# 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.*

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| 1. **Declaration by** | |
| Name of PhD student | Peter Christoffer Holm |
| E-mail | [peter.holm@cpr.ku.dk](mailto: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 |

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| 1. **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  Date: | | Accepted for publication  Date: |
| Manuscript submitted  Date: **8th of May 2023** | | Manuscript not submitted |
| 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). | |  |

| 1. **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 | C |
| 2. Development of the key methods | A |
| 3. Planning of the experiments and methodology design and development | B |
| 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 |
| Provide a short description of the PhD student´s specific contribution to the article.[[1]](#endnote-1)  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.  Further, the PhD student contributed considerably to the interpretation of all results, as well as in the writing and finalisation of the manuscript. | |

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| 1. **Material from another thesis / dissertation[[2]](#endnote-2)** | |
| 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:  No: |
| 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. | 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.   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. |

| 1. **Signatures of the co-authors[[3]](#endnote-3)** | | | | |
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|  | **Date** | **Name** | **Title** | **Signature** |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |

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| 1. **Signature of the principal supervisor** |
| I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.  Date:       Principal supervisor: |

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| 1. **Signature of the PhD student** |
| I solemnly declare that the information provided in this declaration is accurate to the best of my knowledge.  Date:  PhD student: |

Please learn more about responsible conduct of research on the [Faculty of Health and Medical Sciences’ website](http://healthsciences.ku.dk/research/responsible-conduct-of-research/).

1. This can be supplemented with an additional letter if needed. [↑](#endnote-ref-1)
2. 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.”* [↑](#endnote-ref-2)
3. If more signatures are needed please add an extra sheet. [↑](#endnote-ref-3)