

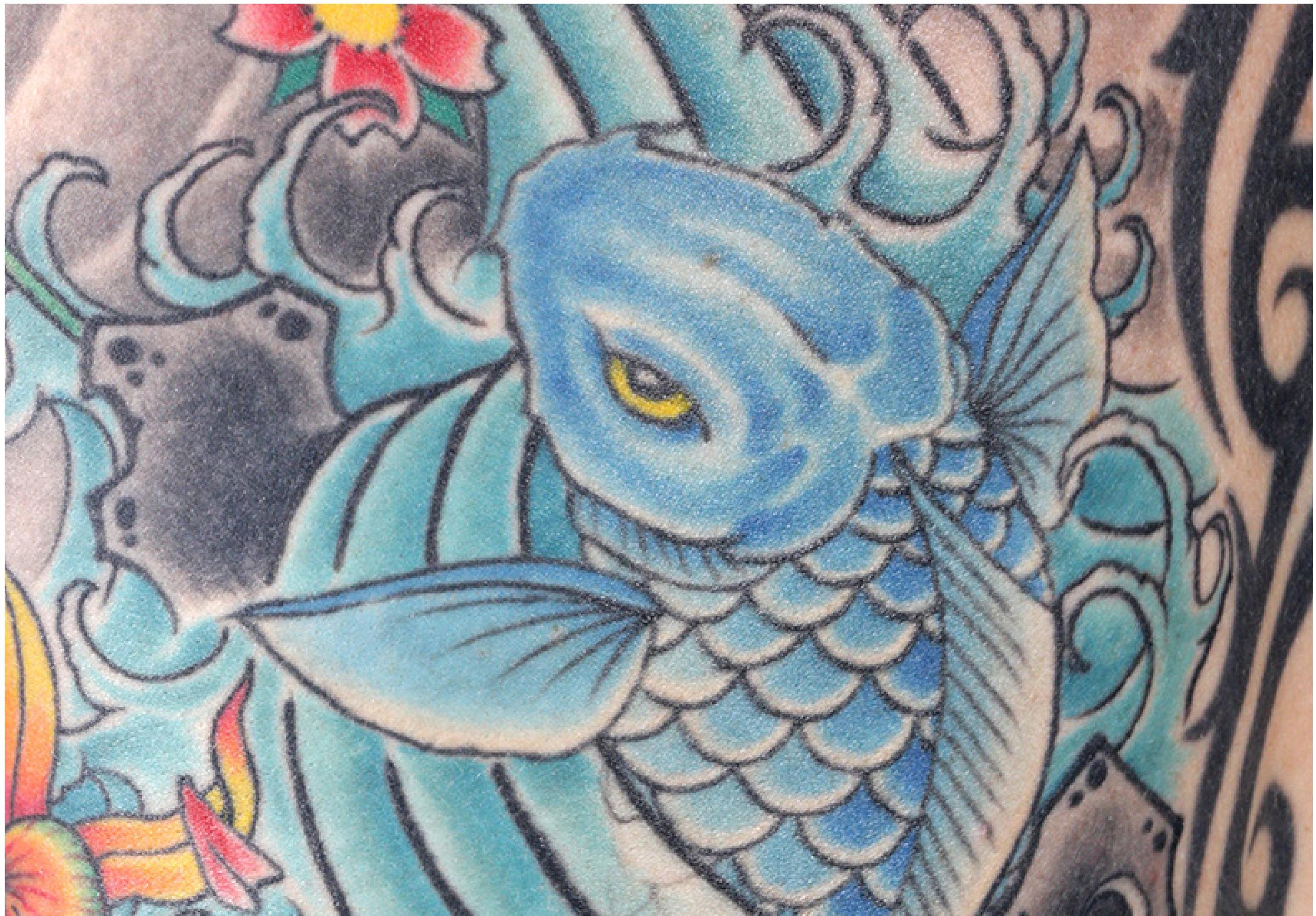


**Programme & Abstracts**

# **3<sup>rd</sup> European Congress on Tattoo and Pigment Research**

**28 - 30 March 2017  
Regensburg · Germany**

[www.ectp2017.org](http://www.ectp2017.org)



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# ECTP 2017 Organisation

**Local Organiser** Wolfgang Bäuml, Professor PhD.  
University of Regensburg, Germany

**ESTP Board** Society Chairman: Jørgen Serup, Professor DMSc  
Bispebjerg University Hospital,  
Copenhagen, Denmark

Vice-chairman: Nicolas Kluger, MD, PhD  
University of Helsinki, Helsinki, Finland

Treasurer: Wolfgang Bäuml, Professor PhD.  
University of Regensburg, Germany

Board member: Christa De Cuyper, MD  
Bruges, Belgium

**Secretariat** ECTP Congress Secretariat  
c/o CAP Partner  
info@cap-partner.eu  
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### Objective of the European Society of Tattoo and Pigment Research (ESTP)

To advance new and original medical, chemical, physical, toxicological, psychological, anthropological, social and other aspects of academic research on tattoos in man including any aspect of pigment and dye research.

The fulfilment of the object shall be shared in cooperation with researchers in any country or region of the world irrespective the primary geography of operations of the Society is Europe and the national states of this region.

Find the statues at their full length on  
[www.estpresearch.org](http://www.estpresearch.org)



## Welcome

Dear colleagues, Dear participants,

**It is a pleasure to welcome you to the 3<sup>rd</sup> European Congress on Tattoo and Pigment Research in Regensburg.**

The congress is an important platform where people from the industry, science, medicine and authorities can discuss and exchange information, face to face. The Congress President and the ESTP Board have prepared an interesting scientific programme. There will be key note speakers from the EU, the tattoo ink producers and the European Society of Tattoo and Pigment Research (ESTP). ESTP has invited the European Chemicals Agency (ECHA) to present the running process of the EU tattoo regulation.

We are delighted that key persons from ECHA accepted this invitation from ESTP to come to Regensburg and you will have the opportunity to discuss the current situation with them.

As a new initiative there will be an industry seminar where some of the companies will have time to present their company and products. Furthermore, you will be able to experience a live laser tattoo removal with a Q&A opportunity.

We hope you will enjoy the congress and the beautiful city, Regensburg. As a World Heritage Site of UNESCO, the city not only offers history and museums, but vibrant and living culture in equal measure. The city has a lot of sightseeing worth visiting. Make sure to visit some of the beautiful architectural monuments, enjoy a coffee on the squares or go for a stroll in the parks and gardens.

A big welcome to Regensburg!

On behalf of the organising committee and the ESTP Board,



**Wolfgang Bäuml**  
MSc, Professor

ECTP 2017  
Congress President



**Jørgen Serup**  
MD, Professor

ESTP Research  
Chairman

## Tuesday, 28<sup>th</sup> March 2017

Time	Title	Speaker / Chair
11.30 - 12.30	Registration, coffee and exhibition	
12.30 - 16.30	<b>REGULATION INITIATIVES</b>	Chairs: Wolfgang Bäuml & Jørgen Serup
O1	Summary of the final reports on tattoo regulations prepared under the auspices of the European Union	Wolfgang Bäuml & Jørgen Serup
O2	Potential regulation on tattoo inks and PMU in the EU under REACH	Evgenia Stoyanova & Mark Blainey, European Chemical Agency (ECHA)
O3	Toxicology test guidelines	Annegret Blume, Germany
14.10 - 14.40	<b>Break and exhibition</b>	
O4	EADV Tattoo Campaign 2016	Christa De Cuyper, Belgium
O5	Coming standards for tattoo hygiene and practices according to CEN	Thijs Veenstra, Netherlands
O6	When pigments become forbidden - Pigment Blue 15	Michael Dirks, Germany
O7	Update on regulatory activities to tattoo inks in the United States (U.S.)	Linda Katz, USA
	Comments and Questions - Roundtable discussion	Speakers, ESTP Board, delegates of companies
16.30 - 16.50	<b>Break and exhibition</b>	
16.50 - 17.45	<b>INDUSTRIAL SEMINAR</b>	
	Presentations of companies	Companies: Fotona Syneron Candela Skinial

## Wednesday, 29<sup>th</sup> March 2017

Time	Title	Speaker / Chair
8.00 - 9.00	Registration, coffee and exhibition	
9.00 - 9.20	<b>WELCOME &amp; OPENING</b>	Chairs: Christa de Cuyper & Sebastiaan van der Bent
	Welcome and opening of the congress by the Congress President	Wolfgang Bäuml, President of ECTP 2017 Regensburg
	Greetings from the Director of the Department of Dermatology	Mark Berneburg, Regensburg
	The European Society of Tattoo and Pigment Research (ESTP): Science and pragmatism	Jørgen Serup, Chairman of ESTP
9.25 - 10.30	<b>TATTOOING AND PMU AT THE CUTTING EDGE</b>	Chairs: Anne Laumann & Christa de Cuyper
O8	Rise and fall of the tattoo trend - challenges of tomorrow?	Anne Laumann, USA
O9	Professional tattooing - looking into the future	Jens Bergström, Sweden
O10	Experiences with quality control of my tattoo parlor delegated to a private accreditation bureau	Liz Kierstein, Denmark
10.30 - 11.00	<b>Break and exhibition</b>	
11.00 - 13.00	<b>TATTOOS AND INKS - RESEARCH AND ANALYTICS</b>	Chairs: Wolfgang Bäuml & Sebastiaan van der Bent
O11	European Commission Summary of Analytical Methods, Report EUR 27394 EN. Death or Glory for ResAP(2008)1	Gerald Prior, Germany
O12	Diarylide Pigments under sunlight - what do in vitro tests tell us?	Christopher Hohl, Switzerland
O13	Organic colorants in tattoo inks - how to check compliance with the European Resolution	Urs Hauri, Switzerland
O14	Tattoo ink analysis by pyrolysis-GC/MS (Py-GC/MS)	Christoph Hutzler, Germany
O15	Reaction of lymph nodes on tattoo pigments	Vivien Schacht, Germany
O16	Distribution of tattoo pigment to lymph nodes and the liver: studies in mice	Jørgen Serup, Denmark
13.00 - 14.00	<b>Lunch and exhibition</b> <b>Book signing session of the new publication: "Diagnosis and Therapy of Tattoo Complications"</b>	
14.00 - 15.40	<b>PARALLEL SESSION: SAFETY OF TATTOOING I In Auditorium 2</b>	Chairs: Urs Hauri & Jørgen Serup
	How to operate as an ink manufacturer in a landscape of chaotic rules	Terry Welker, USA
O17	Sterile inks and methods of sterilization	Lucia Bonadonna, Italy
O18	Manufacturing of safer tattoo inks in the future: The European ambition	Ralf Michel, Germany
O19	Pigment production for tattoo inks	Michael Dirks, Germany
14.00 - 15.20	<b>PARALLEL SESSION: LASER REMOVAL, FROM NANO- TO PICOSECOND In Auditorium 1</b>	Chairs: Susanne Gantner & Uwe Paasch
O20	Basic principles of laser tattoo removal	Wolfgang Bäuml, Germany
O21	Nanosecond pulses - state of the art	Uwe Paasch, Germany
O22	Picosecond laser in a private office	Stefan Sünkel, Germany
O23	Picosecond pulses - my experience	Maurice Adatto, Switzerland
15.20 - 15.50	<b>TATTOO REMOVAL LIVE TREATMENT</b>	Chairs: Uwe Paasch & Susanne Gantner
	Removal of tattoos with picosecond lasers - video conference with Q&A	Stefan Sünkel, Germany
15.40 - 16.15	<b>Break and exhibition</b>	
16.15 - 17.15	<b>General assembly of the ESTP (for members)</b>	
19.30	<b>Congress dinner at Restaurant Haus Heuport</b>	

Time	Title	Speaker / Chair
8.00 - 8.30	<b>Registration, coffee and exhibition</b>	
8.30 - 11.30	<b>OPEN SESSION: SHORT ORAL COMMUNICATIONS</b>	Chairs: Wolfgang Bäumlér & Jørgen Serup
O24	Adverse tattoo reactions - analysis of human biopsies	Ines Schreiver, Germany
O25	Elemental bioimaging of tattoo pigments in lymph nodes and skin tissue	Tanja Berg, Germany
O26	Toxicological characterization of tattoo inks and its decomposition products	Henrik Hering, Germany
O27	Surveillance activities in Italy: Determination of hazardous substances in tattoo inks - the Italian laboratories network	Marco Fontana, Italy
O28	Clients' rating of tattoo removal by Q-switch laser	Katrina Hutton Carlsen, Denmark
O29	MR scanning, tattoos and reported skin burn, fact or myth?	Kasper Alsing, Denmark
	Short summary of congress posters	Wolfgang Bäumlér, Germany
9.50 - 10.15	<b>Break, exhibition and poster viewing</b>	
O30	Results of the national survey on the diffusion, characteristics and risk awareness of tattoos in Italy	Alberto Renzoni, Italy
O31	Epidemiological surveillance of contact allergens by the Information Network of Departments of Dermatology (IVDK) - relevance of contact allergens in tattoo inks	Steffen Schubert, Germany
O32	Drugs and dermopigmentation: Collateral effects of drugs in relation with dermopigmentation treatments	Rita Molinaro, Italy
O33	Inorganic and organic PMU inks	Cornelia Hildebrandt, Germany
O34	What qualifies a safe and good PMU ink?	Nele Teske, Germany
11.30 - 12.15	<b>TATTOOISTS' CORNER</b>	Jens Bergström, Ralf Michel, Terry Welker, Jørgen Serup
	Debate forum	
12.15 - 13.15	<b>Lunch and exhibition</b>	
13.15 - 14.35	<b>TATTOO COMPLICATIONS - DIAGNOSIS AND TREATMENT</b>	Chairs: Sebastiaan van der Bent & Jørgen Serup
O35	Allergic reactions to red pigment tattoos and treatment methods	Sebastiaan van der Bent, The Netherlands
O36	Tattoos, psoriasis and other chronic skin diseases	Christa de Cuyper, Belgium
O37	Black tattoos, papulo-nodular reactions and high risk of sarcoidosis	Mitra Sepehri, Denmark
O38	Skin infections and prevention measures	Wulf Schneider, Germany
14.35 - 15.55	<b>SAFETY OF TATTOOING - II</b>	Chairs: Christa de Cuyper & Wolfgang Bäumlér
O39	Distribution and characterization of toxic metals in human specimen	Ines Schreiver, Germany
O40	Do metals play a role in tattoo allergies?	Christa de Cuyper, Belgium
O41	Tattoo inks - the view of a toxicologist	Gabriele Sabbioni, Germany
O42	Current standard; The good, the bad, the ugly	Jens Bergström, Sweden
15.55 - 16.15	<b>Closing of the congress with announcement of coming events</b>	Chairs: Wolfgang Bäumlér & Jørgen Serup

## Poster presentations

No.	Title	Presenting author
P1	<b>Contact allergic dermatitis to tattoo-contained gold: a case report</b>	Antonella Tammaro
P2	<b>Persistence of different microbial strains in pure and diluted tattoo inks</b>	Lucia Bonadonna
P3	<b>Nickel from metal-based pigments in Tattoo Inks</b>	Gordana Milojevic Miodragovic
P4	<b>"Safer tattoo" - supporting informed decision-making</b>	Anke Meisner
P5	<b>Medical tattoo: some examples</b>	Camille Gravelier
P6	<b>Motivation to get a tattoo or piercing. Result of a Belgian questionnaire</b>	Christa de Cuyper
P7	<b>Allergic contact dermatitis from aminoazobenzene in tattoo</b>	Antonella Tammaro



## Exhibitor overview

	Company details	Booth
	<p><b>Alma Lasers GmbH</b> Tel: +49 / 911 / 891129-0 info@alma-lasers.de www.alma-lasers.de</p> <p>Alma Lasers is a global innovator of laser, light-based, radiofrequency and ultrasound technologies for the aesthetic and surgical markets.</p>	N 13
	<p><b>Asclepion Laser Technologies GmbH</b> Tel: +49 (0) 3641 7700 100 marketing@asclepion.com www.asclepion.com</p> <p>For more than 35 years, Asclepion has been operating in more than 60 countries as a leader on the international medical laser scene.</p>	N 16
	<p><b>CUTERA France</b> Tel: +33 1 60 62 24 40 events-emea@cutera.com www.cutera.com</p> <p>Cutera is a leading provider of laser and energy-based aesthetic systems for a wide range of medical and aesthetic indications.</p>	N 12
	<p><b>Eternal Tattoo Supply, Inc. /Eternal Ink, Inc.</b> Tel: (248) 667-4060 /Toll Free (866) 846-8465 eternaltattoos@aol.com www.eternaltattoosupply.com</p> <p>Eternal Tattoo Supply is your complete One-Stop-Shop for all your Tattoo Supplies featuring every Eternal Ink color in existence. Bringing you the Brightest Colors period!</p>	N 8
	<p><b>FOTONA d.o.o.</b> Tel: +38615009100 info@fotona.com www.fotona.com</p> <p>Fotona today is a world-leading medical laser company recognized for its innovative, award-winning laser systems for applications in aesthetics &amp; dermatology, dentistry, surgery and gynecology. Based in the US and EU, Fotona's business philosophy is to continuously choose perfection to meet the needs of a highly demanding marketplace.</p>	N 6

	Company details	Booth
	<p><b>Karger Publishers</b> Tel: +41 61 306 11 11 karger@karger.com www.karger.com</p> <p>Karger Publishers in Basel, Switzerland, is a globally active medical and scientific publishing company. Independent, and family-run in the fourth generation, Karger Publishers is dedicated to serving the information needs of the scientific community with publications of high-quality content, covering all fields of medical science.</p>	N 11
	<p><b>Quanta System S.p.A.</b> Tel: +39.0331.376797 quanta@quantasystem.com www.quantasystem.com</p> <p>Quanta System with its Discovery PICO Series offers the most powerful picosecond devices for tattoo removal and pigmented lesion treatments.</p>	N 10
	<p><b>Skinial GmbH, Frankfurt</b> Tel: + 49 69 21 99 68 98 info@skinial.com www.skinial.com</p> <p>Skinial removes tattoos without laser with a new, patented, natural method. We are not fading, we remove the ink completely out of the body.</p>	N 14
	<p><b>Syneron Candela Germany</b> Tel: +49 6102 59985-0 info.de@syneron-candela.com www.syneron-candela.com</p> <p>Syneron Candela is the global leader in the aesthetic medical device marketplace. We combine a level of innovation, expertise and customer understanding superior to that of any company in our industry.</p>	N 15
	<p><b>von Berg Pharma GmbH</b> Tel: +49 02247 9689881 vonbergpharma@web.de www.vonbergpharma.com</p> <p>Manufacture and development of preparations for the PMU and the tattoo industry.</p>	N 4

Fotona FracTat™  
Tattoo Removal

## Advanced Tattoo Removal

FracTat™

Fotona's comprehensive, proprietary treatment for highly effective and patient-friendly tattoo removal.

## StarWalker® MaQX

Multi-color laser for multicolor tattoos

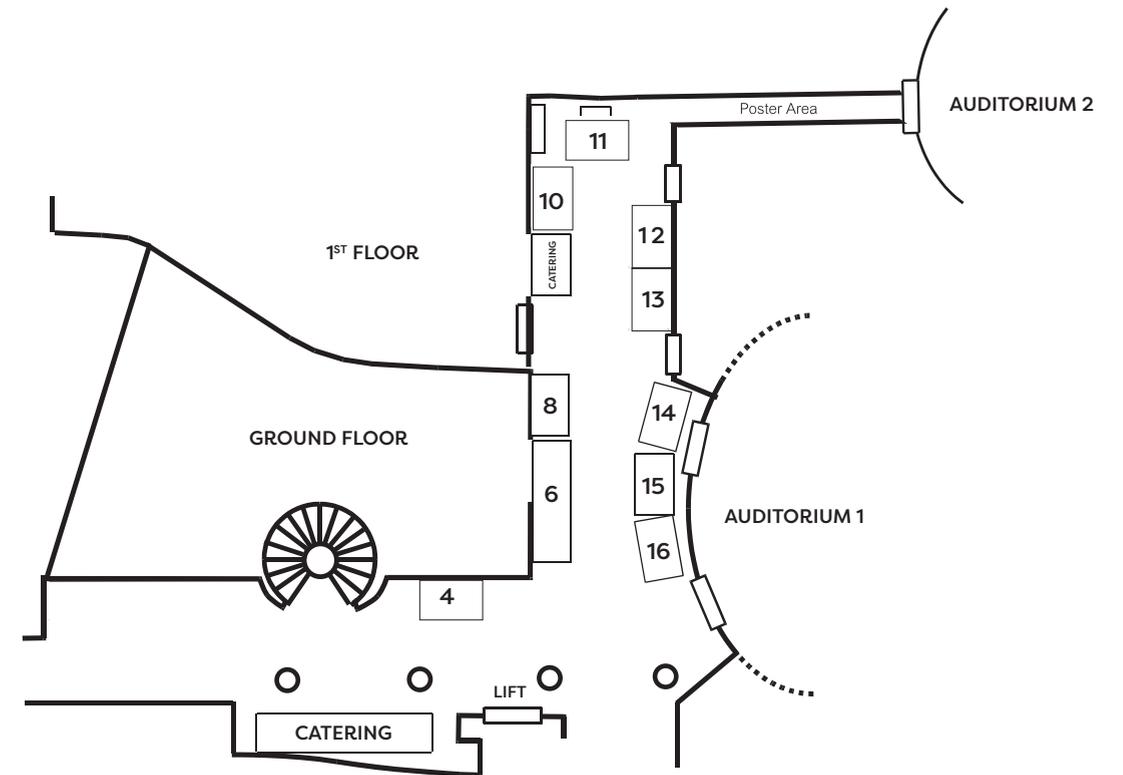
The Fotona StarWalker ASP ultra-short pulse technology combines 4 different wavelengths in an advanced, high-powered solution for tattoo removal.

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## Floor plan



## Exhibitor list

Von Berg Pharma	N 4
Fotona	N 6
Eternal Ink	N 8
Quanta Systems	N 10
Karger	N 11

Cutera	N 12
Alma lasers	N 13
Skinial	N 14
Syneron Candela	N 15
Asclepion	N 16

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## General information

### Venue

University Hospital of Regensburg  
Franz-Josef-Strauß-Allee 11  
93053 Regensburg, Germany

### Congress hours

#### 28 March

Registration: 11.30 - 12.30  
Exhibition: 11.30 - 16.50  
Scientific programme: 12.30 - 17.45

#### 29 March

Registration: 8.00 - 9.00  
Exhibition: 8.00 - 16.15  
Scientific programme: 9.00 - 16.15

#### 30 March

Registration: 8:00 - 8:30  
Exhibition: 8:00 - 13:15  
Scientific programme: 8:30 - 16:15

### Lunch and coffee

Lunch and coffee is included in the registration fee. It is served in the exhibition area.

### Internet

Free Wi-Fi is available in the congress area. A Wi-Fi code can be collected at the registration desk.

### Entitlements

Registration for the congress includes admission to the full congress programme, coffee breaks and lunch, congress bag, programme- and abstract book.

### Transport

Buses number 6 and 19 run directly from the Regensburg Hauptbahnhof (main railway station) to the University Hospital. The "Bustreff Albertstrasse" is on the opposite side of the railway station. From here you can take bus nr. 6 (direction "klinikum") or nr. 19 (direction: Lengfeld / Bad Abbach), and reach the hospital in app. 10 minutes.

Bus line 6 ends at the main entrance of the University Hospital. The congress takes place on the first floor of the hospital by the main entrance.

Limited parking lots are available in front of the main entrance.

### Information for speakers

Please bring your presentation on a USB stick. Please upload your presentation to the computer in the auditorium. A folder divided into each session will indicate where you should place the presentation. An assistant will be present to help you if you have any problems. Please upload your presentation before your session starts.

Please note that we do not allow use of personal laptops for presentations.

### Information for poster presenters

#### Poster mounting

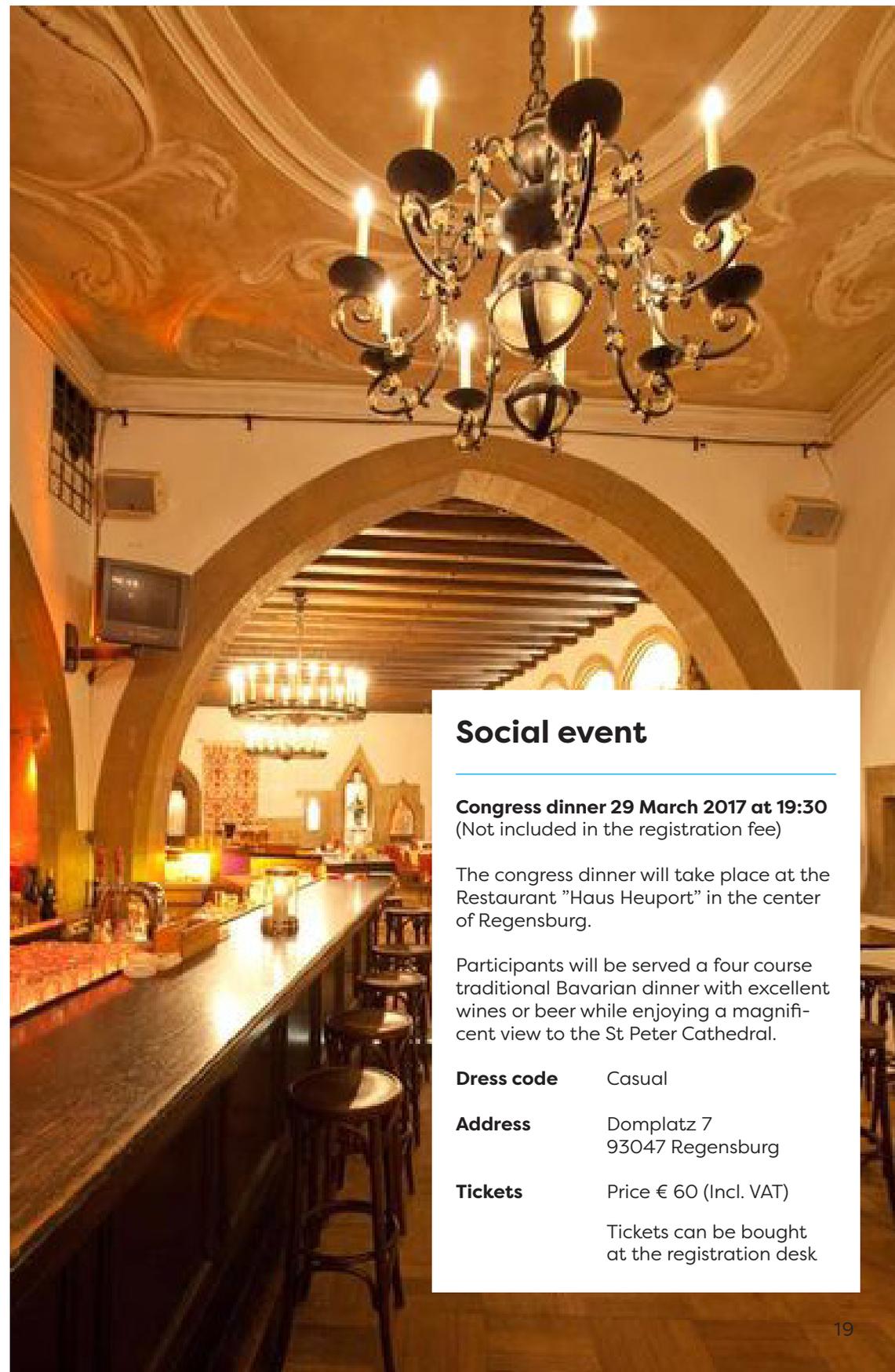
Posters can be mounted 28 March 2017 from 11.30 am when the registration starts. The Congress Secretariat will provide all necessary equipment to mount the posters.

#### Poster removal

Posters can be removed after the last session on 30 March at 16.15.

#### Visit the poster area

Participants are encouraged to visit the poster area in the coffee and lunch breaks. Participants can attach their business card to the poster and expect to be contacted by the author during the congress or later as appropriate.



## Social event

**Congress dinner 29 March 2017 at 19:30**  
(Not included in the registration fee)

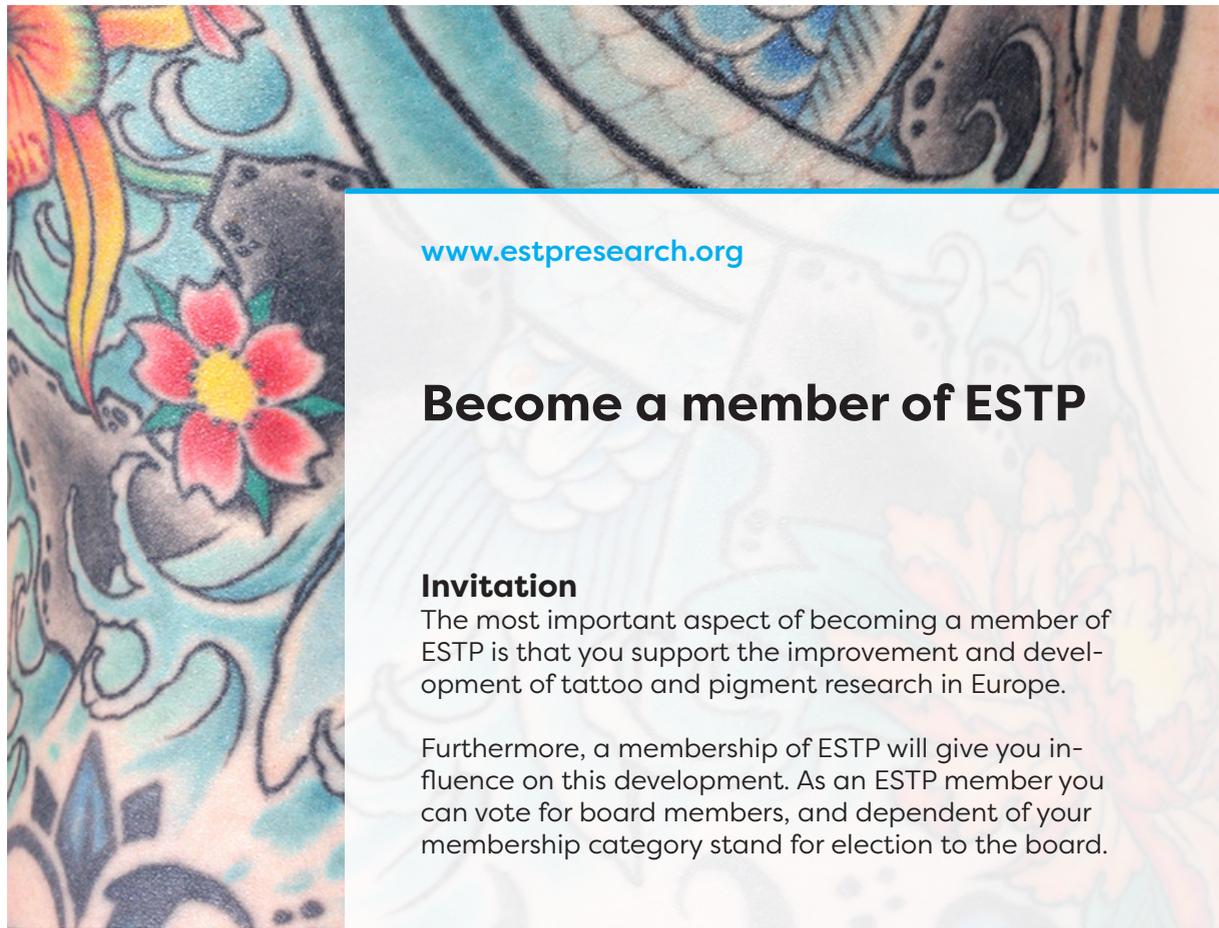
The congress dinner will take place at the Restaurant "Haus Heuport" in the center of Regensburg.

Participants will be served a four course traditional Bavarian dinner with excellent wines or beer while enjoying a magnificent view to the St Peter Cathedral.

**Dress code** Casual

**Address** Domplatz 7  
93047 Regensburg

**Tickets** Price € 60 (Incl. VAT)  
Tickets can be bought at the registration desk



[www.estpresearch.org](http://www.estpresearch.org)

## Become a member of ESTP

### Invitation

The most important aspect of becoming a member of ESTP is that you support the improvement and development of tattoo and pigment research in Europe.

Furthermore, a membership of ESTP will give you influence on this development. As an ESTP member you can vote for board members, and dependent of your membership category stand for election to the board.



### Benefits of your ESTP Membership

- You support the development and improvement of tattoo and pigment research in Europe
- Reduced congress fee at the annual congress
- Society benefits i.e. newsletter, publication service, info & campaign materials, educational materials, clinical data base with photo gallery, tattoo and infection update, hot topics and urgent news
- Networking in Europe and worldwide on tattoo and pigment research

Please fill-in the membership form and send it to the ESTP Secretariat for approval by the ESTP Board.  
Find the form in your congress bag or on the ESTP website [www.estpresearch.org](http://www.estpresearch.org)

## Oral abstracts

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## O1. SUMMARY OF THE FINAL REPORTS ON TATTOO REGULATIONS PREPARED UNDER THE AUSPICES OF THE EUROPEAN UNION

**Wolfgang Bäuml<sup>1</sup>, Jørgen Serup<sup>2</sup>**

<sup>1</sup>Department of Dermatology, University of Regensburg, Regensburg, Germany

<sup>2</sup>Bispebjerg University Hospital, Department of Dermatology, The Tattoo Clinic and the Wound Healing Centre, Copenhagen, Denmark

The European Union, aiming at regulations improving the safety of tattoos and permanent make-up, extended to the DG JUST and the Joint Research Centre in Ispra, Italy to provide evidence-based scientific support to the European policy-making process. Scientists and experts in different fields were involved. The work was structured in four work packages and concluded in a final report. The work took place between 2014 and 2016.

Work package 1. Compilation of information on legislative framework and analytical methods (1). The analysis showed that, at ISO and CEN level, there are neither international nor national standard methods for the analysis of aromatic amines, colorants, elements, polycyclic aromatic amines, phthalates and nitrosamines in tattoo and PMU products. On the contrary, in house validated methods and methods described in the literature are known.

Work package 2. State of play and trends in tattoo practices (2). About 12% of the European population is tattooed. Most tattoo inks used in Europe are imported from USA, while PMU inks are mostly produced in Europe. The number of “non-professional tattooists” might represent up to 10 times the number of “registered/professional” ones.

Work package 3. Adverse health effects and experience with the Council of Europe Resolution (2008)1 (3). Bacterial tattoo infection acquired through inks, tool or procedures is estimated up to 5%. The vast majority of tattoo/PMU adverse reactions are due to delayed and unpredictable hypersensitivity, involving allergy and/or autoimmunity. Direct causal relationship between tattooing and (skin) cancer has been so far neither proved nor excluded. Data gaps and research need were identified. Data needed for risk assessment are missing on absorption, distribution, metabolism and excretion (ADME) of ink ingredients, and on photo-degradation and derived no effect level (DNEL).

Work package 4. Safety of tattoos and permanent make-up. Final report (4). Regulation is hampered by lacking scientific insight in many fields of key importance, and research programs including prospective cohort studies should be developed to prepare valid risk assessment in the future. Harmonized analytical methods and Good Manufacturing Practices for tattoo inks should be developed. Meanwhile, precautionary actions can be undertaken with campaigns, harmonized hygiene guidelines, inspections of studios, and stop of backyard tattooing.

<sup>1</sup> Report EUR 27394 EN; ISBN 978-92-79-50394-8 (PDF).

<sup>2</sup> Report EUR 27528 EN; ISBN 978-92-79-52789-0 (PDF).

<sup>3</sup> Report EUR 27672 EN; ISBN 978-92-79-54234-3 (PDF).

<sup>4</sup> Report EUR 27947 EN; ISBN 978-92-79-58783-2 (PDF)

## O2. POTENTIAL REGULATION ON TATTOO INKS AND PMU IN THE EU UNDER REACH

**Evgenia Stoyanova<sup>1</sup>, Mark Blainey<sup>1</sup>**

<sup>1</sup>European Chemical Agency (ECHA), EU

In 2016, the European Commission asked the European Chemicals Agency (ECHA) to examine the need for a restriction under REACH (EU Regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals) on substances in tattoo inks and permanent make-up. Mr Mark Blainey, Restrictions Coordinator, and Ms Evgenia Stoyanova, Socio-Economic Analyst at ECHA, will explain the restriction process under REACH. They will also give an update of the work to date, performed in cooperation with Member States Competent Authorities of Denmark, Germany, Italy and Norway. Their proposal for regulatory action is anticipated to be formally submitted later this year. The presenters are looking for stakeholder feedback on the substances to be included in the scope of the proposal.

### 03. TOXICOLOGY TEST GUIDELINES

**Annegret Blume**<sup>1</sup>

<sup>1</sup> BfR, Germany

Manufacturers of tattoo inks have to make sure that their products do not pose a risk to the health of the consumer. The presentation will give an overview of validated, regulatory approved toxicological test methods which form the basis for risk assessment of other products like cosmetics, and which might be suitable also for the testing of tattoo inks or their ingredients, respectively. Toxicological endpoints discussed include irritation, sensitization, genotoxicity, carcinogenicity and systemic toxicity. Possible problems with regard to the evaluation of ingredients will be shortly discussed. A comprehensive overview about the requirements for tattoo inks can be found at the BfR website:

<http://www.bfr.bund.de/cm/349/requirements-for-tattoo-inks.pdf>

### 04. EADV TATTOO CAMPAIGN 2016

**Christa De Cuyper**<sup>1</sup>

<sup>1</sup> Dermatology, AZ Sint Jan, Brugge, Belgium

**Aim:**

1. To raise public awareness about the risks of tattooing.
2. To motivate decision makers to develop a European strategy to reduce health risks.

**Method:**

1. The European Academy of Dermatology and Venerology (EADV) PR and Media Committee organised a press conference at the EADV meeting in Copenhagen (2015) and again in Vienna (2016). One of the topics concerned the increasing popularity of tattoos and piercing and the most important risks related to these forms of body art such as infections, allergy and toxic effects of the chemicals in tattoo inks. More in particular the fact that about 20% of tattooed people regret their tattoos and ask for medical advice about tattoo removal was discussed. EADV decided to launch a public awareness campaign on the EADV website and target the young population at risk with a video cartoon. The video cartoon was also distributed on social media and can be used by everyone interested in the subject.

2. EADV insisted on the importance of developing a strategy on the European level to reduce the negative impact of body art on public health and strongly supports the development of hygienic measures (CEN435). Concerned about the toxicity of some components in tattoo inks EADV and other interested parties are now awaiting the conclusion of ECHA whether chemicals used in tattoo inks will come under REACH.

**Conclusions:** EADV is concerned about skin related side effects of body art and public health. Initiatives to inform the public and the authorities are presented.

## 05. COMING STANDARDS FOR TATTOO HYGIENE AND PRACTICES ACCORDING TO CEN

**Thijs Veenstra**<sup>1</sup>

<sup>1</sup>National Institute for Public Health and the Environment, Utrecht, The Netherlands

In 2014, the European Committee for Standardization (C.E.N) established a European committee for tattooing services following an initiative of the German tattooist organization Deutsche organisierte Tätowierer (D.O.T) .

The scope of the committee is standardization of requirements and recommendations for the provision of safe tattooing services with a main emphasis on hygienic practice. Currently a comprehensive working draft has been produced. Later in 2017, a public enquiry phase is expected to be launched. In this phase, national committees may allow non-committee members to view and comment on the draft.

The current draft includes requirements for information to customers, i.e. informed consent, hygienic performance of tattooing, including knowledge and training, infection control, vaccination, suitable facilities as well as requirements for cleaning, disinfection and sterilization, management of waste, necessary documentation and aftercare information. In the past 24 months, national committees with diverse expertise have contributed to the future standard. In this way, the document developed into a confluence of public health, dermatological and professional tattooists interest.

The project is scheduled to complete in 2018 when national committees and member states will decide whether to adopt the standard in national practice. This will hopefully lead to having one uniform European guideline for safe tattooing practice, resulting in safer tattooing practice throughout Europe.

## 06. WHEN PIGMENTS BECOME FORBIDDEN - PIGMENT BLUE 15

**Michael Dirks**<sup>1</sup>

<sup>1</sup>H-A-N-GmbH, Esslingen, Germany

The pigment the - colorful unknown. Everybody believes to know what pigments are. Compared to a lot of other chemical compounds, pigments are solid state matter and should not dissolve in the area where they are used. In addition to that particles are not uniform in size and the shape may also differ. And as all particles they adsorb other chemicals on their surface, arising from raw materials or from by-products of the chemical synthesis. So what is the meaning of a Color Index e.g. PB 15? It tells you the color area and the basic chemical structure and that is all. No further information on particle sizes and distribution or on impurities. However, these are properties which can significantly impact toxicity and eco toxicity.

PB 15 is a well-known pigment already introduced in 1935 and very well investigated in both vitro and vivo studies. A complete REACH level 1 evaluation dossier is available. Therefore experimental toxicity data are available on the acute, subchronic and chronic toxicity, on skin sensitization, on the genotoxicity, reproductive toxicity, developmental toxicity and on the carcinogenicity. All toxicological endpoints investigated resulted in the conclusion that CuPC does not pose a health hazard. CuPC is not classified.

Based on these findings which show that the pigment itself does not pose a risk to human health, more focus should be drawn to impurities and other additives which come together with the pigment.

## O7. UPDATE ON REGULATORY ACTIVITIES RELATED TO TATTOO INKS IN THE UNITED STATES (U.S.)

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In the U.S. there is no pre-market approval of cosmetics or their ingredients, other than color additives. While state and local authorities oversee the practice of tattooing, inks and pigments used in tattoos are subject to U.S. Food and Drug Administration (FDA) oversight. Manufacturers must adequately demonstrate the safety of cosmetic products; however, safety data is not submitted to FDA prior to marketing. Adverse event reports (AERs) are reviewed and investigated, however, they often lack sufficient information including; the brand, name and lot of ink to track trends. As a result of five recalls since 2011, FDA has tested 75 inks from Internet sources, for microbiological contamination. Our work has focused on the evaluation of inks for aerobic microorganisms, non-tuberculous mycobacteria and endotoxin. However, we are also working toward the development of methods to characterize pigments, as well as the detection and quantification of potential contaminants, in tattoo pigments and inks. To increase awareness of the risks of infection associated with contaminated inks, we have developed outreach for consumers, tattooists and the industry. Outreach is intended to educate consumers to ask the tattooist for the names of the specific inks used in their body art, in the event they need to report an adverse event to improve the quality of reports. We continue to work with state and local governments and industry to share information.

## O8. RISE AND FALL OF THE TATTOO TREND - CHALLENGES OF TOMORROW?

Anne Laumann<sup>1</sup>

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The influences that have always shaped tattooing continue to do so today. Accurate prevalence data is not really available but, as we look across the world the Art of the Tattoo is alive and well. No longer repressed, tattooing flourishes in many countries in a variety of forms, aesthetics, symbols and meanings.

**O9. PROFESSIONAL TATTOOING - LOOKING INTO THE FUTURE****Jens Bergström<sup>1, 2, 3</sup>**<sup>1</sup>Heavenly Ink, Sweden<sup>2</sup>TPE, Tattoo and Piercing Education Scandinavia<sup>3</sup>Srt, Sweden's Registered Tattoo Artists

Looking to understand the future of tattooing and the development of the trade we need to allow us to also look at the past. Little have changed in the way we strive to develop and perfect our way of working. Humans have always tried to find safer more effective ways to heal and take care of any injury inflicted on the body. But time change and so does our means to perfection. We are close to finding the last, very important pieces to the puzzle that represent a good healthy way to execute tattoos in the future. Some dangers remain, such as uncontrolled practitioners and rouge material, but the future has much to offer. Together we can find sustainable ways to make tattoos and the removal of tattoos safe and with as little negative impact on the health-care and environment as possible.

**O10. EXPERIENCES WITH QUALITY CONTROL OF MY TATTOO PARLOR DELEGATED TO A PRIVATE ACCREDITATION BUREAU****Liz Kierstein<sup>1</sup>**<sup>1</sup>Tatto-Liz Tattoo Studio, Copenhagen, Denmark*State of the art tattooing since 1989, medical tattooing since 1995, Founder of and spokesperson for The Professional Independent Tattooers, Denmark (www.dpud.dk)*

After approx. 12 months of developing a new model for accreditation and certification in Danish Tattoo Studios similar to the one used in Danish Region Hospitals Tatto-Liz became the first to have this model executed. The auditation was performed by "Glad Consulting", Denmark.

The vision about this hopefully leading to a possible demand of having all tattoo studios pass a hygiene and quality control after Danish Standard would help raise the security in our studios. Both for our clients and ourselves. Exactly after the Danish Standards DS 2451-10 and Insta 800 which is now also introduced into physician and dentist clinics.

## O11. EUROPEAN COMMISSION SUMMARY OF ANALYTICAL METHODS, REPORT EUR 27394 EN. DEATH OR GLORY FOR RESAP(2008)1

Gerald Prior<sup>1</sup>

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The majority of laws for Tattoo and Permanent Make-Up (PMU) inks in EU countries are based on ResAP(2008)1, a document published by the Council of Europe over 9 years ago. At a meeting of EU Member States and representatives from the Council of Europe in November 2014 one goal was to collect details of analytical methods being used by authorities in the EU for Tattoo and PMU inks and another was to publish the results as a book. The collected and listed methods are those being used to test whether the inks comply to either ResAP(2008)1 or to local legislation. It is important to take into consideration that less than 40% of EU Member States were present at this meeting. Subsequently, this means that for more than 60% of EU Member States no details of the applied analytical methods at domestic level were collected with the required accuracy. For less than 40% of EU Member States 46 different methods were collected. The subsequently published book of the meeting is hence not only a summary of the large amount of methods being used by a minority but also a documentation of the catastrophic and unclear situation within the EU. These circumstances are troublesome and confusing for local authorities but especially for the international and local manufacturers of tattoo and PMU inks and further for the importers of these products. It is hard to believe that the EU can justly be called a „common market“ in this field if there is no common denominator.

A closer look at the listed methods reveals that for the analysis of heavy metals alone 25 different analytical methods are in use by less than 40% of EU Member States. The work-up of these 25 methods varies from simple extraction with artificial gastric fluid to digestion with strong acids under high pressure or in a microwave system. This broad range in work-up methods ultimately leads to a broad variation in the achieved results in different EU countries. Consequently, manufacturers and importers are having different legal problems with one and the same ink in different EU countries: this is leading to an increase in legal proceedings between local authorities and manufacturers or importers.

Another aspect in this context are RAPEX notifications. RAPEX is the EU rapid alert system for dangerous products based on EU Directive 2001/95/EC. It is used to warn all EU Member States of hazardous substances in products on the EU market.

For the majority of products being notified in the RAPEX System, e.g. toys, textiles, EU harmonised analytical methods are being used. In practice this means all EU Member States achieve the same results if they test the same product. This is obviously not the case for tattoo and PMU inks as no harmonised methods exist. Warnings from one EU country can, therefore, surely only be valid for the country conducting the analysis and not for the whole of the EU. Likewise, a withdrawal of products based on the analysis performed in one country cannot be valid for all EU countries as different countries would have found different results due to using other analytical methods.

ResAP(2008)1 is widely accepted by tattoo and PMU ink manufacturers as a minimum requirement. It is further the basis for several national laws. The abundance of testing methods, each leading to different results, makes it impossible for any manufacturer to fulfil the requirements in all EU Member States. Under these circumstances it is questionable whether ResAP(2008)1 will have any relevance in the future.

## O12. DIARYLIDE PIGMENTS UNDER SUNLIGHT – WHAT DO IN VITRO TESTS TELL US?

Christopher Hohl<sup>1</sup>

<sup>1</sup>Kantonales Laboratorium, Basel, Switzerland

Tattoo inks often contain diarylide pigments as colorants which are widely used in combination with titan dioxide in its rutile modification to obtain yellow and orange color tones. They consist of a benzidine derivative as the central structural element. As tattoos tend to fade with time and photodegradation of pigments being responsible to a certain extent, we developed an in vitro method simulating solar irradiation of a pigment in the skin. The method basically consisted of applying the diazo pigment alone or mixed with rutile in a matrix of lysed bovine collagen between two plates of varying UV-light transparency and irradiating for 0.5-1.5 h under daylight conditions. Photodegradation was characterised by the HPLC determination of the four guide compounds 4-chloro-aniline, ortho-toluidine, 3,3'-dichlorobenzidine and PCB 11.

Tests with the two often used pigments C.I.21095 and C.I.21110 showed as an important result, that already after 0.5 h of irradiation under daylight containing UVA, both underwent strong photo degradation to the carcinogenic 3,3'-dichlorobenzidine when mixed with rutile.

Under these conditions, other azo pigments probably also form hazardous aromatic amines, giving these kinds of studies a high degree of urgency.

### O13. ORGANIC COLORANTS IN TATTOO INKS – HOW TO CHECK COMPLIANCE WITH THE EUROPEAN RESOLUTION

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**Introduction:** The CoE Resolution ResAP(2008)1 restricts the use of organic pigments in tattoo inks. Colorants listed in annex 2 of the CoE Resolution and restricted colorants in annex IV of the Cosmetics Regulation are forbidden as well as those that may split into carcinogenic primary aromatic amines (PAA). In the last years, Swiss studies revealed high proportions of noncompliance regarding the use of colorants.

**Discussion:** Because of their poor solubility and chemical variety, several different methods are needed for checking the compliance of tattoo colorants:

Laser desorption-Time of Flight-MS (LDI-ToF) is predestined for the determination of pigments because the analytes don't have to be solubilised. Matrix effects and differing sensitivity between pigments limit its use as a comprehensive method though.

UV/VIS-spectrometry after dilution with strong solvents reveals the main colorants but the selectivity of the method is not adequate for an unequivocal identification of all pigments.

Liquid chromatography (LC) coupled to Ultraviolet/Visible (UV/VIS) or Mass spectrometric (MS) detection is very selective and detects the main and tinting colorants as well as the impurities. Because only LC compatible solvents may be used, some pigments cannot be determined.

Thin layer chromatography (TLC) allows for the use of strong solvents and reveals the whole pigment pattern. Migration is not always achieved though and separation not as selective as with LC.

At last, the determination of those pigments that may split into carcinogenic primary aromatic amines needs an indirect, harmonised method that suffers from the poor solubility of the pigments in combination with the aqueous reduction conditions.

### O14. TATTOO INK ANALYSIS BY PYROLYSIS-GC/MS (PY-GC/MS)

Christoph Hutzler<sup>1</sup>, Ines Schreiber<sup>1</sup>, Peter Laux<sup>1</sup>, and Andreas Luch<sup>1</sup>

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**Aim:** To enable risk assessment, tattoo inks used on the market need to be monitored for the presence of prohibited compounds. Since most pigments and polymeric ingredients of tattoo inks are insoluble and non-volatile the working-out of appropriate analytical means reveals rather challenging.

**Methods:** Py-GC/MS provides a quick and reliable method for pigment decomposition and product identification via comparison to pure pigments or tattoo ink formulations. Here, we pyrolyzed pigments or tattoo inks at different temperatures coupled online to gas chromatography with mass selective detection. Using this method, the chemical structures of unknown parental compounds could be assigned based on the decomposition patterns compiled in the commercial or custom mass spectra libraries.

**Results:** Pigments and polymers used for pigment dispersion, such as polyvinyl pyrolidones and polysiloxanes, were identified simultaneously in tattoo inks. Also other organic ingredients like fragrances, preservatives or impurities resulting from synthesis were identified 1).

We established a pyrogram library of commonly used pigments and other ingredients in tattoo inks applicable for substance screening. Based on this, false declaration of tattoo pigments, suspicious additives and carcinogenic cleavage products can be easily identified. Further, Py-GC/MS was successfully used to predict toxic cleavage products formed by laser irradiation of organic pigments.

**Conclusions:** Py-GC/MS is an efficient tool for the identification of pigments and other organic compounds present in tattoo inks. It can also be used as a powerful prediction model for fragmentation products to be expected originating from organic pigments upon laser irradiation 1), 2).

**References:**

- 1) Schreiber et al. Arch Toxicol. 2016; 90(7): 1639-50. doi: 10.1007/s00204-016-1739-2.
- 2) Schreiber et al. Sci Rep. 2015; 5:12915. doi: 10.1038/srep12915.

## O15. REACTION OF LYMPH NODES ON TATTOO PIGMENTS

Vivien Schacht<sup>1</sup><sup>1</sup>Dept. of Dermatology and Allergy, Hannover Medical School, Hannover, Germany

After application of tattoo pigments into the skin for a permanent tattoo pigments are stored inside of macrophages in the dermis and in lymph nodes. In the dermis and inside of lymphatic vessels on the way to the lymph nodes pigments and their additives have contact with cells of the immune system leading to a more or less pronounced inflammatory reaction. This inflammatory reaction is dependent on the mixture of the pigments and their additives on one hand and on the status of the immune system of the owner of the tattoo on the other hand. The differences of tattoo pigments make it difficult to compare inflammatory reactions on tattoos. Moreover, information about the components of tattoo pigments are hardly available for many customers.

So far, we see no long standing differences of reactions on black versus multicolored tattoo pigments in lymph nodes. Acute reactions days or weeks after tattooing are regularly seen, e.g. swelling because of production of new follicles in the draining lymph nodes. Years after tattooing pigments are still verified all over the lymph node and macrophages of the dermis containing pigments are still entering lymphatics leading to the next draining lymph node. Some pigments are seen as fine granules and others are aggregated in huge clusters inside of macrophages. In lymph nodes of elderly people lymph node parenchyma is replaced by fat, this phenomenon is called fatty degeneration. Because of the degeneration less macrophages and pigments are seen in these lymph nodes and the question has to be asked where the stored pigments inside of their macrophages are gone. Possible localizations are downstream lymph nodes or distant organs with high capillary networks of the blood vascular system.

## O16. DISTRIBUTION OF TATTOO PIGMENT TO LYMPH NODES AND THE LIVER: STUDIES IN MICE

Jørgen Serup<sup>1</sup>, Mitra Sepehri<sup>1</sup>, Tobias Sejersen<sup>2</sup>, Klaus Qvortrup<sup>2</sup>, Catharina Lerche<sup>1</sup><sup>1</sup>Bispebjerg University Hospital, Department of Dermatology, The Tattoo Clinic and the Wound Healing Centre, Copenhagen, Denmark<sup>2</sup>University of Copenhagen, Core Facility for Integrated Microscopy, The Panum Institute, Copenhagen, Denmark

Tattoo pigments deposited in the skin are known to flow with the lymph and become restrained in the regional lymph nodes. It has not been studied if tattoo pigment particles pass to the bloodstream and thus may directly expose distant organs. This study of mice extensively tattooed on the back aimed to assess deposition of tattoo pigments in internal organs

**Material and methods:** 25 mice were studied, i.e. 10 tattooed black, 10 tattooed red and 5 controls. Mice were sacrificed after one year, and samples taken from the tattooed skin, lymph nodes, liver, kidney and the lungs. Samples were examined for tattoo pigment deposits by light microscopy (LM) and by transmission electron microscopy (TEM).

**Results:** In both groups of tattooed mice and in total in 19 mice tattoo pigment was observed by TEM in the Kupffer cells of the liver contrasting no observed pigment in other internal organs. LM and TEM showed dense pigment in the skin and in lymph nodes.

**Conclusion:** Tattoo pigments were found in the liver. This is a new observation. Tattoo pigments, thus, reach the blood stream with potential exposure of multiple organs. The Kupffer cells of the liver are macrophages having a special role in the detoxification of the blood, which may explain why pigments were concentrated in the liver. We cannot estimate if circulating pigments reach the blood directly from the skin or by leakage from the pigment deposition in regional lymph nodes. LM indicates that the amount of circulated pigment is low in comparison with the permanent pigment deposits in tattooed skin and lymph nodes.

## O17. STERILE INKS AND METHODS OF STERILIZATION

Lucia Bonadonna<sup>1</sup><sup>1</sup>National Institute of Health, Rome, Italy

**Aim:** Introduction of tattoo inks in the skin has been associated with a potential entry of a great number of microorganisms (bacteria, viruses, moulds). Contaminated pigments, diluents and instruments can represent primary infection risk factors. At the moment, tattooing is subject to little control from a viewpoint both to ink production/sterilization and tattooing practices. In the last decade two European recommendations were approved. According to the more recent ResAP 2008-1 tattoo inks should be sterilized before marketing; nevertheless it does not provide details on sterilization and preservation process. Advantages and disadvantages of the commonest sterilization techniques will be described.

**Methods:** The radiation is generally suitable for sterilization of tattoo inks. This sterilization technology is widely used in many countries and enables products to be sterilized without altering organoleptic, physical and chemical characteristics. Sterilization should destroy the DNA of all the microorganisms, thus inactivating them.

**Results:** From the scientific literature the radiation technology is considered safe, reliable, and highly effective. Nevertheless microbiological studies match the supposition that the current ink sterilization systems have a low capability to inactivate microbial burden in tattoo inks. It is not a case that radiation resistance varies widely among different microorganisms and that is related to differences in their chemical and physical structure, as well as in their ability to recover from radiation injury.

**Conclusions:** There is a strong need to develop a European regulation addressing both ink production and sterilization, tattooing practices and quality control and their distribution in order to ensure the consumers' health.

Abstract for presentation O18 not available at the time of print.

## O19. PIGMENT PRODUCTION FOR TATTOO INKS

Michael Dirks<sup>1</sup><sup>1</sup>H-A-N-GmbH, Eslingen, Germany

What are pigments? Compared to a lot of other chemical compounds, pigments are solid state matter and should not dissolve in the area where they are used. In addition to that particles are not uniform in size and the shape may also differ. And as all particles they adsorb other chemicals on their surface, arising from raw materials or from by products of the chemical synthesis. In general, the pigment user selects the pigments according to the color index and believes all pigments with the same color index are identical. However, this is not the intention of the color index, it only gives the user an idea about the color area and no information on other components like additives and/or impurities. Therefore, more attention has to be drawn to impurities arising from raw materials and impurities formed as by-products by the pigment synthesis. For most of the technical applications, like paints, printing inks and plastics these impurities do not cause any problems. However, if it comes to sensitive applications like toys, cosmetics, medical applications, food contacts and tattoo inks. For these applications the impurities and in some cases the breakdown products of the pigments, are very critical. There are several ways to come to "pure" pigments. Firstly, by a proper selection of the raw materials and by which process the pigments are synthesized; secondly by a subsequent purification of technical pigment. The right selection will depend on chemistry and physics of each individual pigment.

## O20. BASIC PRINCIPLES OF LASER TATTOO REMOVAL

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In the western world millions of people have many and large tattoos. Social stigmatization is still a major reason for removing tattoos from skin. A nation-wide survey in German speaking countries showed that about 5 % of tattooed people seek for tattoo removal, which is equivalent to half a million people in Germany.

When following the rules of selective photothermolysis, the laser treatment should not induce persistent side effects for the skin. The treatment of tattoos containing black ink often gives excellent results, whereas the results are not predictable and usually worse for coloured tattoos. The efficacy of that treatment seems to be correlated to both the chemical structure of the tattooed compounds and the laser wavelength used. Another important laser parameter is the pulse duration. Since the size of pigment particles in skin is rather small, it is mandatory to apply laser pulses with high intensities and pulse duration in the nanosecond or picosecond range. It is still controversially discussed whether picoseconds are really superior to nanoseconds regarding efficacy and application for different tattoo colours.

The use of millisecond pulses of lasers or intense pulsed light sources (IPL) provides low efficacy and a high risk of scarring. Another risk might occur due to chemical alterations of the tattoo pigments, which consist either of carbon black or azo pigments.

Abstract for presentations O21 + O22 not available at the time of print.

## O23. PICOSECOND PULSES - MY EXPERIENCE

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**Background & Objectives:** Tattoos have played an important role in human culture for thousands of years, and they remain popular today. The development of quality-switched (QS) lasers in the nanosecond (10<sup>-9</sup>) domain has revolutionized the removal of unwanted tattoos for over 20 years. However, restrictions known with this nanosecond technology, such as resistant colours (blue, green yellow) and multiple sessions (sometimes up to 25) is over. Since 2012 we have a new generation of lasers called picosecond, as their pulse duration ranges between 350 and 500 picosecond (10<sup>-12</sup>).

**Study Design / Material & Methods:** To update the audience with the 3-year personal experience we have in tattoo removal, with the 3 main available wavelengths (532, 755 & 1064nm). During this presentation personal examples with this technology will be presented in various tattoo conditions. This ultra-short pulse duration breaks the tattoo pigment in much smaller particles, thus eliminating it more easily and quickly. Although it is not colour blinded, picosecond technology is able to remove pigment, like yellow, which was totally resistant to nanosecond technology.

**Results:** The use of picosecond laser results in a) less sessions needed, so less time required to clear tattoos (1). b) better clearance of residual pigment c) possibility of removing previous resistant colours (2), as well as paradoxical darkening (3).

**Conclusion:** With this new picosecond technology, a new era is opened in the field of laser tattoo removal, allowing better and faster pigment removal.

**Litterature:**

- 1) The picosecond laser for tattoo removal. Hsu VM, Aldahan AS, Mlacker S, Shah VV, Nouri K. Lasers Med Sci. 2016 Nov;31(8):1733-1737.
- 2) Clearance of yellow tattoo ink with a novel 532-nm picosecond laser. Alabdulrazzaq H, Brauer JA, Bae YS, Geronemus RG. Lasers Surg Med. 2015 Apr;47(4):285-8.
- 3) Successful treatment of paradoxical darkening. Bae YS, Alabdulrazzaq H, Brauer J, Geronemus R. Lasers Surg Med. 2016 Jul;48(5):471-3.

## O24. ADVERSE TATTOO REACTIONS - ANALYSIS OF HUMAN BIOPSIES

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**Aim:** Allergic reactions to tattoos are most commonly observed with red color shades. However, the chemical identity of these colors is usually not reported. Sensitizing elements such as Ni, Cd, Mn and Co as well as organic pigments have been associated with tattoo allergies. However, analytical evidence of the pigments in the skin or inks provided by the tattooist is often not available.

**Methods:** We screened 104 skin biopsies of patients who have developed an allergy against their red or violet tattoo. Specimens were analyzed for potential sensitizing elements using inductive-coupled plasma mass spectrometry (ICP-MS). Organic pigments were identified by matrix-assisted laser desorption/ionization time-of flight (MALDI-ToF)-MS/MS.

**Results:** About half of the samples contained Cr, Ni or both elements. The azo-pigments red (P.R.)22, P.R.170, P.R.210, pigment orange 13 and the dioxazine pigment violet 23 occurred more often in the skin samples compared to their general use in tattoo inks. Other pigments identified belonged to the quinacridone family of pigments.

**Conclusion:** Elements found in samples from tattoos occasionally might play a role in tattoo allergies. However, organic pigments are suspected to play a major role. The identified organic pigments should be further evaluated for their sensitizing properties. However, such insoluble pigments are generally non-reactive by patch tests<sup>1</sup>. Yet, some pigment decomposition products are known sensitizers (unpublished data). Therefore, future experiments will focus on the sunlight and laser decomposition products of the found pigments which will be tested by the direct-peptide reactivity assay (DPRA) to identify the true sensitizing compound(s).

<sup>1</sup> Serup, J. & Hutton Carlsen, K. Patch test study of 90 patients with tattoo reactions: negative outcome of allergy patch test to baseline batteries and culprit inks suggests allergen(s) are generated in the skin through haptization. *Contact Dermatitis* 71, 255-263 (2014).

## O25. ELEMENTAL BIOIMAGING OF TATTOO PIGMENTS IN LYMPH NODE AND SKIN TISSUE

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Despite the popularity of tattooing, regulations for tattoo inks and their individual constituents are still insufficient concerning possible health risks. For an adequate risk assessment, knowledge about concentration, distribution and deposition of the dyes after tattooing is essential.

Therefore, human tissue samples were investigated with micro xray fluorescence ( $\mu$ XRF) and laser ablation inductively coupled plasma mass spectrometry (LAICPMS). Metals, metalloids or heavy metals, which are contained either as colouring components or as contaminants, can be analysed and quantified directly in the tissue.

In this work, LA-ICPMS analysis was applied in order to study the distribution of iron and titanium in human lymph node and skin tissue. The ablation of the sample material occurred with a 213 nm Nd:YAG laser. A helium/argon gas flow transported the resulting aerosol to the ICPMS for elemental analysis. Quantification was performed with homemade matrixmatched gelatine standards. Additionally,  $\mu$ XRF analysis validated the results.

$\mu$ XRF and LA-ICP-MS were shown to be powerful techniques for investigating the allocation of dyes in lymph node and skin tissue. In accordance to the dye-containing regions in microscopic images, high concentrations of iron (skin and lymph node) and titanium (lymph node) were observed with LAICPMS. Furthermore, chlorine could be detected qualitatively by  $\mu$ XRF. Especially, the high concentration of metals within the lymph node indicates an allocation of the dyes by the lymphatic system.

## O26. TOXICOLOGICAL CHARACTERIZATION OF TATTOO INKS AND ITS DECOMPOSITION PRODUCTS

Henrik Hering<sup>1</sup>, Ines Schreiber<sup>1</sup>, Christoph Hutzler<sup>1</sup>, Peter Laux<sup>1</sup>, Andreas Luch<sup>1</sup>

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Tattooing has become a widespread kind of body modification in Western culture. About 15% of all people and every fourth under the age of 28 in Germany have at least one tattoo.

During tattooing, the ink is directly injected into the lower dermal skin layer, thereby enabling distribution of hazardous substances systemically throughout the body. For the soluble ingredients, an immediate distribution must be assumed. Translocation and/or decomposition of the insoluble pigments may occur over lifetime. Pigment decomposition is expected by both endogenous metabolism and/or sunlight exposure of the tattooed person.

In our previous studies, we showed the laser-induced breakdown of six tattoo pigments into various toxic or carcinogenic substances. To estimate the hazardous potential of known carcinogens among these degradation products, we investigated their toxicity towards skin cells *in vitro*. To this end, we applied the comet assay on NIH-3T3 fibroblasts, a model for dermal cells. General and oxidative DNA damage were detected by taking advantage of the higher test specificity upon application of human 8-hydroxyguanine DNA glycosylase (hOGG1). In addition, a modified comet assay applying the restriction enzymes *HpaII* and *MspI* will be used to evaluate human skin biopsies and 3D skin models for altered methylation patterns due to epigenetic changes caused by tattoo pigments.

## O27. SURVEILLANCE ACTIVITIES IN ITALY: DETERMINATION OF HAZARDOUS SUBSTANCES IN TATTOO INKS - THE ITALIAN LABORATORIES NETWORK

Manuela Agnello<sup>1</sup>, Marco Fontana<sup>1</sup>, Luca D'Ambrosio<sup>2</sup>, Flavio Ciesa<sup>2</sup>

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In the last ten years Italy has promoted a national program of chemical evaluation for the safety of tattoos and permanent make-up.

Italian Ministry of Health has developed a national network of laboratories for the implementation of analytical controls on articles (according to Annex XVII - REACH regulation n° (CE) n. 1907/2006) and other products.

The network involved various regional public laboratories with high specialization grade operating on the entire Italian territory.

ARPA Piemonte developed methods for the analysis of aromatic amines and PAHs on tattoo inks and PMU inks, APPA Bolzano developed method for the determination of heavy metals in the same articles.

The analytical results of hazardous substances determination are discussed, for hundreds of products deriving from the policies of surveillance of Italian public health authorities.

Our focus regards the most critical typologies of products, the variability of products conformity depending on variables such as the typology of pigments, and the commercial provenance.

Finally, the improvement of control policies is proposed through the strengthening of a European network of laboratories adopting shared analytical methods.

## O28. CLIENTS' RATING OF TATTOO REMOVAL BY Q-SWITCH LASER

K. Hutton Carlsen<sup>1</sup>, J. Esmann<sup>2</sup>, J. Serup<sup>1</sup><sup>1</sup>Department of Dermatology, the "Tattoo Clinic", Bispebjerg University Hospital, Copenhagen, Denmark<sup>2</sup>Department of Laser Surgery, Centre for Laser Surgery, Hellerup, Denmark**Aim:** To determine clients' reasons for tattoo removal, effectiveness of YAG laser, side effects and satisfaction with final outcome.**Methods:** Tattooed clients, who had received YAG laser treatments from 2001-2013 at the private clinic "Centre for Laser Surgery", received a questionnaire after a minimum 2-year post-treatment period. All data handling was blinded to the laser surgeon.**Results:** 154 clients participated (114 females, 40 males). Reasons for tattoo removal were stigmatisation (33%), too visible (29%) and poor quality (22%). Prior to treatment, clients' expectations were high, i.e. 66% expected complete removal without side effects.

Clients rated effectiveness of removal from 0 (no effect) to 10 (complete removal): blue 9.5, black 9.4, yellow 8.9, red 8.8 and green 6.5. After treatment at the "Centre for Laser Surgery", 80% had no scarring, however, hypopigmentation, minor scarring and shiny areas occurred in 20% despite qualified treatment. Clients were especially dissatisfied with green pigment remnants, mimicking bruising. Pain during treatment was moderate to extreme in 84%. Treatment assessment and results were rated to be acceptable to superb (85%) and inferior to unacceptable (15%).

**Conclusions:** Tattoo removal by Q-switch YAG laser was overall, rated satisfactory despite very high expectations prior to treatment, which were only partly met. During the treatment course, clients thus adjusted their expectations. The laser surgeon should be aware of his/her role as a tutor and prepare the client for a situation, where outcomes may not be optimal.

## O29. MR SCANNING, TATTOOS AND REPORTED SKIN BURN, FACT OR MYTH?

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Samples were spread in capped Petri discs and initially tested with a 0.97 T neodymium solid magnet to observe visual magnetic behavior. Outside the scanner room and immediately before MRI, the surface temperature of the ink was measured using an infrared probe. Samples were placed in a clinical 3T scanner at the height of the isocenter. Two separate scans were performed on the samples, i.e. positioned in the isocenter and moved 30 cm away from the center. Immediately after scanning the surface temperature of the inks was measured again. Chemical analysis of samples was performed by mass spectroscopy (MS) after microwave dissolution in nitric acid and hydrochloric acid, with measurement of total concentrations (sum of soluble and metallic content) of the metals cadmium, chromium, cobber, nickel, lead, zinc and mercury.

**Results:** Only few inks were magnetic on contact with the solid magnet. Mean temperature increase measured in the isocenter of pastes and dispersions ranged between 0.14 to 0.26 degree C (p<0.01), and in the off centre position from -0.16 to 0.21 degree (p<0.01). Magnetic inks on solid magnet exposure showed no special increase of temperature. Chemical analysis of the inks showed high concentrations of iron, but also nickel and chrome were found as contaminants. High concentration of iron in the inks, i.e. the iron oxide pigment, was not associated with any special increase of temperature. The measured minute increase of temperature was seen as clinically not relevant and far below what could ever induce a thermal tissue burn.**Conclusion:** The study could not confirm any clinically relevant temperature increase of tattoo inks and pigments, in particular iron oxides after MRI and, thus, not support the widely held belief or myth that MR scanning can produce thermal burn in the tattooed skin. Sensation of burn is essentially sensory. MR is a powerful stimulus, which among others may induce electromagnetic effects on pigments that for presently unknown reasons may elicit the sense of "burn" in a tattoo during MRI.

### O30. RESULTS OF THE NATIONAL SURVEY ON THE DIFFUSION, CHARACTERISTICS AND RISK AWARENESS OF TATTOOS IN ITALY

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**Background:** In addition to data on the prevalence of tattooed people in Italy (about 6.9 million individuals, 12.8% of population), we analysed other relevant aspects. We observe a constant upward trend in the practice of tattooing.

**Aim:** Consumer health protection, through the estimation of prevalence and characteristics of tattooed population and the appraisal of the awareness on the risks associated to tattoos. To provide more information to stakeholders and professionals operating in this field.

**Methods:** Computer-assisted-telephone interviews and Computer-Assisted-Web Interview were completed by a representative sample of 7608 persons aged 12-75+ year-old, in Italy.

**Results:** Tattoos are more prevalent among women (55.9%). There is a high prevalence of monochromatic tattoos. 41.4% of tattooed persons declared to have tattoos of small dimensions. According to the data of the survey, 3.3% of tattooed claim to have had complications or reactions, but the figure seems underestimated. In all these cases, only 12.1% consulted a dermatologist/general practitioner; more than half (51, 3%) did not consult anyone. In general, only 58.2% of respondents are aware of health risks.

**Conclusions:** The results of the first Italian survey show that 36.7% of all tattoos have been performed in the last five years considered. Only 50.8% of tattooed declared to be sure to have signed an informed consent. The main sources of information for people, on which risk perception is based on, are parents, friends, media and internet. New rules are needed to improve tattoo safety, tattooists' training and consumers' awareness on the risks and contraindications.

### O31. EPIDEMIOLOGICAL SURVEILLANCE OF CONTACT ALLERGENS BY THE INFORMATION NETWORK OF DEPARTMENTS OF DERMATOLOGY (IVDK) - RELEVANCE OF CONTACT ALLERGENS IN TATTOO INKS

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The IVDK is a network of 56 dermatology departments in Germany, Austria and Switzerland for analysis, evaluation and surveillance of contact allergens in consumer and industrial products. The IVDK holds the world's largest database on contact allergy comprising patch test and anamnestic data (about 250 000 patients since 1989). Its objectives are the primary prevention of contact dermatitis and epidemiological surveillance (e.g. of the outcome of regulatory measures), thereby covering several substance classes which may also have relevance for the tattoo market. For instance, sensitization rates to nickel decreased in young women in Germany by adjustments of release limits from jewellery, which was surveyed by the IVDK. Furthermore, (meth)acrylates were considered as contact allergens in dental technicians and nail artists. The epidemic of methylisothiazolinone (MI) sensitization was argued and monitored by the IVDK. Warnings and intense communication with the cosmetics industry took place and resulted very recently in a turning point towards a moderate decrease of MI sensitization. Concomitant reactions to other isothiazolinones were examined by the IVDK as well. These exemplarily addressed substances are constantly or frequently found in tattoo inks as contaminations, binders or preservatives. In cooperation with the German Contact Dermatitis Research Group (DKG), the IVDK is initiating a study to investigate the problem of allergens in tattoo inks with epidemiological methods. Close communication with tattoo ink producers, tattoo artists and users would be appreciated.

## O32. DRUGS AND DERMOPIGMENTATION: COLLATERAL EFFECTS OF DRUGS IN RELATION WITH DERMOPIGMENTATION TREATMENTS

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**Aim:** The presence of numerous scientific publications gave rise to this research to realize an exhaustive study to provide an appropriate knowledge about collateral effects of drugs in relation to the tattooing treatment.

**Method:** The base of the study is represented by the Study held by Rita Molinaro in cooperation with Treviso Hospital Breast Unit and Italian Health Superior Institute and the consequent scientific results on more than 200 patients immuno-depressed, with 6 years follow-up.

**Results:** The consumption of commonly used drugs, oncological and psychoactive substances, may impact the treatment of tattooing, the tattoo healing process and even interact with the color and pigment itself.

Topical products, including non-regulated treatments, such as some anesthetics in combination, may significantly influence the skin pH, interacting with the pigment enhancing the risk of migration.

**Conclusions:** Therefore comes out the need to train and inform correctly the operators about the interview procedures for the informed consensus, about the communication way with doctors with regards to the dispatch of patients, about which doctor to enquire for getting the authorization on treating the oncological patient and request the post-treatment protocols according to different needs of the patient / client.

This is not a question of prohibiting tattoo in people taking medications or with autoimmune diseases, but being conscious of how these drugs interfere with the treatment of tattooing. Develop the awareness to work closely with the doctors for the full protection of the professional and the patient / client.

## O33. INORGANIC AND ORGANIC PMU INKS

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Permanent make up (PMU) is an expanding business with a broad range of applications like eye-brow and lip pigmentations, corrections of discolorations of the skin, but also covers less known applications like scalp pigmentations, and various other.

The discussion of safety of inorganic PMU inks in regard to heavy metal impurities like nickel has triggered the development of new organic PMU colors. Inks on basis of organic colors are commonly used for tattoo application where bright, intense colors and a broad range of different color shades is demanded. Organic pigments are nickel-free, but there are other safety concerns of this pigments when in skin.

In addition, the requirements of PMU colors are as versatile as the application since skin and pigmentation technique varies, and the PMU color shades have to cover a broad spectrum from natural looking color shades until intense colors.

In this work we will discuss the different requirement of PMU colors for eyebrow and lip pigmentation. We will present results of eye brow and lip pigmentations with organic inks. The results show that organic PMU colors are excellent for lip pigmentation and look promising for eye brow pigmentations, still being a classical application for inorganic PMU inks. This data will be supplemented with a safety assessment of the organic and inorganic colors, and general measures for quality control or the products.

## O34. WHAT QUALIFIES A SAFE AND GOOD PMU INK?

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**Aim:** This work takes a closer look at PMU inks and discusses safety aspects and relevant chemical and physical properties of high performance inks. There are many PMU inks available each having specific performance characteristics like viscosity, ink flow and color stability. In addition, safety issues like allergies could influence the pigmentation result badly. Currently the performance of PMU colors is assessed by a PMU artist. This represents a subjective opinion guided by the preferences and the pigmentation technique of the artists. But on the other hand quantitative analysis like rheology or particle size do not predict well the ink-needle interaction, a major factor for the pigment uptake. Therefore, new methods for ink flow optimizations are required.

To better understand the complex issue we have done a comparative study of PMU inks with different analytic methods. Results are then compared and discussed on the basis of the performance in the skin.

**Methods:** The ingredients and heavy metal impurities of selected PMU inks are evaluated. High-speed camera investigation of PMU inks in action on tattoo- and PMU-needles was used to identify the flow properties. In addition, physical and chemical properties, such as particle size, viscosity and zeta potential was measured.

**Results & Conclusions:** The high speed camera videos demonstrated significant differences of the ink flow on the needle. These data predict well the pigmentation results of the PMU artists. Therefore, this method is a promising tool for quality control and ink flow optimizations.

## O35. ALLERGIC REACTIONS TO RED PIGMENT TATTOOS AND TREATMENT METHODS

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**Disclosure:** The authors declare no conflict of interest.

**Aim:** To present different clinical and histologic presentations of cutaneous allergic reactions to red pigment tattoos and therapeutical options.

**Methods:** Observational retrospective study of allergic reactions to red pigment tattoos and treatment options as diagnosed in the academic hospitals in Amsterdam / Academic Tattoo Clinic Amsterdam. All patients who were treated by the author(s) were included. In addition, we retrospectively searched the electronic medical records of the dermatology departments of the academic hospitals in Amsterdam.

**Results:** In total 39 patients were included. More than half of the patients developed the reaction on the lower extremities. Symptoms mainly developed within the first 3 months after placing the tattoo, nevertheless 46% of patients developed symptoms in a period of 3 months up to 7 years after tattooing. In majority of the cases the clinical presentation was an elevated plaque in the red part of the tattoo. Other, more rare, clinical presentations included ulcero-necrotic and excessive hyperkeratotic lesions. Despite similar clinical presentation, several histopathological patterns were observed: lichenoid, pseudolymphomatous, granulomatous or a combined inflammation. Approximately one third of patients reported worsening of symptoms during tattoo exposure to sunlight and approximately two third had a history related to atopic constitution (allergic asthma, atopic dermatitis or allergic rhinitis). Furthermore, in half of the patients we observed a delay of 6 months or more between the onset of symptoms and a visit to the clinic.

Generally, first line treatment consisted of local or intralesional corticosteroids. Patients with persistent complaints were successfully treated with carbon dioxide (CO<sub>2</sub>) laser. In exceptional cases systemic minocycline, cyclosporine or hydroxychloroquine were used.

**Conclusion:** A great variety in clinical appearance and histopathological patterns is observed in red pigment tattoo reactions. Further research is needed to analyse if a specific histological pattern correlates with treatment outcome. Treatment requires an individual approach taking into account tattoo location and size, patients preference and potential side effects. Therapeutical options include local corticosteroid, laser therapy, surgery, dermatome shaving, allopurinol, cyclosporine and hydroxychloroquine.

## O36. TATTOOS, PSORIASIS AND OTHER CHRONIC SKIN DISEASES

Christa De Cuyper<sup>1</sup><sup>1</sup>Dermatology, AZ Sint Jan, Brugge, Belgium

Psoriasis is a chronic skin disease affecting 2-3% of the population. Koebnerisation is a well known phenomenon in psoriatic patients and a point of concern for patients considering to get a tattoo. Factors which could play a role are the activity of the disease and a history of previous Koebner effect after skin trauma. Other skin diseases such as lichen ruber and systemic diseases such as sarcoidosis can have a similar tendency.

**Conclusion:** Tattooing must be a well informed decision, in particular in a person with a concomitant skin disease or a systemic disease with cutaneous manifestations. The risks of infection can be increased by an impaired skin barrier and by the administration of immunosuppressive drugs. Koebnerisation can occur. Tattooists should be aware of these risks and inform their clients to seek medical advice, before starting the procedure

## O37. BLACK TATTOOS, PAPULO-NODULAR REACTIONS AND HIGH RISK OF SARCOIDOSIS

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**Aim:** It is well known that sarcoidosis is more prevalent among patients with tattoo reactions. In a systematic study we investigated the association between tattoo reactions and sarcoidosis.

**Methods:** During a period from 2008-2015 a total group of 494 tattoo complications in 406 patients were examined in a subspecialized dermatological clinic. Based on clinical assessment and histology, 92 reactions in 72 patients showed a papulo-nodular pattern. Since sarcoidosis is expected to be nodular this group was further examined for sarcoidosis; locally and systematically.

**Results:** Of 92 papulo-nodular reactions, 27 (29%) reactions in 19 patients were diagnosed as local or systemic sarcoidosis. This was supported by histology. 65 (71%) were diagnosed as non-sarcoidosis. A new observation the "Rush phenomenon" with concomitant reaction, "rush", in many other black tattoos, triggered by a recent tattoo with papulo-nodular reaction, was observed in 70% in the sarcoidosis group and 28% in the non-sarcoidosis group, indicating a predisposing factor which may be autoimmune and linked to sarcoidosis. In the predisposed individual, agglomerates of black pigment forming foreign bodies, may trigger widespread reactions in the skin and internal organs.

**Conclusions:** The association between black tattoos, papulo-nodular reactions and sarcoidosis was strong. Sarcoidosis is estimated to be 500 fold increased in patients with a papulo-nodular reaction in a tattoo, compared with the prevalence in the general population. Depending on individual predisposition papulo-nodular reactions may, as triggers, induce widespread reactions in other black tattoos, a "rush phenomenon".

**Info:** Title (article): Papulo-nodular reactions in black tattoos as markers of sarcoidosis Study of 92 tattoo reactions from a hospital material

Abstract for presentation O38 not available at the time of print.

### O39. DISTRIBUTION AND CHARACTERIZATION OF TOXIC METALS IN HUMAN SPECIMEN

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**Aim:** Tattoo pigments have been widely investigated in ink products. In contrast, little data is available on the pigment particles once injected into the skin and after migration to the lymph nodes. We here investigated the pigment identities and biomolecular alterations in the tissue surrounding the particles in skin and lymph node of donors without known symptoms.

**Methods:** Each four human skin and lymph node sections were analyzed by means of synchrotron X-ray fluorescence and FTIR microscopy techniques at the beamline ID21 and ID16B at ESRF.

**Results:** TiO<sub>2</sub> pigments were co-localized with bromine (Br) deriving from an organic green pigment in skin and regional lymph nodes. Average TiO<sub>2</sub> particle size in skin and lymph nodes was 180 nm. Organic Br-containing pigments were much more polydisperse with particles sizes presumably below 50 nm and up to several micrometers; with smaller particles preferentially found in the lymph nodes. Fe-containing particles were slightly smaller compared to TiO<sub>2</sub>. The FTIR assessment of dermis sections that contained pigment particles showed higher amid I β-sheet/α-helix ratios compared to dermis without pigment particles.

**Conclusions:** The results suggest a preferentially transport of smaller particles towards the lymph nodes. The conformational changes of proteins towards β-sheets in the proximity of the particles indicate protein misfolding.

Protein misfolding as seen here are known to occur as an initial step in the onset of a foreign body granulomatous reaction as often associated with tattoos. Differentiation between the particle characteristics that drive biocompatibility or rejection of the particles in the skin is part of ongoing research.

### O40. DO METALS PLAY A ROLE IN TATTOO ALLERGY?

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We present a patient with a papulonodular reaction in several tattoos, associated with systemic symptoms. After surgical removal of metal osteosynthesis material the skin symptoms improved within a week. Skin testing with an extract of the metal screws evoked a flare up of the symptoms. Different metals could be identified in the extract of the screws and the presence of corresponding metals could be demonstrated in the skin biopsy. The association of metal implants and cutaneous allergic manifestations will be discussed.

**O41. TATTOO INKS - THE VIEW OF A TOXICOLOGIST****Gabriele Sabbioni<sup>1,2</sup>**<sup>1</sup>Walther-Straub-Institut für Pharmakologie und Toxikologie, Ludwig-Maximilians-Universität München, München, Germany<sup>2</sup>Institute of Environmental and Occupational Toxicology, Airolo, Switzerland

Millions of people have tattoos. The systemic effects of tattoo colorants are mostly unknown (<http://www.sciencedirect.com/science/article/pii/S014067361560215X>). The Council of Europe (CoE, [www.coe.int](http://www.coe.int)) has established guidelines and negative lists for tattoo products in 2003 and 2008 ([www.coe.int/t/e/social\\_cohesion/soc-sp/resap\\_2008\\_1%20e.pdf](http://www.coe.int/t/e/social_cohesion/soc-sp/resap_2008_1%20e.pdf)). The CoE established a list of 27 aromatic amines (negative list), which should neither be present in tattoos products nor released from tattoo colorants. However, tattoo colorants containing aromatic amines from the negative list established by the CoE are still used for tattoos.

Several tattoos are on the market, which contain carcinogenic compounds such as polyaromatic hydrocarbons or aromatic amines. Aromatic amines can be present as contaminants, or the aromatic amines can be released metabolically or through photo and laser degradation from tattoo colorants. Exposure to aromatic amines is a bladder cancer risk. Using the concept of the Environmental Protection Agency (U.S.A.) for the risk assessment of compounds present in the environment, people with tattoo colorants synthesized from aromatic amines have at least a comparable cancer risk (<http://ebph.it/article/view/12018>) such as meat consumer (<http://www.who.int/features/qa/cancer-red-meat/en/>).

**O42. CURRENT STANDARD; THE GOOD, THE BAD THE UGLY****Jens Bergström<sup>1,2,3</sup>**<sup>1</sup>Heavenly Ink, Sweden<sup>2</sup>TPE, Tattoo and Piercing Education Scandinavia<sup>3</sup>Srt, Sweden's Registered Tattoo Artists

What competence should be demanded? Who should be allowed to do tattoos? Is an ugly tattoo a bad tattoo and is Elitism the right way to go. Governments have in the past been reluctant to regulate and set standards to work from and now we have a situation that demands large resources to avoid the growth of cost in the healthcare and loss of working Antibiotics. What is the bare minimum we can allow as a working standard and good practice? The way we approach this now will hopefully leave a positive mark in the future.

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Before



8 weeks after the 2nd treatment



Before



After 2 treatments

.Photos: Eric Bernstein, M.D

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## P1. CONTACT ALLERGIC DERMATITIS TO TATTOO-CONTAINED GOLD: A CASE REPORT

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The art of tattooing has increasing in recent decades. Allergic sensitivity to one of the pigments is the most frequent cause of dermatological reactions at the site of the tattoo. Gold is a new pigment used in tattooing, because of its bright yellow color and luster. Allergy to this metal is uncommon. To our knowledge, this is the first reported case of allergic contact dermatitis to gold in a tattoo.

We describe a case of young woman with a 2 weeks history of an allergic dermatitis presenting with warmth, pruritus, erythema and scaling, arising on her left arm in the site of a coloured tattoo. These lesions developed 2 months after tattooing.

The patch test was performed using the standard North American series test and extended metal series.

Our patient showed positive patch test reactions to goldsodium thiosulfate 2% (+1), goldsodium thiosulfate 0.5% (+1) and Nickel (+1) at 48h. At 72 h she presented an increased sensibilisation with goldsodium thiosulfate 2% (+2), goldsodium thiosulfate 0.5% (+2) and Nickel (+1).

Treatment with systemic and topical corticosteroid therapy was instituted, with an improvement of the clinical lesions after 2 weeks.

## P2. PERSISTENCE OF DIFFERENT MICROBIAL STRAINS IN PURE AND DILUTED TATTOO INKS

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**Aim:** To test the ability of some environmental and human microbial species to survive in tattoo inks, an investigation was carried out. Some microbial strains were inoculated in sterile pure tattoo inks and, in order to simulate use conditions, their ability to survive in diluted ink solutions was also tested.

**Methods:** Known concentrations of specific bacterial strains were added at sterile tattoo inks (e-beam irradiated) and phosphate buffer ink dilutions (1:10 and 1:100 v/v). The following microbial ATCC strains *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus pumilus*, *Mycobacterium fortuitum*, *Candida albicans* and *Fusarium solani* were selected and put in. Periodically aliquots were collected and plated on appropriate cultural substrates.

**Results:** Except for *B. pumilus*, which survived in undiluted inks for two weeks, all the tested microbial strains had a quick decrease of their densities over 24 hours by their inoculum. Indeed, at 10<sup>-1</sup> dilution *B. pumilus* lived for one month while at 10<sup>-2</sup> it survived for more than 40 days. At the same dilutions, *F. solani* survived until eight months, whilst *S. aureus*'s concentrations dramatically decreased both at 10<sup>-1</sup> and 10<sup>-2</sup> dilution within one week. At the 10<sup>-2</sup> dilution, *P. aeruginosa*, *M. fortuitum*, *C. albicans* concentrations increased of five-magnitude orders respect to the initial inoculum maintaining this concentration for the whole observation period.

**Conclusions:** Except for *B. pumilus*, the selected strains showed a low capacity of survival in undiluted ink, associated with the presence of the chemical components of inks. Instead, all the species showed higher chances of survival in diluted inks.

### P3. NICKEL FROM METAL-BASED PIGMENTS IN TATTOO INKS

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**Aim:** Nowadays, tattooing practice is worldwide adopted socio-cultural phenomenon. However, the injection of coloring agents into the skin might encourage allergic reactions, attributed to contained metals.

**Method:** This report presents a case of 11 tattoo inks analyzed on nickel content. All inks were formulated as water based liquids containing 3 to 6 metal based pigments, including iron oxide. Analytical method comprised of microwave digestion by nitric and hydrochloric acid and flame atomic absorption spectrometry, with limit of quantification at 0.3 ppm.

**Results:** Concentration of nickel in analyzed samples ranged from 1-48 mg/kg. It was noticed that 54.5% of analyzed samples showed nickel concentration above 5 ppm, while the remaining samples were between 1 and 2 ppm. Samples showing higher quantities of nickel were the ones containing only iron oxide pigments (CI 77499, 77491, 77492), whereas samples with lower nickel concentration contained also other pigments (TiO<sub>2</sub>, CrO<sub>5</sub>). The separation of the groups could be explained by the fact known from the literature, that many iron oxide pigments contain at least some trace amounts of nickel.

**Conclusions:** Knowing that 1 ppm of Ni is considered as the safe allergological limit, obtained nickel concentrations in analyzed inks indicate that their contact with the skin might pose a risk for the development of dermatological reactions in tattooed people. It should be mentioned that Serbian regulation for cosmetics and similar products doesn't define the maximum allowable level of nickel in tattoo products. European Resolution ResAP(2008)1 describes maximum allowed concentration of nickel as low as technically achievable.

### P4. "SAFER TATTOO" - SUPPORTING INFORMED DECISION-MAKING

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Consumer information is one of the pillars of consumer protection.

Expert groups encourage public information campaigns about the risks of tattooing (e.g. Resolution on requirements and criteria for the safety of tattoos and permanent make-up of the Council of Europe<sup>1</sup> and findings of the Consumer Safety Network Subgroup Tattoos and Permanent Make-up at the Joint Research Center<sup>2</sup>).

The consumer information campaign "Safer Tattoo" aims at supporting well-informed decision-making. We raise awareness of the risks of tattooing and give information on how they can be minimized. The campaign centers around the webpage "safer-tattoo.de". The main target group is the young population.

1. Council of Europe, Resolution (2008)1 on requirements and criteria for the safety of tattoos and permanent make-up, 2008
2. Paola Piccinini, Sazan Pakalin, Laura Contor, Ivana Bianchi, Chiara Senaldi; Safety of tattoos and permanent make-up. Final report; EUR 27947 EN; doi: 10.2788/011817

## P5. MEDICAL TATTOO: SOME EXAMPLES

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<sup>2</sup> *Health Technician, Cannes Hospital, France*

<sup>3</sup> *Tattooist, Antibes, France*

**Aim:** The purpose of this poster is to review the data available on medical tattoo and to show some examples of medical tattoo performed in France.

**Methods:** Review of the scientific and informal literature on the subject (MeshTerms: Burn, Tattoo, Dermography, Dermopigmentation).

**Results:** In recent years, tattoo became commonplace and number of tattooed individuals has increased significantly. Alongside these changes some patients become tattoo seekers on pathological skin. This practice is still marginal and unstructured.

Several studies show that damaged-skin camouflage is increasing quality of life for patients complaining about their physical aspect. However sometimes surgery is refused by patients. So it is important to propose other possibilities.

We present some tattoo performed on pathological skin.

**Conclusions:** Medical tattoo can be used in some skin pathology. Advantages as inconveniences has to be known by patients.

**References:** This work includes 37 bibliographical references.

## P6. MOTIVATION TO GET A TATTOO OR PIERCING. RESULT OF A BELGIAN QUESTIONNAIRE

Christa de Cuyper<sup>1</sup>, Beatrice Van De Maele<sup>1</sup>

<sup>1</sup> *Dermatology, Az Sint Jan, Brugge, Belgium*

**Aim:** To investigate the motivation to get a tattoo or piercing and the appreciation of the final result.

**Method:** A questionnaire was presented to 105 participants of 3 different groups: 36 prisoners, 37 visitors of a summer music festival and 32 patients of a dermatology out-clinic.

**Results:** The motivation to get a tattoo in the majority of the people was symbolic (mother, partner, children and non documented personal reasons). Zodiac signs being a popular motive.

If people had regret it was mostly because of the bad esthetic result due to poor quality tattooing, poor wound healing and surinfection after tattooing or piercing resulting in disfiguring scarring.

**Conclusions:** Tattoos often have a symbolic significance. To avoid disappointment and regret tattooing and piercing should be a well informed decision and be done in good hygienic circumstances by a trained body art professional.

## P7. ALLERGIC CONTACT DERMATITIS FROM AMINOAZOBENZENE IN TATTOO

Antonella Tammaro<sup>1</sup>, Flavia Pigliacelli<sup>1</sup>, Gabriella De Marco<sup>1</sup>, Severino Persechino<sup>1</sup>

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The tattoo phenomena is expanding rapidly among young people, all around the world: the process of tattooing involves the repetitive piercing of the skin with ink-filled needles, with the use of different types of pigment, like Azo ones. These azo-pigments are used for printing, painting of cars and staining of various consumer products. These pigments may contain titanium dioxide for lightening the shade, precursors and by-products of pigment synthesis, as well as diluents that are used for pigment suspension. We presented a clinical case of a 35 years old woman with 2 week history of itching allergic dermatitis presenting with heat, erythema and scaling appeared in the area of a colored tattoo on her shoulder 2 months after tattooing. Lesions were localized in the orange pigmented areas.

We did a Patch test of SIDAPA series that resulted negative. Special series F.I.R.M.A. for tattoo was positive for aminoazobenzene-p 0.25% (++2) and phenylenediamine base-p 1%. Aminoazobenzene cause orange pigment.

We performed local infiltration of triamcinolone acetonide, with temporary resolution of clinical manifestation

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