



DECLARATION OF CO-AUTHORSHIP

The declaration is for PhD students and must be completed for each conjointly authored article. Please note that if a manuscript or published paper has eleven or less authors, all authors must sign a declaration of co-authorship.

If it has twelve or more authors, only the PhD student, the corresponding author(s), the senior author and the principal supervisor need to sign the declaration of co-authorship.

1. Declaration by	
Name of PhD student	Peter Christoffer Holm
E-mail	peter.holm@cpr.ku.dk
Name of principal supervisor	Søren Brunak
Title of the PhD thesis	Machine Learning-Based Precision Medicine in Ischemic Heart Disease

2. The declaration applies to the following article	
Title of article	Subgrouping multimorbid patients with ischemic heart disease by means of unsupervised clustering: a cohort study of 72,249 patients defined comprehensively by diagnoses prior to presentation
Article status	
Published <input type="checkbox"/>	Accepted for publication <input type="checkbox"/>
Date:	Date:
Manuscript submitted <input checked="" type="checkbox"/>	Manuscript not submitted <input type="checkbox"/>
Date: 8 th of May 2023	
If the article is published or accepted for publication, please state the name of journal, year, volume, page and DOI (if you have the information).	

3. The PhD student's contribution to the article (please use the scale A-F as benchmark)	
Benchmark scale of the PhD-student's contribution to the article	A, B, C, D, E, F
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant	
1. Formulation/identification of the scientific problem	C
2. Development of the key methods	A
3. Planning of the experiments and methodology design and development	B

3. The PhD student's contribution to the article (please use the scale A-F as benchmark) <u>Benchmark scale of the PhD-student's contribution to the article</u>	A, B, C, D, E, F
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant	
4. Conducting the experimental work/clinical studies/data collection/obtaining access to data	C
5. Conducting the analysis of data	B
6. Interpretation of the results	C
7. Writing of the first draft of the manuscript	C
8. Finalisation of the manuscript and submission	C
<p>Provide a short description of the PhD student's specific contribution to the article.ⁱ</p> <p>The PhD student contributed to the study design and helped formulate the overall scope of the project, but their primary responsibility in this research project was to oversee the technical and computational aspects. As such, the student contributed the entire original implementation of the computational workflow and wrote code for: data cleaning and processing, clustering analysis, processing of results, cluster robustness analysis, statistical analyses, and data visualisation.</p> <p>Further, the PhD student contributed considerably to the interpretation of all results, as well as in the writing and finalisation of the manuscript.</p>	

4. Material from another thesis / dissertationⁱⁱ	
Does the article contain work which has also formed part of another thesis, e.g. master's thesis, PhD thesis or doctoral dissertation (the PhD student's or another person's)?	Yes: <input checked="" type="checkbox"/> No: <input type="checkbox"/>
If yes, please state name of the author and title of thesis / dissertation.	Amalie Dahl Haue MD PhD "On Diagnostic Codes"
If the article is part of another author's academic degree, please describe the PhD student's and the author's contributions to the article so that the individual contributions are clearly distinguishable from one another.	<p>The co-author shares the first authorship of the manuscript with the PhD-student. The primary contribution of the other first author was the formulation of the research project, obtaining access to the data, and clinical interpretation of the results. Additionally, the co-author wrote most of the manuscript, but the PhD student contributed considerably.</p> <p>As described above, the PhD-student oversaw developing the experimental pipeline and other methodological and computational aspects of the study and wrote >90% of the code.</p>

5. Signatures of the co-authorsⁱⁱⁱ

	Date	Name	Title	Signature
1.	19/12 2023	SØREN BRUNAK	PROF	
2.	19/12 2023	HENNING BØNGAARD	PROF	
3.	21/12 2023	Awakie Muri Hale	M.PH.D	

6. Signature of the principal supervisor

I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.

Date: 19/12/2023

Principal supervisor:

SØREN BRUNAK 

7. Signature of the PhD student

I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.

Date: ~~22/12/2023~~ 2. Jan 2024

PhD student: Peter Christoffer Holm



Please learn more about responsible conduct of research on the [Faculty of Health and Medical Sciences' website](#).

ⁱ This can be supplemented with an additional letter if needed.

ⁱⁱ Please see Ministerial Order on the PhD Programme at the Universities and Certain Higher Artistic Educational Institutions (PhD Order) § 12 (4):

"Any articles included in the thesis may be written in cooperation with others, provided that each of the co-authors submits a written declaration stating the PhD student's or the author's contribution to the work."

ⁱⁱⁱ If more signatures are needed please add an extra sheet.



DECLARATION OF CO-AUTHORSHIP

The declaration is for PhD students and must be completed for each conjointly authored article. Please note that if a manuscript or published paper has eleven or less authors, all authors must sign a declaration of co-authorship.

If it has twelve or more authors, only the PhD student, the corresponding author(s), the senior author and the principal supervisor need to sign the declaration of co-authorship.

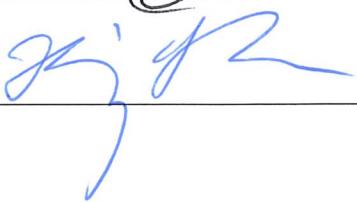
1. Declaration by	
Name of PhD student	Peter Christoffer Holm
E-mail	peter.holm@cpr.ku.dk
Name of principal supervisor	Søren Brunak
Title of the PhD thesis	Machine Learning-Based Precision Medicine in Ischemic Heart Disease

2. The declaration applies to the following article	
Title of article	Development and validation of a neural network-based survival model for mortality in ischemic heart disease
Article status	
Published <input type="checkbox"/>	Accepted for publication <input type="checkbox"/>
Date:	Date:
Manuscript submitted <input checked="" type="checkbox"/>	Manuscript not submitted <input type="checkbox"/>
Date: June 16, 2023	
If the article is published or accepted for publication, please state the name of journal, year, volume, page and DOI (if you have the information).	

3. The PhD student's contribution to the article (please use the scale A-F as benchmark)	
<u>Benchmark scale of the PhD-student's contribution to the article</u>	A, B, C, D, E, F
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant	
1. Formulation/identification of the scientific problem	B
2. Development of the key methods	A
3. Planning of the experiments and methodology design and development	B

3. The PhD student's contribution to the article (please use the scale A-F as benchmark) <u>Benchmark scale of the PhD-student's contribution to the article</u>		A, B, C, D, E, F
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant		
4. Conducting the experimental work/clinical studies/data collection/obtaining access to data		B
5. Conducting the analysis of data		A
6. Interpretation of the results		B
7. Writing of the first draft of the manuscript		B
8. Finalisation of the manuscript and submission		A
<p>Provide a short description of the PhD student's specific contribution to the article.ⁱ</p> <p>The PhD student did most of the work in formulating the scientific problem and has essentially done all the work with regards to development of study design and methodology, computational experiments, analysis of data, software development, and finalisation and submission of the manuscript.</p>		

4. Material from another thesis / dissertationⁱⁱ	
Does the article contain work which has also formed part of another thesis, e.g. master's thesis, PhD thesis or doctoral dissertation (the PhD student's or another person's)?	Yes: <input checked="" type="checkbox"/> No: <input type="checkbox"/>
If yes, please state name of the author and title of thesis / dissertation.	Amalie Dahl Haue "On Diagnostic Codes"
If the article is part of another author's academic degree, please describe the PhD student's and the author's contributions to the article so that the individual contributions are clearly distinguishable from one another.	The co-author in question is the second author of the manuscript, and her main contribution of the article was to oversee the clinical perspectives of the research, both in context of the formulation/identification of the scientific problem and in the interpretation of the results. Secondly, this co-author contributed considerably to writing of the first draft of the manuscript and in obtaining access to the data.

5. Signatures of the co-authorsⁱⁱⁱ				
	Date	Name	Title	Signature
1.	19/12 2023	SØREN BRUNDTZ	PROF	
2.	19/12 2023	HENNING BUNDGAARD	PROF	
3.				

6. Signature of the principal supervisor

I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.

Date: 19/12 2023

Principal supervisor:

SØREN BRUNAIC

**7. Signature of the PhD student**

I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.

Date: 2nd Jan. 2024

PhD student: Peter Christoffer Holm



Please learn more about responsible conduct of research on the [Faculty of Health and Medical Sciences' website](#).

ⁱ This can be supplemented with an additional letter if needed.

ⁱⁱ Please see Ministerial Order on the PhD Programme at the Universities and Certain Higher Artistic Educational Institutions (PhD Order) § 12 (4):

"Any articles included in the thesis may be written in cooperation with others, provided that each of the co-authors submits a written declaration stating the PhD student's or the author's contribution to the work."

ⁱⁱⁱ If more signatures are needed please add an extra sheet.



DECLARATION OF CO-AUTHORSHIP

The declaration is for PhD students and must be completed for each conjointly authored article. Please note that if a manuscript or published paper has eleven or less authors, all authors must sign a declaration of co-authorship.

If it has twelve or more authors, only the PhD student, the corresponding author(s), the senior author and the principal supervisor need to sign the declaration of co-authorship.

1. Declaration by	
Name of PhD student	Peter Christoffer Holm
E-mail	peter.holm@cpr.ku.dk
Name of principal supervisor	Søren Brunak
Title of the PhD thesis	Machine Learning-Based Precision Medicine in Ischemic Heart Disease

2. The declaration applies to the following article	
Title of article	Development of a neural network-based competing risk model for long-term prognostication in ischemic heart disease from a large database of electronic health records and clinical registries
Article status	
Published <input type="checkbox"/>	Accepted for publication <input type="checkbox"/>
Date:	Date:
Manuscript submitted <input type="checkbox"/>	Manuscript not submitted <input checked="" type="checkbox"/>
Date:	
If the article is published or accepted for publication, please state the name of journal, year, volume, page and DOI (if you have the information).	

3. The PhD student's contribution to the article (please use the scale A-F as benchmark)	Benchmark scale of the PhD-student's contribution to the article	
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant		A, B, C, D, E, F
1. Formulation/identification of the scientific problem		B
2. Development of the key methods		A
3. Planning of the experiments and methodology design and development		A

3. The PhD student's contribution to the article (please use the scale A-F as benchmark) <u>Benchmark scale of the PhD-student's contribution to the article</u>		A, B, C, D, E, F
A. Has essentially done all the work (> 90 %) B. Has done most of the work (60-90 %) C. Has contributed considerably (30-60 %) D. Has contributed (10-30 %) E. No or little contribution (<10 %) F. Not relevant		
4. Conducting the experimental work/clinical studies/data collection/obtaining access to data		
5. Conducting the analysis of data		
6. Interpretation of the results		
7. Writing of the first draft of the manuscript		
8. Finalisation of the manuscript and submission		
<p>Provide a short description of the PhD student's specific contribution to the article.ⁱ</p> <p>The PhD student did most of the work in formulating the scientific problem and has essentially done all the work with regards to development of study design and methodology, computational experiments, analysis of data, data visualisation, software development, and writing of the draft manuscript as included in the thesis.</p>		

4. Material from another thesis / dissertationⁱⁱ	
Does the article contain work which has also formed part of another thesis, e.g. master's thesis, PhD thesis or doctoral dissertation (the PhD student's or another person's)?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
If yes, please state name of the author and title of thesis / dissertation.	
If the article is part of another author's academic degree, please describe the PhD student's and the author's contributions to the article so that the individual contributions are clearly distinguishable from one another.	

5. Signatures of the co-authorsⁱⁱⁱ				
	Date	Name	Title	Signature
1.	19/12 2023	SØREN BREWAK	PROF	

5. Signatures of the co-authors ⁱⁱⁱ				
2.	19/12/2023	HENNING BRUNAKARD	PROF	
3.	29/12/23	Alex Christensen	ASSOC PROF	
4.	21/12- 2023	AMALIE MATHL HAVE	MD, PhD	
5.				
6.				
7.				
8.				
9.				
10.				

6. Signature of the principal supervisor
I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.
Date: 19/12/2023
Principal supervisor: SØREN BRUNAK 

7. Signature of the PhD student
I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.
Date: 2 Jan 2024
PhD student: Peter Christoffer Holm 

Please learn more about responsible conduct of research on the [Faculty of Health and Medical Sciences' website](#).

ⁱ This can be supplemented with an additional letter if needed.

ⁱⁱ Please see Ministerial Order on the PhD Programme at the Universities and Certain Higher Artistic Educational Institutions (PhD Order) § 12 (4):

"Any articles included in the thesis may be written in cooperation with others, provided that each of the co-authors submits a written declaration stating the PhD student's or the author's contribution to the work."

ⁱⁱⁱ If more signatures are needed please add an extra sheet.