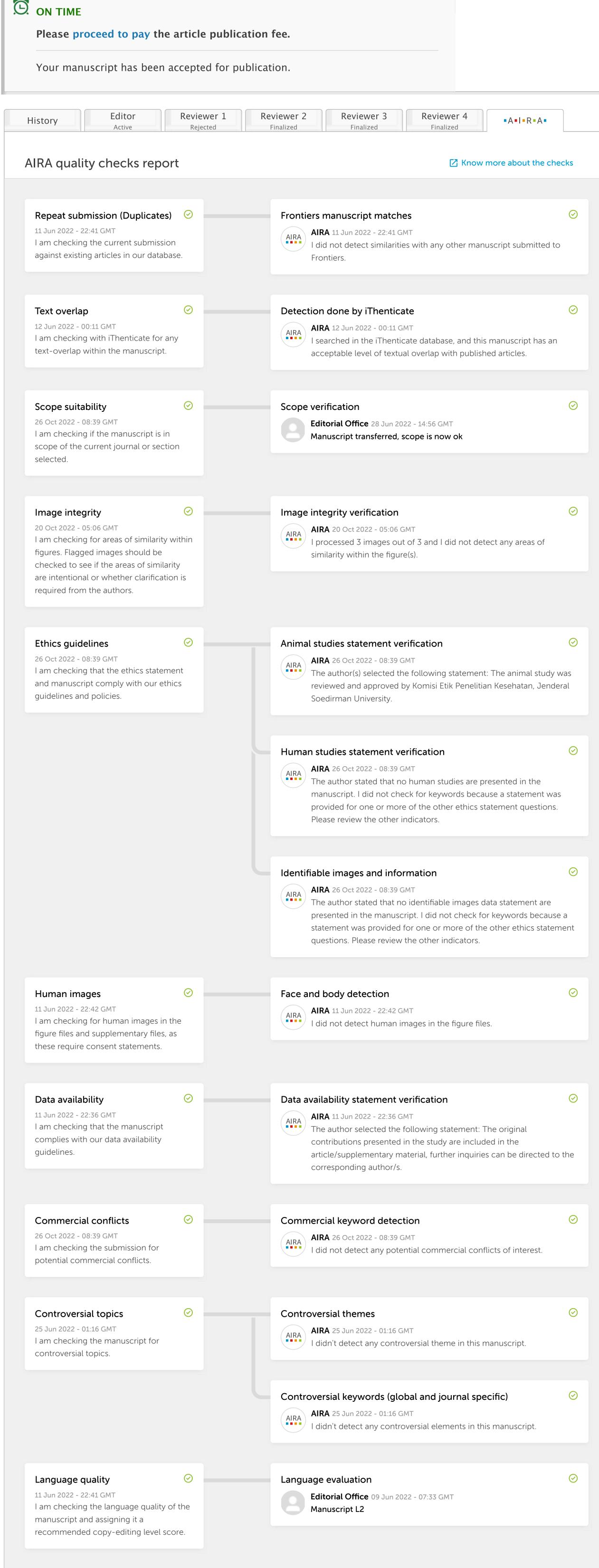
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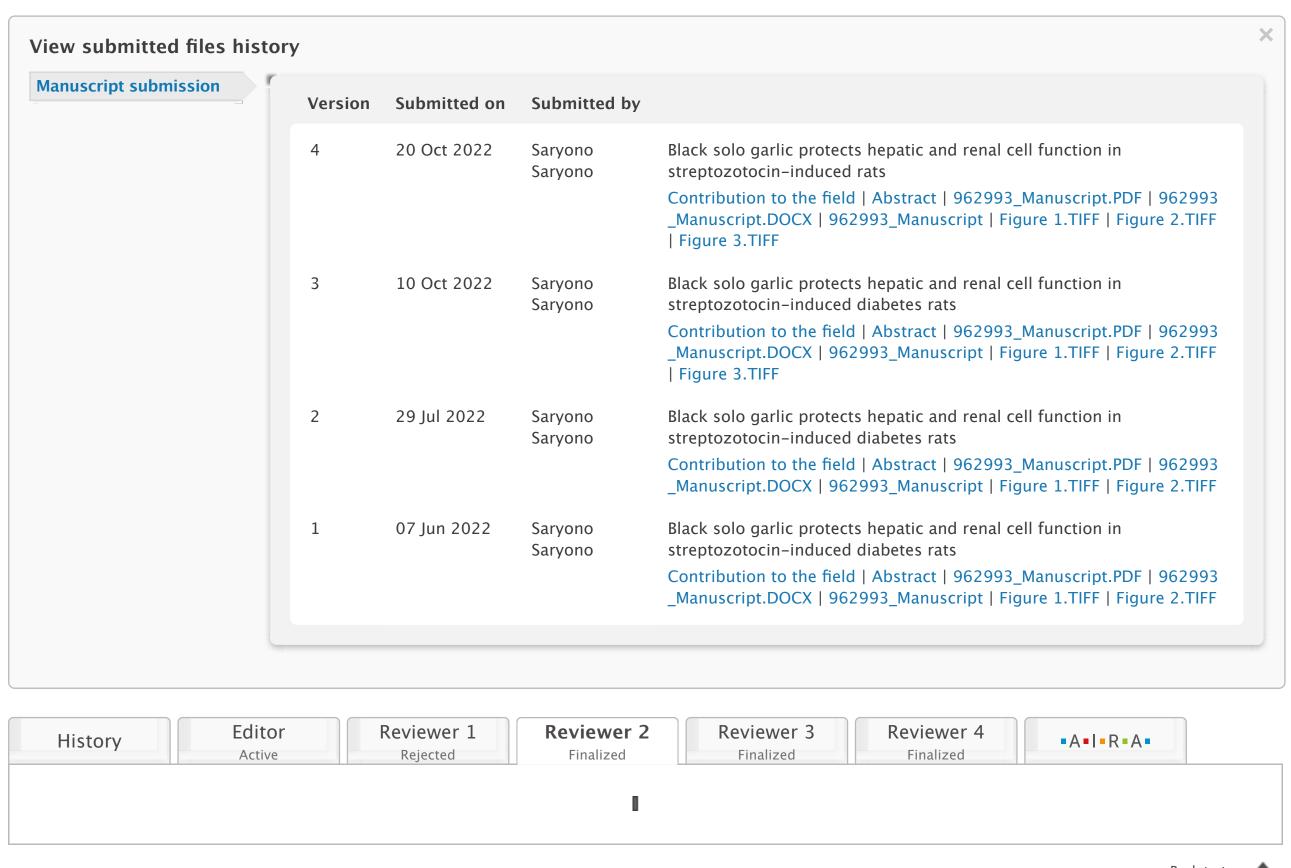
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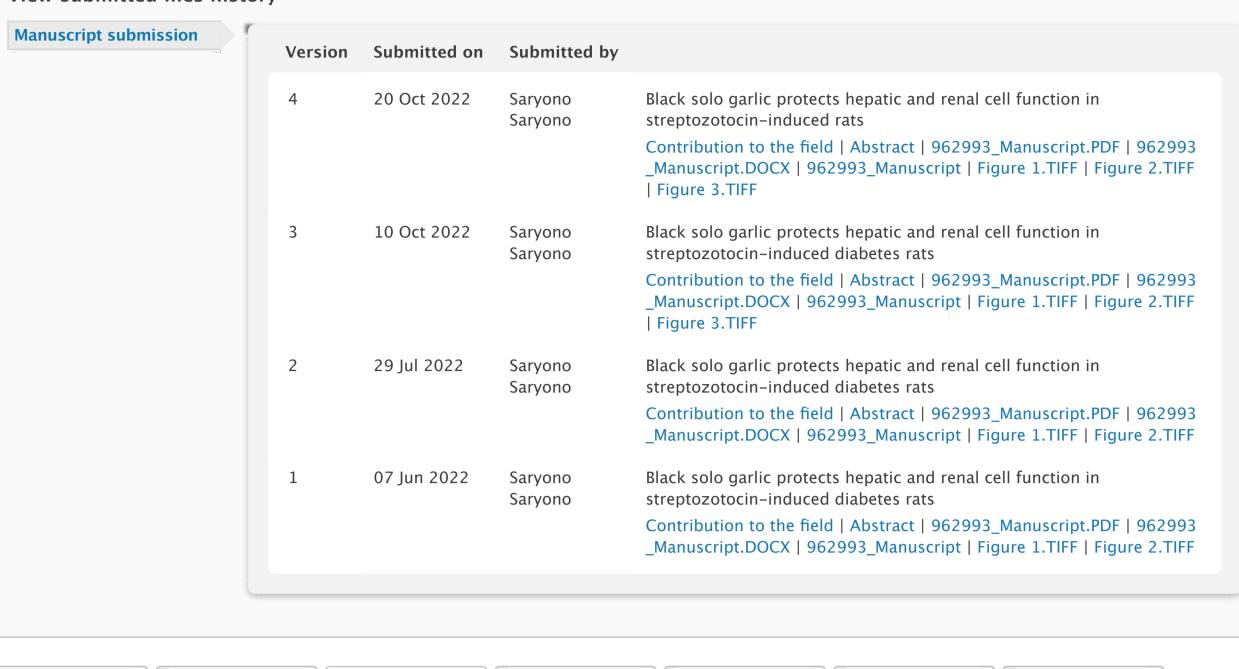
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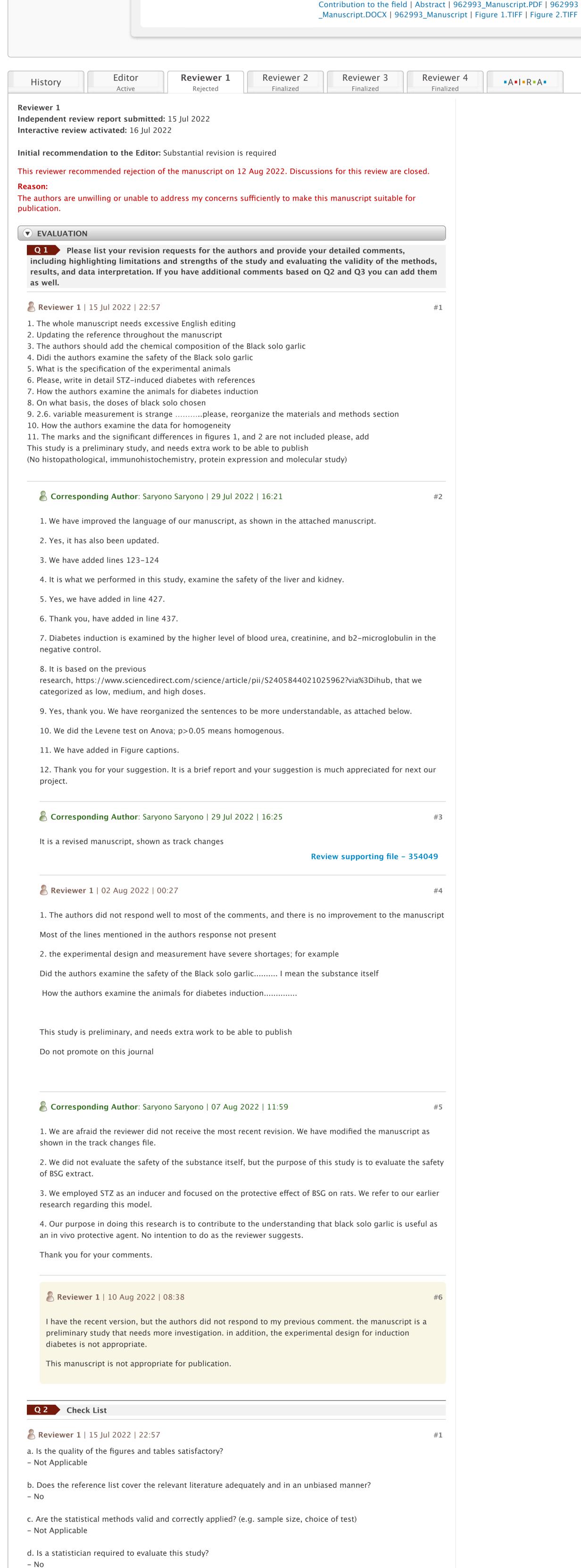
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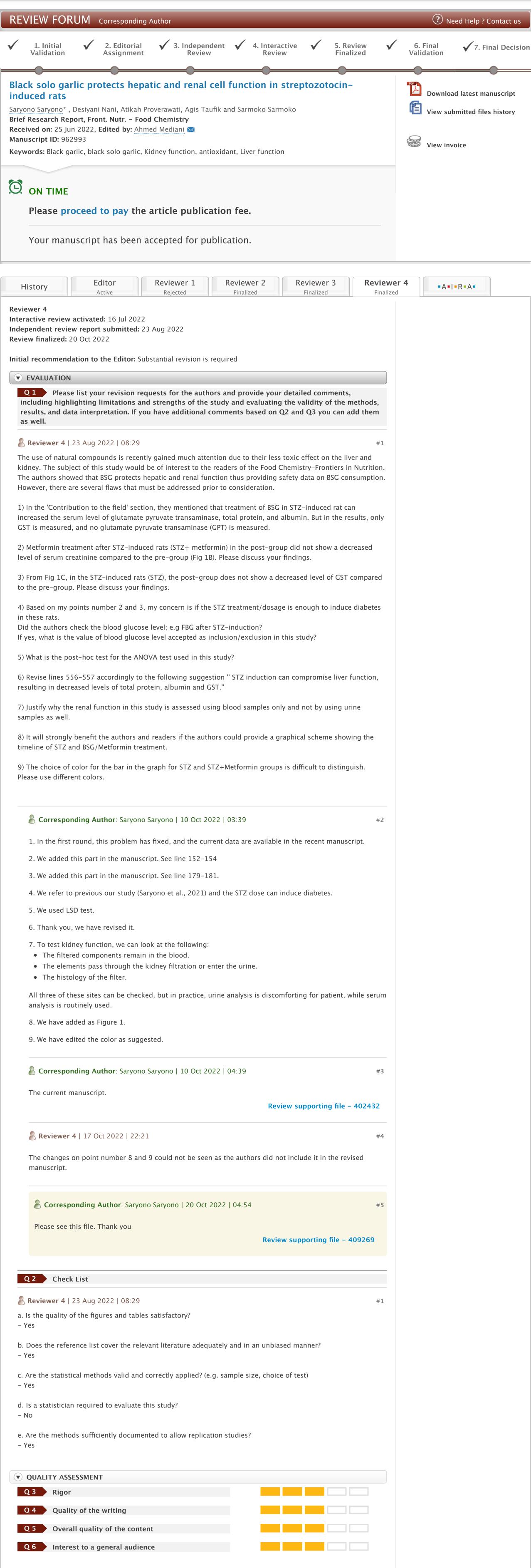
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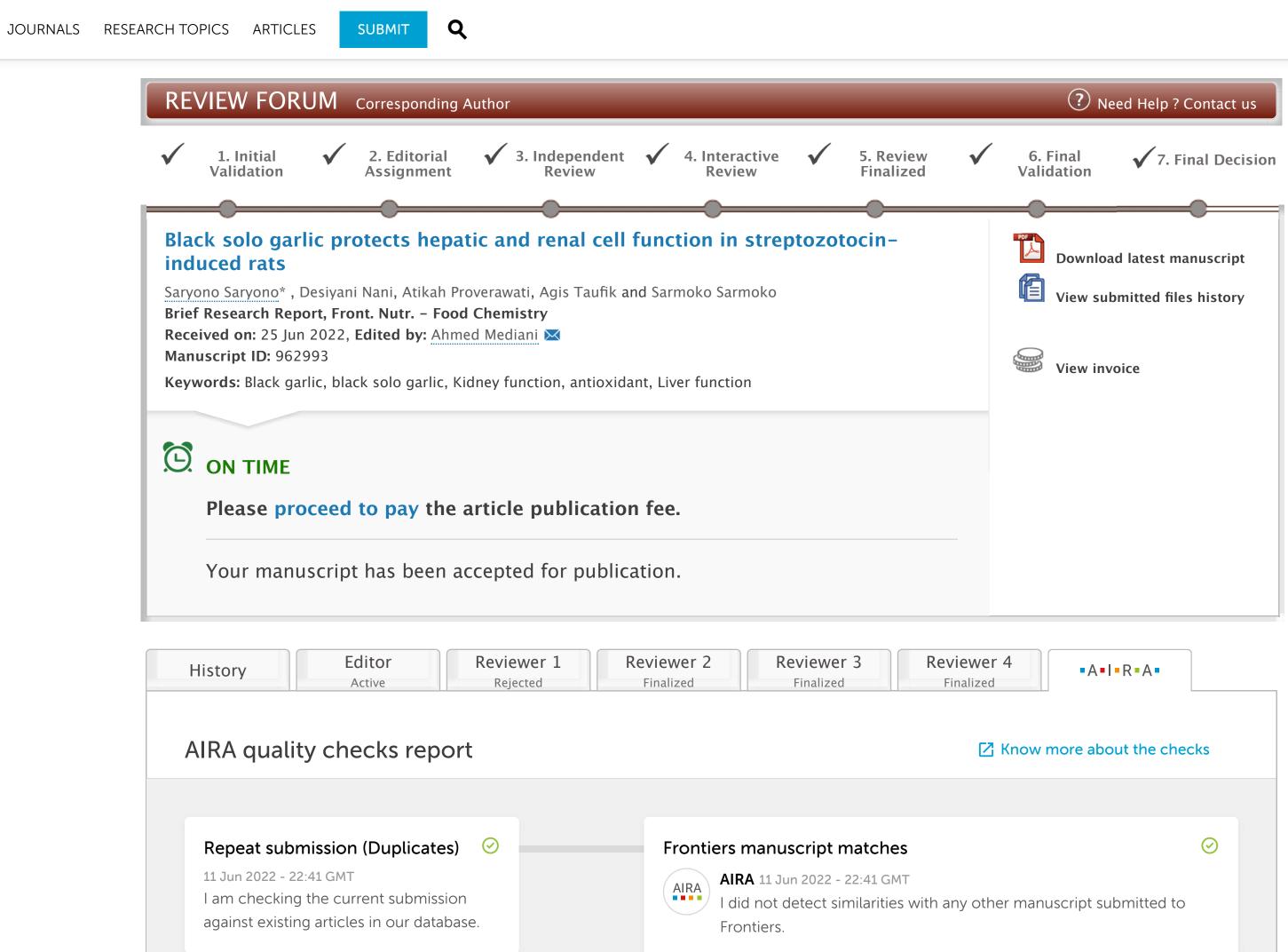
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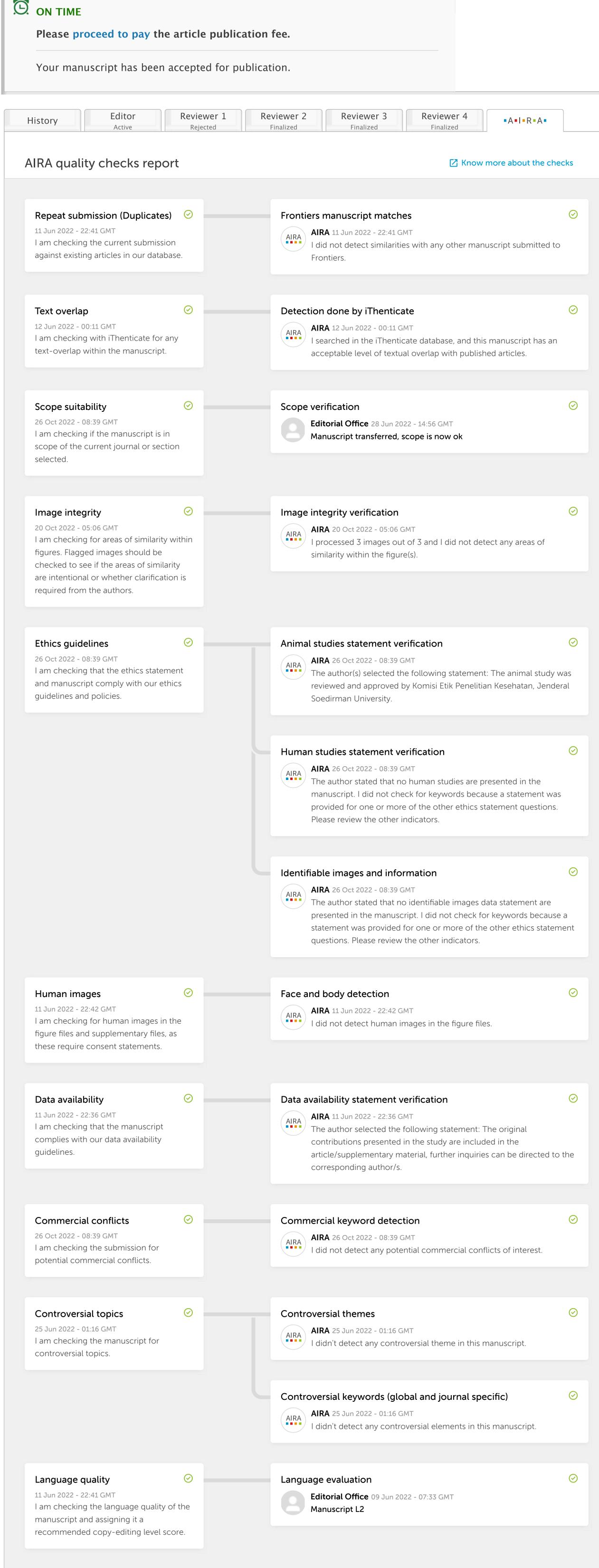
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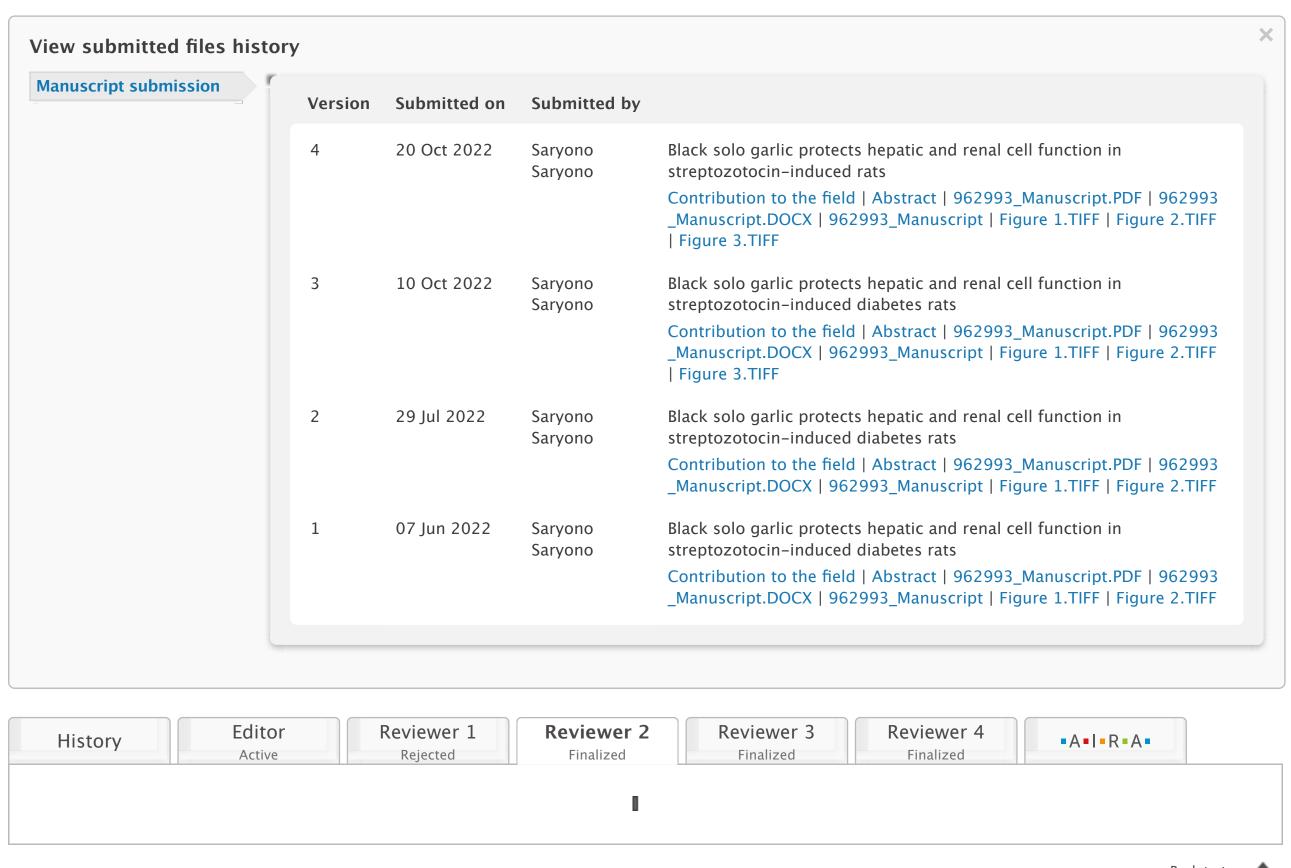
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# Black solo garlic protects hepatic and renal cell function in streptozotocin-induced diabetes rats

- 1 Saryono<sup>1\*</sup>, Desiyani Nani<sup>1</sup>, Atikah Proverawati<sup>2</sup>, Agis Taufik<sup>1</sup>, Sarmoko<sup>3</sup>
- <sup>1</sup>Nursing Department, Faculty of Health Sciences, Jenderal Soedirman University, Purwokerto,
- 3 Central Java, Indonesia
- <sup>2</sup>Nutrition Department, Faculty of Health Sciences, Jenderal Soedirman University, Purwokerto,
- 5 Central Java, Indonesia
- <sup>3</sup>Pharmacy Department, Faculty of Health Sciences, Jenderal Soedirman University, Purwokerto,
- 7 Central Java, Indonesia
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- 10 University, Dr. Soeparno Street Purwokerto 53123, Indonesia. Email: <a href="mailto:saryono2016@unsoed.ac.id">saryono2016@unsoed.ac.id</a>
- 12 **Keywords**: black garlic, black solo garlic, liver function, kidney function, antioxidant
- 14 Abstract

11

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29

- 15 The use of black solo garlic has been tested to reduce free radicals previously, but there has been no
- safety test on kidney and liver function. This study aimed to examine the effect of brewed black solo
- 17 garlic on liver (total protein, albumin, GST) and kidney (urea, creatinine, β-2-microglobulin)
- functions in STZ-induced white rats. The experimental animals were randomly divided into six
- 19 groups, each consisting of five experimental animals. The groups are composed of normal control
- 20 group, STZ-induced control group, black solo garlic treatment groups respectively with a dose of 6.5,
- 21 13.5 and 26 g/kgBW and metformin positive control. The serum level of glutamate pyruvate
- 22 transaminase, total protein and albumin declined after STZ induction. After treatment black solo
- 23 garlic to streptozotocin-induced rats, the serum level of glutamate pyruvate transaminase, total
- 24 protein and albumin increased significantly. The urea, creatinine and  $\beta_2$ -microglobulin levels
- 25 increased after STZ induction. After black solo garlic administration, however, the levels of urea,
- 26 creatinine and β<sub>2</sub>-microglobulin declined significantly, showing that consuming brewed black solo
- 27 garlic is safe for liver and kidney. The black solo garlic is safe for used to give antioxidant effect on
- garne is sale for five and kidney. The black solo garne is sale for used to give antioxidant effect on
- 28 liver and kidney functions.

#### 30 1 Introduction

- 31 Free radicals are constantly generated in the body, both in normal metabolic process and in
- 32 pathological condition. High-level free radicals cause cell damage due to oxidation process,

- especially liver and kidney cells. Drugs and foods are the main sources of free radicals in human
- body. Heavy metal-contaminated foods often cause health problems (Hernayanti et al., 2021).
- 35 Oxidant compounds from free radicals will cause cell damage, reduce immunity and change cell
- 36 properties. These cause impaired cell performance and various diseases. Most of degenerative
- diseases are correlated with increased level of free radicals in the body (Saryono et al., 2017).
- 38 The prevalence of degenerative diseases, such as renal failure, hepatic cirrhosis, liver carcinoma,
- 39 coronary heart disease and diabetes mellitus, increases. Multiple studies show that the high incidence
- 40 of degenerative diseases is related to dietary pattern. Foods that contain xenobiotic compounds,
- 41 pollutants, dyes and preservatives are potential source of free radicals. Free radicals have unpaired
- 42 electrons in the outermost orbit, making them unstable. In order to be stable, free radical species will
- 43 oxidize adjacent molecules and cause damage. Cells are subject to inflammation, injury, dysfunction
- and death. Kidney and liver damage can occur directly because of free radicals or indirectly through
- 45 complications because of other diseases (Muriel, 2009).
- 46 Repairing cell damage and increasing the body's immunity are carried out through drug
- 47 consumption. However, such effort is not effective since many chemical compounds cause liver and
- 48 kidneys toxicity and even immunosuppression (Tran et al., 2018). On the other hand, behaviors like
- 49 fast-food consumption, non-nutritious food, preserved food, smoking, alcoholic drink, drug abuse
- and low activity can reduce the body's immune system continuously. Some herbal plants are useful
- as the source of antioxidants, one of which is solo garlic (*Allium sativum* L.).
- 52 Solo garlic contains allicin, which is very unstable (Zhai et al., 2018). Garlic has several varieties,
- with multiple bulbs and single bulb, but solo garlic has the highest antioxidant power (Chen et al.,
- 54 2019). All the active compounds in solo garlic are collected in a single clove. To reduce its flavor and
- for better comfort in the digestive system, garlic can be fermented into black garlic (Saryono and
- 56 Proverawati, 2019).
- 57 Black garlic means fermented garlic through heating it at 65°-80°C for 20-40 days. Black garlic's
- antioxidant activity is higher since the amount of S-Allyl-cysteine is much more than that of raw
- 59 garlic (Colín-González et al., 2012). Black garlic contains organosulfur compounds with potent
- antioxidant activity and free radical scavengers (Nasr, 2014). During its aging process, the level of S-
- allyl-cysteine, phenolic acids and flavonoids increases (Qiu et al., 2020). Previous study results show
- that black garlic's aqueous extract has antioxidant and anti-inflammatory properties that can alleviate
- colistin-induced acute kidney failure (Lee et al., 2019). There is no test on the safety of the use of
- black garlic and its antioxidant effect on liver and kidney functions. This study aimed to examine the
- effect of brewed black garlic on liver (total protein, albumin, GST) and kidney (urea, creatinine, B-2-
- 66 microglobulin) functions in STZ-induced white rats.

#### 2 Material and Methods

#### 68 **2.1 Plants**

67

73

- 69 Solo garlic was selected for almost the same size and without defects. The fresh solo garlic was
- obtained from garlic farm of the community in Brebes, Central Java and validated in the plant
- 71 taxonomy laboratory of the Faculty of Biology. A phytochemical test was also carried out on the solo
- 72 garlic's content in the toxicology laboratory of the Faculty of Biology.

#### 2.2 Fermentation process

- 74 The selected fresh solo garlic was put into a modified rice cooker-made fermentation device neatly,
- divided into several layers and each layer was covered with a sheet of tissue. The modified
- fermentation machine was set in warm mode (temperature 60-80°C) and monitored for up to 21 days.
- Every 3 days, any changes in the garlic were observed and the condition checked. Any dew arising
- was dried up it using tissue and rewrapped with aluminum foil. The garlic turned black after 21 days
- and had a chewy texture.

# 80 2.3 Black solo garlic preparation

- The black solo garlic was peeled clean and weighed as per dose mashed using a pestle and mortar.
- The fine garlic was put into a glass cup and dissolved in hot water (200 ml per dose) at 80-90°C.
- 83 stirred until it was well blended and left for 15 minutes. The black solo garlic was filtered to get the
- brewed water and left until cooling down. The brewed black solo garlic was taken as per dose using a
- 85 syringe to be given to the rats using sonde.

# 2.4 Preparation of animal experiments

- 87 This research was conducted upon ethical consideration from the Ethical Commission for Health
- Research, Faculty of Health Sciences, Jenderal Soedirman University, No: 152/EC/KEPK/VII/2020.
- 89 The research used a true experiment method with pre- and post-test approach and a control group
- 90 design.

86

111

- 91 The experimental animals were about 150-250 grams. The experimental animals were randomly
- 92 divided into 6 groups, each consisting of 5 experimental animals. Each experimental animal was
- coded 1 through 5 on their tail. During the study, the experimental animals were fed with distilled
- 94 water and standard feed in the form of BR II ad libitum. Prior to the study, the experiment animals
- 95 were acclimatized for 7 days. The experimental animals were put into plastic box cages in size of 20
- 96 cm x 30 cm x 15 cm. The boxes were filled with sawdust at a thickness of  $\pm 2$  cm and covered with
- 97 woven wire in size of 30.5 cm x 20.5 cm x 3.5 cm with 0.5 cm<sup>2</sup> of woven area. The sawdust was
- 98 replaced regularly to keep it clean and comfortable. The room temperature (25°C) was kept stable for
- 99 the experimental animals' comfort. Induction was carried out after the rats adapted.
- STZ induction was carried out on the 8th day after making them fast for 6-8 hours. STZ was as
- administered for 50 mg/kg BW of rat previously dissolved in 2.5 ml of 0.05 M citrate buffer. After (3
- days of) induction on day 11, the experimental animals were given treatment with black solo garlic
- extract for 2 days. 7 days.

#### 104 2.5 Treatments

- This study used 6 groups, composed of normal control group, STZ-induced control group, black solo
- garlic treatment groups respectively with a dose of 6.5, 13.5 and 26 g/kgBW and positive control
- group administered with metformin at a dose of 10 mg/kgBW. The rats in the intervention group for
- 108 14 days, composed of group BSG 6.5 (6.5 g/KgBW dose), BSG 13 (13 g/KgBW dose) and group
- BSG 26 (26 g/KgBW dose) were given treatment with brewed black solo garlic as per dose every
- morning and afternoon using a gastric probe with adequate treatment.

#### 2.6 Variable measurement

- Three ml of blood samples were taken from orbital plexus using a capillary pipette. The variables
- measured were urea, creatinine, β<sub>2</sub>-microglobulin, total protein, albumin and GST. Urea level was

- measured using a UV Vis spectrophotometer with Barthelot method, creatinine was measured using
- Jaffe kinetic method, total protein was measured using Biuret method, and albumin was measured
- using Bromine Cressol Green. The measurements were carried out on urea using a UV Vis
- spectrophotometer at absorbance 578 nm, creatinine at absorbance of 492 nm, albumin at absorbance
- of 578, and total protein at absorbance of 546 nm. The β<sub>2</sub>-microglobulin and GST variables were
- measured using ELISA kit (BT Laboratories, Shanghai) as per manufacturer's protocol. The optical
- density was measured using an ELISA reader (Labotrone, Germany) at 450 nm. Each level was
- measured by comparing the samples' OD to the standard curve.

### 2.7 Statistical analysis

- The data were displayed as mean SEM. The difference between the treatment groups and the control
- groups was analyzed using the one-way ANOVA test. The graphic was presented using GraphPad
- Prism software (San Diego, USA). The test result was considered significant if p value <0.05.

#### 126 3 Results

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# 3.1 Black solo garlic's effect on renal function

- The results show that STZ induction in the experimental animals resulted in a significant increase in
- urea, creatinine and β<sub>2</sub>-microgobulin levels (Figure 1). The administration of black solo garlic at
- doses 13.5 and 26 g/kgBW reduced urea and creatinine levels by 60% and β<sub>2</sub>-mikrogobulin level by
- 131 30%. Thus, administering black solo garlic at a dose of 13.5 g/kgBW is comparable to a dose of 26
- 132 g/kgBW to alleviate the toxic effect of STZ administration.
- The results show that STZ induction evidently increased blood urea, creatinine, and beta-2-
- microglobulin level compared to normal group. There was no difference in the urea level between
- treatment black solo garlic 13.5 g/kgBW dose, black solo garlic 26 g/kgBW dose, metformin, and
- normal group, suggesting that black solo garlic can improve kidney cells' filtration of blood, so that
- they can excrete urea again. This causes STZ-induced rats' blood urea level return to close to normal.
- Regards to creatinine level, there was no difference in creatinine level between groups of BSG 13.5,
- BSG 26, and normal control after black solo garlic administration, but there was a significant
- difference from the metformin group and BSG 6.5 group. It suggests that black solo garlic at dose
- 141 13.5 and 26 g/kgBW repaired the kidney cells, rendering them capable of keeping the blood
- creatinine level back to normal like that of the normal group.
- Beta-2-microglobulin is a nucleated cells produced protein. β<sub>2</sub>M is filtered by glomerulus but will be
- 144 reabsorbed. The results show that there was no difference in the β<sub>2</sub>-microglobulin level between BSG
- 145 13.5, BSG 26, metformin, and normal group. Kidney dysfunction as indicated with low glomerular
- filtration rate will lead to an increase in  $\beta_2$ -mikrogobulin.  $\beta_2$ -mikrogobulin is a very sensitive
- indicator of kidney cell damage, showing that black solo garlic can improve kidney cells' capability
- of filtering the blood properly. Low damage will lead to declining release of β<sub>2</sub>M protein, making its
- level in the blood low. This caused the rats' blood β<sub>2</sub>-mikrogobulin level administered with brewed
- black solo garlic to return to close to normal.

#### 3.2 Black solo garlic's effect on hepatic function

- Administering STZ induction can have adverse effect on liver, rendering its function impaired. Toxic
- 153 compounds' metabolites will lead to oxidation in liver cells, resulting in liver inflammation. Liver

- 154 damage can reduce total protein, GST enzymes and albumin levels. Black solo garlic administration
- 155 at doses 13.5 and 26 g/kgBW can also increase total protein, GST and albumin levels back to close to
- 156 normal (Figure 2).
- 157 Administering STZ injection can lead to impaired liver function, rendering total protein, albumin,
- 158 and GST level to decline. The results show that there was no difference in total protein level between
- 159 BSG 13.5, BSG 26, metformin, and normal group, suggesting that black solo garlic can re-store liver
- 160 cell function. Similarly, there was no difference in albumin level between BSG 13.5, BSG 26,
- 161 metformin, and normal group, showing that black solo garlic can improve liver cells' capability of
- 162 synthesizing protein, rendering them capable of increasing albumin level again. This made the STZ-
- 163 induced rats' blood albumin level to return to close to normal.
- 164 There was no difference in glutathione S-transferase (GST) level between BSG 13.5, BSG 26, and
- metformin; however, there was difference with that of the normal group after black solo garlic 165
- 166 treatment. Liver GST enzyme levels increased to close to GST levels in the normal group. STZ
- 167 induction led to liver cell damage, thus less GSH was produced. This led to declining GST activity.
- 168 Black solo garlic can repair liver cells, so that liver enzymes return to its normal function, especially
- 169 GSH. An increase in GSH causes GST to become active again and have its level increased.

#### 170 4 **Discussion**

- 171 Streptozotocin induction leads to pancreatic beta cell damage due to immunological injury (Saryono
- 172 et al., 2021). This will lead to insulin secretion disorders, affecting hyperglycemia. Hyperglycemia
- 173 leads to metabolic and hemodynamic changes that will stimulate kidney damage. Hyperglycemia
- 174 stimulates several metabolic pathways such as Protein kinase C activation, increased production of
- 175 advanced glycosylation end products (AGEs) and diacylglycerol, and increased reactive oxygen
- 176 species (ROS) (Espiritu et al., 2010). Hemodynamic changes are mediated by increased production of
- 177 angiotensin II. Angiotensin II stimulates podocyte-derived VEGF, suppresses nephrin expression and
- 178 induces TGF-b. Increased VEGF will lead to increased proliferation of cells that express vascular
- 179 endothelial growth factor receptor (VEGFR-1) and VEGFR-2. Cell proliferation will lead to
- 180 glomerular hypertrophy, resulting in kidney swelling.
- 181 STZ induction can lead to kidney and liver cell damage due to free radical oxidation process. The
- 182 high production of reactive oxygen species (ROS) such as superoxide, peroxyl and hydroxyl radicals
- 183 can oxidize microvasculature so that they can cause microangiopathy in kidney, resulting in vascular
- 184 injury and organ dysfunction. ROS can also cause oxidative damage to DNA, resulting in cell death
- 185 (Fahmy, 2017). Oxidation on the endothelial walls of blood vessels at glomerulus can lead to
- 186 endothelial cells activation. Monocytes are activated to become macrophages, leading to scavenger
- 187 receptors expression. Macrophages activation will stimulate CD4+ T cells activation. Macrophages
- 188 and CD4+ T cells secrete pro-inflammatory cytokines that induce intracellular adhesion molecules
- 189 (ICAM). Furthermore, several pro-inflammatory cytokines stimulate inflammation expansion by
- 190 increasing the neutrophils production at infection site in glomerulus, so that toxic compound filtration
- 191 and excretion processes, like urea and creatinine, start to be disrupted. This excretion disorder causes
- 192 urea, creatinine, and  $\beta_2$ -mikrogobulin accumulation and increase in the body.
- The more toxic the compounds that enter into the body, the greater the toxic response is. Liver is an 193
- 194 important organ for metabolism, biomolecular synthesis and detoxification (Almatroodi et al., 2020).
- 195 Liver damage can occur immediately or after a few weeks or months. STZ injection will lead to
- 196 oxidation process by free radicals and secondary metabolites of toxic compounds in liver cells.

- 197 Hepatotoxicity due to STZ compounds will lead to inflammation and disruption of gluconeogenesis
- process in liver. This liver damage leads to low production level of GST. Liver's ability to produce
- protein also decline, leading to declining level of total protein and blood albumin.
- The antioxidant effect of black garlic can reduce fat peroxidation and indirectly increase NO
- synthesis, thereby inhibiting AGEPs production (Ilmawati et al., 2017). The organosulfur component
- and the flavonoid content of black garlic are antiglycation and potent antioxidants which can repair
- 203 liver and kidney cells by increasing antioxidant enzymes' activity, such as catalase, superoxide
- dismutase and glutathione peroxidase (Tsai et al., 2019; Naji et al., 2017). Previous studies also show
- 205 black garlic extract administration can alleviate oxidative stress in kidney cells, making inflammation
- 206 decline (Lee et al., 2019).
- 207 Black garlic contains S-Allil-Cysteine (SAC) that is antidiabetic, antioxidant, and anti-inflammatory
- with higher bioactivity than ordinary garlic (Lestari and Rifa'i, 2018; Jeong et al., 2016; You et al.,
- 209 2019). Pro-inflammatory mediators are produced when inflammation occurs (Shang et al., 2019).
- 210 Black garlic administration can suppress pro-inflammatory mediators, reducing tissue damage during
- inflammation (Ilmawati et al., 2019). Antioxidant compounds such as S-allyl cysteine, S-allyl
- 212 mercaptocysteine, and allicin show potent antioxidant activity (Shang et al., 2019). SAC is evidently
- able to eliminate superoxide anions, hydrogen peroxide, hydroxyl radicals, peroxynitrile radicals, and
- 214 peroxyl radicals produced in neuronal cells, and hypochlorous acid and singlet oxygen produced in
- 215 microglial cells (Nillert et al., 2017).
- 216 Black solo garlic's chemical compounds are generally the same as that of ordinary garlic, but there
- are some additional compounds, such as alliin (411.4 mg/mL) and allicin (268,2 mg/mL (Fitriana et
- al., 2019). In comparison to garlic, black garlic does not emit stronger flavor due to reduced allicin,
- which is converted into antioxidant compounds such as alkaloids and flavonoids during ripening
- process (Resende Nassur et al., 2018).

#### 221 5 Conclusion

- The serum level of glutamate pyruvate transaminase, total protein and albumin declined after STZ
- induction. After black solo garlic treatment into streptozotocin-induced rats, the serum level of
- 224 glutamate pyruvate transaminase, total protein and albumin increased significantly. The urea,
- 225 creatinine and β<sub>2</sub>-microglobulin levels increased after STZ induction. After black solo garlic
- administration for the streptozotocin-induced rats, however, the levels of urea, creatinine and β<sub>2</sub>-
- 227 microglobulin declined significantly, showing that consuming brewed black solo garlic is safe for
- liver and kidney.

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#### 6 Conflict of Interest

231 None.

### 232 7 Author Contributions

- SY, AP: Conceptualization and project administration. SY, DN, AP, AT, SM: Methodology and
- investigation. AT: Validation. SY, SM: Formal analysis. SY, DN, AP: writing—original draft
- preparation. SY, SA: Writing—review and editing. SY, DN: Supervision. SY, SM: Funding
- acquisition.

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326	
327	Figure captions
328 329 330	Figure 1. Black solo garlic protects the renal function. (A) Urea level, (B) creatinine, and (C) $\beta_2$ -microglobulin after treatment of black solo garlic (BSG) 6.5, 13.5 and 26 g/kgBW dose in streptozotocin (STZ)-induced rats.
331 332 333	Figure 2. Black solo garlic protects the hepatic function. (A) Total protein, (B) albumin, and (C) GST level after treatment of black solo garlic (BSG) 6.5, 13.5 and 26 g/kgBW dose in streptozotocin (STZ)-induced rats.