Case Study
An Unusual Case of Anti-JK3 Alloantibody and Implications for Pregnancy Management

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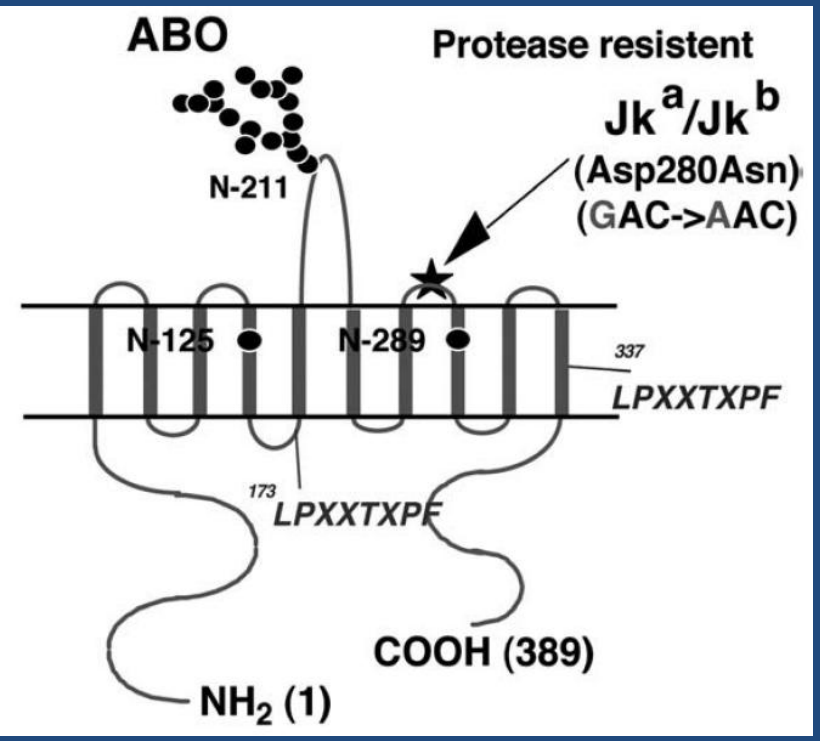
HAABB Meeting

April 20, 2016

Patient History

- 32 year old Caucasian woman from Mennonite community
- Recently moved to Columbia, MO from PA
- Presented to OB/GYN in Oct 2015 at approximately 21 weeks gestation
- 9 prior pregnancies with 4 1st trimester spontaneous abortions
- Known anti-Jk3, and anti-E from outside hospital record

Jk (Kidd) Antigen



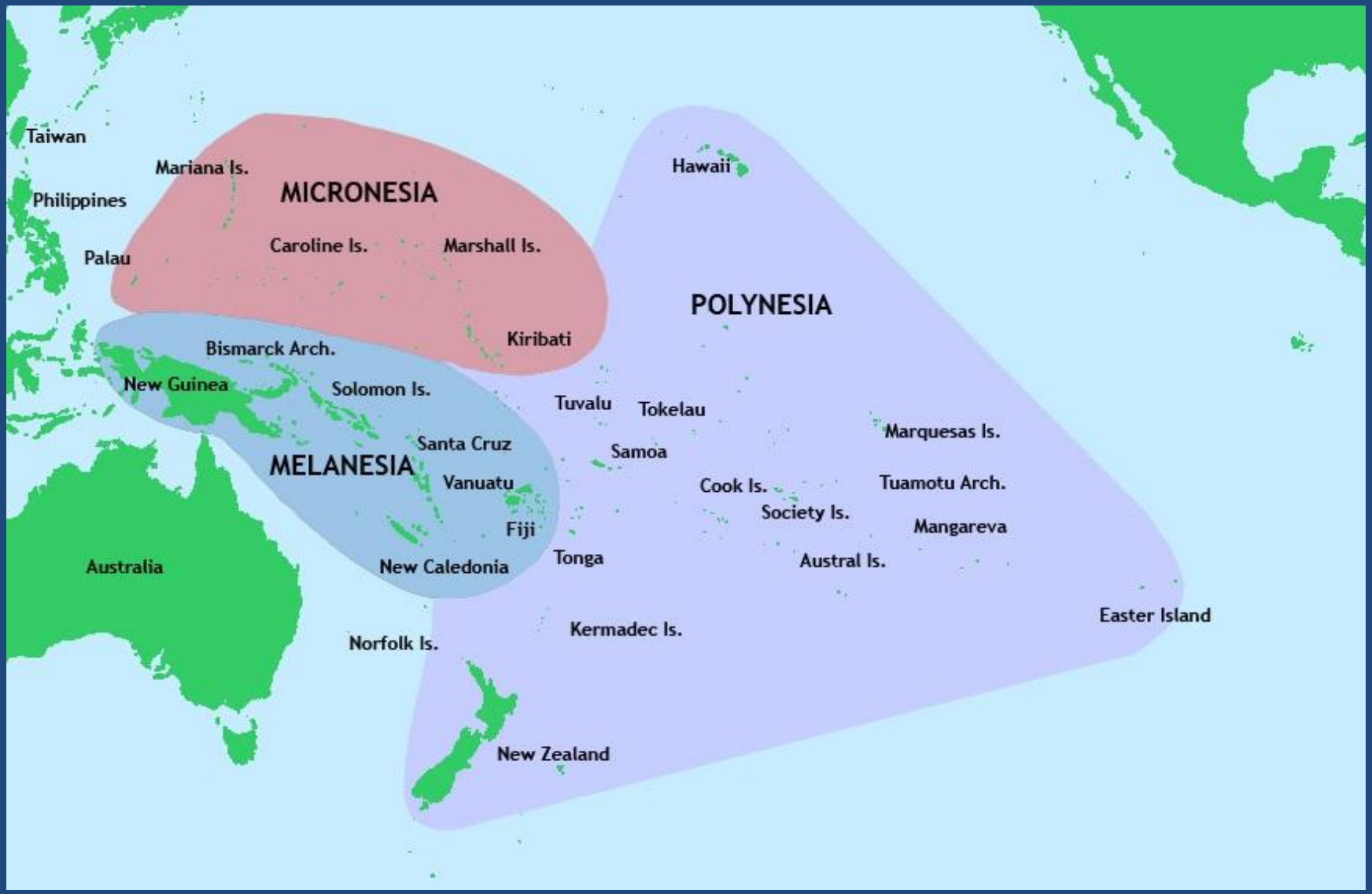
- Part of urea transporter on RBCs
  - Human urea transporter 11 (HUT11)
- Transports urea across cell membranes in the hypertonic renal medulla
  - Prevents cells from shrinking and swelling

Prevalence

	Frequency (%)		
Phenotype	Whites	Blacks	Asians
Jk(a+b-)	26	52	23
Jk(a+b+)	50	40	50
Jk(a-b+)	24	8	27
Jk(a-b-)	>0.1	>0.1	>0.1

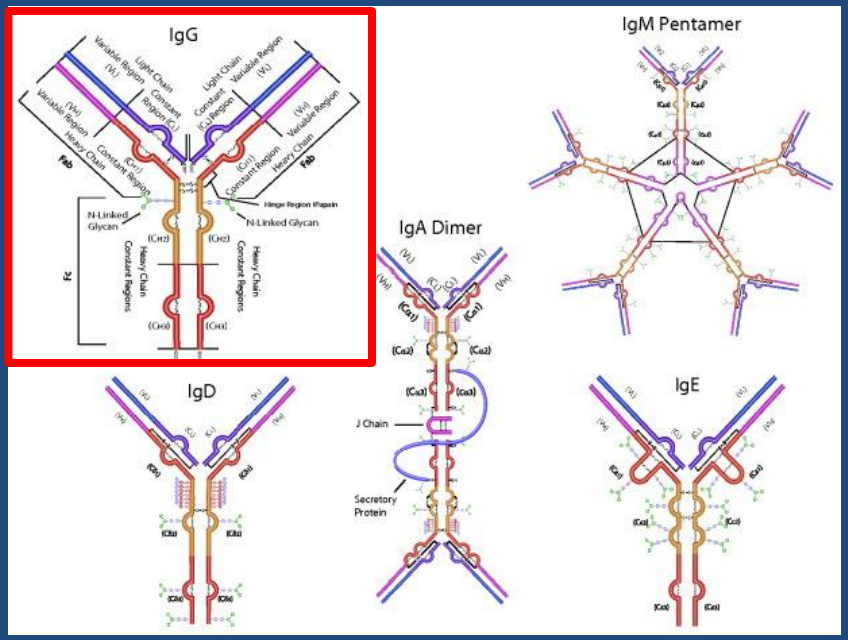
- Jk(a-b-) or null phenotype is rare
  - Discovered in 1959: antibody against both Jka and Jkb in a female patient
    - Called antibody anti-Jk3
  - Increased prevalence in Polynesians
    - 0.9% overall, 1.4% in Niueans
  - Increased prevalence in Finns
    - More rare than in Polynesians

Where is Polynesia?



Where is Niue?

Anti-Kidd Antibodies



- Found in antibody mixtures
- Mostly IgG
- About half are able to fix complement → extravascular/intravascular hemolysis
- Transient and exhibit dosage
- Common cause of delayed HTRs
  - Likely due to transient nature on detection
- Rarely cause acute HTRs

Anti-Kidd and HDFN

- Rarely cause severe HDFN
- Anti-Jka first described in 1951; detection of antibodies against unknown RBC antigen in Mrs. Kidd during pregnancy
  - Led to fatal HDFN
- As of 2012 there were only 13 reported cases of Anti-Jk3 related HDFN
  - Most were mild, rarely fatal
  - Not previously described in a Mennonite community

Back to the Patient

- Original panel: plasma reacted with all test cells – negative auto-control
  - Kidd antigens are essentially ubiquitous
- Sample sent to ARC reference lab for antibody identification
  - Serum initially reacted with all test cells
    - No reaction with Jk3 negative cells

Red Cell Phenotypes

- Mother
  - Type: O +
  - C +
  - Fya +
  - K1 +
  - c (little) –
  - E –
  - Jka –
  - Jkb –
- Father
  - Type: unknown
  - C –
  - Fya +
  - K1 –
  - c (little) +
  - E +
  - Jka +
  - Jkb +

Implications

- 100% chance of having a Kidd antigen
- At least a 50% chance of having E
  - HDFN may occur from anti-E alone, but usually mild
- RBCs needed for mother, baby once born, and possibly before delivery for intrauterine transfusion (IUT)
  - In a similar case in 2014 there were only 2 Jk3 negative frozen units available

Autologous Units

- The patient … rozen units at a private inst…
- Couldn't sh… to their use of a closed syste… APC 215)
- Good news… tended to 14 days from 2… closed system
- Bad news: 2-3 days for thawed units to arrive at our blood bank

Request at ARC

- Request placed with ARC for O positive Jka/Jkb/E/c (little) negative units
- For possible IUTs we preferred O neg units
  - Very difficult to find O neg/c (little) neg units
  - We settled for units that were O positive

Fisher-Race Haplotype	Wiener Haplotype	Prevalence (%)		
		White	Black	Asian
Dce	R_0	4	44	3
DCe	R_1	42	17	70
DcE	R_2	14	11	21
DCE	R_Z	<0.01	<0.01	1
ce	r	37	26	3
Ce	r'	2	2	2
cE	r''	1	<0.01	<0.01
CE	r^y	<0.01	<0.01	<0.01

Frozen Units

- 1 frozen unit was found in Hawaii
  - Personal escort was denied and the unit was flown to our ARC facility in St. Louis (2 hour drive away)
  - Expiration in 24 hours after thaw begins and several hours to get to us

Directed Donation by Family

- Tested siblings were all blood type A
- One sister was pregnant and not tested
- Father type A
- Mother type O
- None went in for antigen testing

Rare Donor Registry

- ARC located one appropriate donor in CA willing to donate a fresh unit
  - This donor actually works for the ARC
- We planned to collect unit in January for February due date

Timing

Unit Location	Status	Time To Arrive	Shelf Life Post Thaw
3 autologous units in PA	Frozen	2-3 days	14 days
1 unit in St. Louis	Frozen	7 hours	24 hours
1 possible unit in CA	Fresh	1-2 days	42 days

- Fresh units (≤ 7 days old) preferred for fetal/neonate transfusions
  - When to collect?

Complications

- Normally for IUT we wash units to increase HCT to 80%
  - We would not do this because then shelf life drops to 24 hours
- Irradiation
  - Required for units going to baby, but not mom
  - Shortens shelf life to 28 days
  - ARC irradiates units for us or emergency protocol in radiology
    - We chose to use our protocol when needed

More Problems

- In December, fetal ultrasounds became concerning for fetal anemia

- 12/18/15 fetal US PSV: 54.3 cm/s, 1.24 MoM
- 12/23/15 fetal US PSV: 65 cm/s, 1.43 MoM
- 12/30/15 fetal US PSV: 78.4 cm/s, 1.65 MoM

- On 12/23 we requested the fresh unit be collected to have on site for an emergency/possible urgent intrauterine transfusion

Birth

- OB/GYN elected for C-Section on 12/31 at 34 weeks due to more evidence of fetal anemia
- By then, we had 1 fresh unit on site
- Physician was uncomfortable with only 1 unit
  - We requested 1 autologous unit from PA 12/30
  - Arrived in 1 day, just before procedure
- Patient elected to have a tubal ligation

Outcome

- Procedure performed without transfusion
- Live male infant (2450 g, APGAR 6 at 1 min, 8 at 5 min) born with resuscitation performed by pediatrics
- Day of life 2, started on 2 banks of phototherapy (total bilirubin 7.9 mg/dL)
  - Discontinued 1 bank on DOL 5
  - Stopped on DOL 6 (total bilirubin 6.1)
- Autologous unit discarded
- Fresh unit released into general inventory
  - Fresh unit had passed the cutoff for freezing

Baby Screening

- Blood type: O positive
- DAT positive for IgG
- Pan-reactive eluate
- Cord blood cells type as E antigen positive
  - Presence/contribution to hemolytic anemia of anti-E undetermined due to pan-reactivity

Summary

- Very few reported cases of anti-Jk3 in pregnancy
- Most have been mild, requiring phototherapy
- This is another case supporting this trend
- Many facets of care to consider
  - Communication is key
  - With clinicians, patients, blood bank personnel, blood collection agency, etc.

Thank You!

References

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