Grant Proposal

Magnus Olofsson

"*Staphylococcus aureus* Nasal Carriage and T Lymphocyte Subsets"

Magnus Olofsson
Infection Biology—Clinical Perspectives
Linköping University
26 May 2015

Nasal carriage of *Staphylococcus aureus* is…

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Nasal carriage of *Staphylococcus aureus* is…

- …**important** given the associated risk of nosocomial infection

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Nasal carriage of *Staphylococcus aureus* is…

- …**important** given the associated risk of nosocomial infection
- …**complicated**, which impedes any attempt at predicting *whom* might be at risk

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Nasal carriage of *Staphylococcus aureus* is…

- …**important** given the associated risk of nosocomial infection
- …**complicated**, which impedes any attempt at predicting *whom* might be at risk
- …possibly related to the balance within different subsets of **circulating T lymphocytes**

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Microbial Carriage and the Immune System

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Microbial Carriage and the Immune System

- All microbial niches are not equally significant

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Microbial Carriage and the Immune System

- All microbial niches are not equally significant
- The nose is an "unlikely hero"

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Microbial Carriage and the Immune System

- All microbial niches are not equally significant
- The nose is an "unlikely hero"
- A protective biofilm favours the staphylococci

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Clinical Typologies and the Inner Workings

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Clinical Typologies and the Inner Workings

- Clinical typologies might:

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- Clinical typologies might:
  1) lend support in clinical decision-making, for instance in saving scarce resources

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Clinical Typologies and the Inner Workings

- Clinical typologies might:
  1) lend support in clinical decision-making, for instance in saving scarce resources
  2) not explain the inner workings that **regulate** the nasal carriage of *Staphylococcus aureus*

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Clinical Typologies and the Inner Workings

- Clinical typologies might:
  1) lend support in clinical decision-making, for instance in saving scarce resources
  2) not explain the inner workings that **regulate** the nasal carriage of *Staphylococcus aureus*
- Interleukin-17—the "new kid on the block"

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Aims of the Study

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To quantify the relationship between:

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To quantify the relationship between:

1) Staphylococcus aureus nasal carriage, *and*

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Aims of the Study

To quantify the relationship between:

1) Staphylococcus aureus nasal carriage, *and*
2) levels of circulating T lymphocyte subsets in a group of healthy subjects of different ages

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Specific Research Questions

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Specific Research Questions

- Is there a **quantifiable, inverse correlation** between the:

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Specific Research Questions

- Is there a **quantifiable, inverse correlation** between the:
  1) risk of *Staphylococcus aureus* nasal carriage, *and*

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Specific Research Questions

- Is there a **quantifiable, inverse correlation** between the:
  1) risk of *Staphylococcus aureus* nasal carriage, *and*
  2) levels of circulating T lymphocytes subset 17 in healthy humans?

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Specific Research Questions

- If so, is there evidence of a distinct **threshold level** for circulating T lymphocytes subset 17, above which nasal carriage is rare?

Specific Research Questions

- If so, does the base rate of nasal carriage **remain unaffected** as the levels of circulating T lymphocytes subset 17 begin to fall in old age due to normal immunosenescence, *or…*

Specific Research Questions

- …is there evidence that **more colonizers** are recruited in old age as a consequence of falling subset 17 counts?

Subjects and Setting

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Subjects and Setting

- A non-experimental observational study done in a primary care setting

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- A non-experimental observational study done in a primary care setting
- Two distinct age strata:
  1) subjects ≈ 30 years
  2) subjects ≈ 70 years

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Subjects and Setting

- A non-experimental observational study done in a primary care setting
- Two distinct age strata:
  1) subjects ≈ 30 years
  2) subjects ≈ 70 years
- A judgemental sample of "healthy volunteers"

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Sampling and Analysis

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Sampling and Analysis

- A questionnaire addressing:

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Sampling and Analysis

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  1) current illnesses

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Sampling and Analysis

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  2) current medication
  3) recent use of antibiotics

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Sampling and Analysis

- A questionnaire addressing:
  1) current illnesses
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- Participants are asked to provide:

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Sampling and Analysis

- A questionnaire addressing:
  1) current illnesses
  2) current medication
  3) recent use of antibiotics
- Participants are asked to provide:
  1) a swab from the nasal mucosa

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Sampling and Analysis

- A questionnaire addressing:
  1) current illnesses
  2) current medication
  3) recent use of antibiotics
- Participants are asked to provide:
  1) a swab from the nasal mucosa
  2) a blood sample

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Sampling and Analysis (II)

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Sampling and Analysis (II)

- The bacterial swabs are analysed using Petri dishes for cultivation

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Sampling and Analysis (II)

- The bacterial swabs are analysed using Petri dishes for cultivation
- The blood samples are analysed using flow cytometry, where the levels of the respective subsets of T lymphocytes are counted

Future Significance

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Future Significance

- Forming the foundation for biopsy studies in healthy humans

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Future Significance

- Forming the foundation for biopsy studies in healthy humans
- Providing a basis for future research on therapeutic use of interleukin-17 in order to **stop** nasal carriage

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Thank you!

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